INTRODUCTION TO PSYCHOLOGY



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Book: Introduction to Psychology (Jorden A. Cummings and Lee Sanders)

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CHAPTER OVERVIEW

1: Introducing Psychology

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1.1: Introduction

Charles Stangor and Jennifer Walinga

Psychology is the *scientific study of mind and behaviour*. The word “psychology” comes from the Greek words “psyche,” meaning *life*, and “logos,” meaning *explanation*. Psychology is a popular major for students, a popular topic in the public media, and a part of our everyday lives. Television shows such as *Dr. Phil* feature psychologists who provide personal advice to those with personal or family difficulties. Psychological television crime dramas such as *Cracked*, *Criminal Minds*, *Psyche*, *CSI*, and others feature the work of forensic psychologists who use psychological principles to help solve crimes. And many people have direct knowledge of psychology because they have visited psychologists, such as school counsellors, family therapists, and religious, marriage, or bereavement counsellors.

Because we are frequently exposed to the work of psychologists in our everyday lives, we all have an idea about what psychology is and what psychologists do. In many ways I am sure that your conceptions are correct. Psychologists do work in forensic fields, and they do provide counselling and therapy for people in distress. But there are hundreds of thousands of psychologists in the world, and most of them work in other places, doing work that you are probably not aware of.

Most psychologists work in research laboratories, hospitals, and other field settings where they study the behaviour of humans and animals. For instance, my colleagues in the Psychology Department at the University of Maryland study such diverse topics as anxiety in children, the interpretation of dreams, the effects of caffeine on thinking, how birds recognize each other, how praying mantises hear, how people from different cultures react differently in negotiation, and the factors that lead people to engage in terrorism. Other psychologists study topics such as alcohol and drug addiction, memory, emotion, hypnosis, love, what makes people aggressive or helpful, and the psychologies of politics, prejudice, culture, and religion. Psychologists also work in schools and businesses, and they use a variety of methods, including observation, questionnaires, interviews, and laboratory studies, to help them understand behaviour.

This chapter provides an introduction to the broad field of psychology and the many approaches that psychologists take to understanding human behaviour. We will consider how psychologists conduct scientific research, with an overview of some of the most important approaches used and topics studied by psychologists, and also consider the variety of fields in which psychologists work and the careers that are available to people with psychology degrees. I expect that you may find that at least some of your preconceptions about psychology will be challenged and changed, and you will learn that psychology is a field that will provide you with new ways of thinking about your own thoughts, feelings, and actions.



Figure 1.1 Psychology is in part the study of behaviour. Why do you think these people are behaving the way they are? [Long Description]

Image Attributions

Figure 1.1:

- “Friendly smoking” by Valentin Ottone (http://www.flickr.com/photos/saneboy/3595175373/) is licensed under CC BY 2.0.

- “At the beach” by Julian Schüngel (http://www.flickr.com/photos/medevac71/4468071278/) is licensed under CC BY-NC-ND 2.0.
- “Bar Trek and friends” by Jim H (http://www.flickr.com/photos/greyloc...n/photostream/) is licensed under CC BY-SA 2.0.
- “Physical therapist” by U.S. Navy photo (http://commons.wikimedia.org/wiki/Fi...erapy_trea.jpg) is in the public domain.
- “couple yelling at each other” by Vic (http://www.flickr.com/photos/5963256...n/photostream/) is licensed under CC BY 2.0.

Long Descriptions

Figure 1.1 long description: Five photos:

1. Man in hospital bed with broken leg; a soldier is lifting his leg as is if to give physical therapy.
2. Young girl smoking a cigarette.
3. A man doing a hand stand on a beach with sun setting in background.
4. A man and woman yelling at each other with their heads touching.
5. One man and four women dressed up like Star Trek characters and aliens.

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1.2: Psychology as a Science

Charles Stangor and Jennifer Walinga

Learning Objectives

- Explain why using our intuition about everyday behaviour is insufficient for a complete understanding of the causes of behaviour.
- Describe the difference between values and facts and explain how the scientific method is used to differentiate between the two.

Despite the differences in their interests, areas of study, and approaches, all psychologists have one thing in common: they rely on scientific methods. **Research psychologists** *use scientific methods to create new knowledge about the causes of behaviour*, whereas **psychologist-practitioners**, such as clinical, counselling, industrial-organizational, and school psychologists, *use existing research to enhance the everyday life of others*. The science of psychology is important for both researchers and practitioners.

In a sense all humans are scientists. We all have an interest in asking and answering questions about our world. We want to know why things happen, when and if they are likely to happen again, and how to reproduce or change them. Such knowledge enables us to predict our own behaviour and that of others. We may even collect **data** (i.e., *any information collected through formal observation or measurement*) to aid us in this undertaking. It has been argued that people are "everyday scientists" who conduct research projects to answer questions about behaviour (Nisbett & Ross, 1980). When we perform poorly on an important test, we try to understand what caused our failure to remember or understand the material and what might help us do better the next time. When our good friends Monisha and Charlie break up, despite the fact that they appeared to have a relationship made in heaven, we try to determine what happened. When we contemplate the rise of terrorist acts around the world, we try to investigate the causes of this problem by looking at the terrorists themselves, the situation around them, and others' responses to them.

The Problem of Intuition

The results of these "everyday" research projects can teach us many principles of human behaviour. We learn through experience that if we give someone bad news, he or she may blame us even though the news was not our fault. We learn that people may become depressed after they fail at an important task. We see that aggressive behaviour occurs frequently in our society, and we develop theories to explain why this is so. These insights are part of everyday social life. In fact, much research in psychology involves the scientific study of everyday behaviour (Heider, 1958; Kelley, 1967).

The problem, however, with the way people collect and interpret data in their everyday lives is that they are not always particularly thorough. Often, when one explanation for an event seems right, we adopt that explanation as the truth even when other explanations are possible and potentially more accurate. For example, eyewitnesses to violent crimes are often extremely confident in their identifications of the perpetrators of these crimes. But research finds that eyewitnesses are no less confident in their identifications when they are incorrect than when they are correct (Cutler & Wells, 2009; Wells & Hasel, 2008). People may also become convinced of the existence of extrasensory perception (ESP), or the predictive value of astrology, when there is no evidence for either (Gilovich, 1993). Furthermore, psychologists have also found that there are a variety of cognitive and motivational biases that frequently influence our perceptions and lead us to draw erroneous conclusions (Fiske & Taylor, 2007; Hsee & Hastie, 2006). In summary, accepting explanations for events without testing them thoroughly may lead us to think that we know the causes of things when we really do not.

Research Focus: Unconscious Preferences for the Letters of Our Own Name

A study reported in the *Journal of Consumer Research* (Brendl, Chattopadhyay, Pelham, & Carvallo, 2005) demonstrates the extent to which people can be unaware of the causes of their own behaviour. The research demonstrated that, at least under certain conditions (and although they do not know it), people frequently prefer brand names that contain the letters of their own name to brand names that do not contain the letters of their own name.

The research participants were recruited in pairs and were told that the research was a taste test of different types of tea. For each pair of participants, the experimenter created two teas and named them by adding the word stem "oki" to the first three

letters of each participant's first name. For example, for Jonathan and Elisabeth, the names of the teas would have been Jonoki and Elioki.

The participants were then shown 20 packets of tea that were supposedly being tested. Eighteen packets were labelled with made-up Japanese names (e.g., Mataku; Somuta), and two were labelled with the brand names constructed from the participants' names. The experimenter explained that each participant would taste only two teas and would be allowed to choose one packet of these two to take home.

One of the two participants was asked to draw slips of paper to select the two brands that would be tasted at this session. However, the drawing was rigged so that the two brands containing the participants' name stems were always chosen for tasting. Then, while the teas were being brewed, the participants completed a task designed to heighten their need for self-esteem, and that was expected to increase their desire to choose a brand that had the letters of their own name. Specifically, the participants all wrote about an aspect of themselves that they would like to change.

After the teas were ready, the participants tasted them and then chose to take a packet of one of the teas home with them. After they made their choice, the participants were asked why they chose the tea they had chosen, and then the true purpose of the study was explained to them.

The results of this study found that participants chose the tea that included the first three letters of their own name significantly more frequently (64% of the time) than they chose the tea that included the first three letters of their partner's name (only 36% of the time). Furthermore, the decisions were made unconsciously; the participants did not know why they chose the tea they chose. When they were asked, more than 90% of the participants thought that they had chosen on the basis of taste, whereas only 5% of them mentioned the real cause — that the brand name contained the letters of their name.

Once we learn about the outcome of a given event (e.g., when we read about the results of a research project), we frequently believe that we would have been able to predict the outcome ahead of time. For instance, if half of a class of students is told that research concerning attraction between people has demonstrated that "opposites attract" and the other half is told that research has demonstrated that "birds of a feather flock together," most of the students will report believing that the outcome that they just read about is true, and that they would have predicted the outcome before they had read about it. Of course, both of these contradictory outcomes cannot be true. (In fact, psychological research finds that "birds of a feather flock together" is generally the case.) The problem is that just reading a description of research findings leads us to think of the many cases we know that support the findings, and thus makes them seem believable. *The tendency to think that we could have predicted something that has already occurred that we probably would not have been able to predict* is called the **hindsight bias**.

Why Psychologists Rely on Empirical Methods

All scientists, whether they are physicists, chemists, biologists, sociologists, or psychologists, use *empirical methods* to study the topics that interest them. **Empirical methods** *include the processes of collecting and organizing data and drawing conclusions about those data*. The empirical methods used by scientists have developed over many years and provide a basis for collecting, analyzing, and interpreting data within a common framework in which information can be shared. We can label the **scientific method** as *the set of assumptions, rules, and procedures that scientists use to conduct empirical research*.

Although scientific research is an important method of studying human behaviour, not all questions can be answered using scientific approaches. Statements that cannot be objectively measured or objectively determined to be true or false are not within the domain of scientific inquiry. Scientists therefore draw a distinction between values and facts. *Values* are personal statements such as "Abortion should not be permitted in this country," "I will go to heaven when I die," or "It is important to study psychology." **Facts** are *objective statements determined to be accurate through empirical study*. Examples are "There were more than 21,000 homicides in Canada in 2009" or "Research demonstrates that individuals who are exposed to highly stressful situations over long periods of time develop more health problems than those who are not."

Because values cannot be considered to be either true or false, science cannot prove or disprove them. Nevertheless, as shown in Table 1.1, research can sometimes provide facts that can help people develop their values. For instance, science may be able to objectively measure the impact of unwanted children on a society or the psychological trauma suffered by women who have abortions. The effect of imprisonment on the crime rate in Canada may also be determinable. This factual information can and

should be made available to help people formulate their values about abortion and incarceration, as well as to enable governments to articulate appropriate policies. Values also frequently come into play in determining what research is appropriate or important to conduct. For instance, the Canadian government has recently increased funding for university research, designating $37 million annually to the three major research councils dealing with health, social science, and the sciences (Research Canada, 2014).

Table 1.1 Examples of Values and Facts in Scientific Research.

Personal value	Scientific fact
The environment should be protected.	The Canadian government has reduced environmental funding by $200 million but annually pays more than $1.4 billion in subsidies to the oil and gas industry.
Practical work experience helps to develop skilled workers.	More than $100 million for interest-free loans will be available in 2014 through the Canada Apprentice Loan program, an expansion of the Canada Student Loans Program.
Technology is increasingly necessary.	The federal government in Canada will invest $305 million over five years to extend high-speed broadband to some 280,000 homes in 2014.
It is important to quit smoking.	The Canadian government will raise the cost of cigarettes by more than $4 on a carton in 2014.
Source: Huffington Post, 2014.	

Although scientists use research to help establish facts, the distinction between values and facts is not always clear-cut. Sometimes statements that scientists consider to be factual turn out later, on the basis of further research, to be partially or even entirely incorrect. Although scientific procedures do not necessarily guarantee that the answers to questions will be objective and unbiased, science is still the best method for drawing objective conclusions about the world around us. When old facts are discarded, they are replaced with new facts based on newer and more correct data. Although science is not perfect, the requirements of empiricism and objectivity result in a much greater chance of producing an accurate understanding of human behaviour than is available through other approaches.

Levels of Explanation in Psychology

The study of psychology spans many different topics at many different **levels of explanation**, which are *the perspectives that are used to understand behaviour*. Lower levels of explanation are more closely tied to biological influences, such as genes, neurons, neurotransmitters, and hormones, whereas the middle levels of explanation refer to the abilities and characteristics of individual people, and the highest levels of explanation relate to social groups, organizations, and cultures (Cacioppo, Berntson, Sheridan, & McClintock, 2000).

The same topic can be studied within psychology at different levels of explanation, as shown in Table 1.2, “Levels of Explanation.” For instance, the psychological disorder known as **depression** affects millions of people worldwide and is known *to be caused by biological, social, and cultural factors*. Studying and helping alleviate depression can be accomplished at low levels of explanation by investigating how chemicals in the brain influence the experience of depression. This approach has allowed psychologists to develop and prescribe drugs, such as Prozac, which may decrease depression in many individuals (Williams, Simpson, Simpson, & Nahas, 2009). At the middle levels of explanation, psychological therapy is directed at helping individuals cope with negative life experiences that may cause depression. And at the highest level, psychologists study differences in the prevalence of depression between men and women and across cultures. The occurrence of psychological disorders, including depression, is substantially higher for women than for men, and it is also higher in Western cultures, such as in Canada, the United States, and Europe, than in Eastern cultures, such as in India, China, and Japan (Chen, Wang, Poland, & Lin, 2009; Seedat et al., 2009). These sex and cultural differences provide insight into the factors that cause depression. The study of depression in psychology helps remind us that no one level of explanation can explain everything. All levels of explanation, from biological to personal to cultural, are essential for a better understanding of human behaviour.

Table 1.2 Levels of Explanation

Level of Explanation	Underlying Process	Examples
Lower	Biological	• Depression is in part genetically influenced. • Depression is influenced by the action of neurotransmitters in the brain.
Middle	Interpersonal	• People who are depressed may interpret the events that occur to them too negatively. • Psychotherapy can be used to help people talk about and combat depression
Higher	Cultural and social	• Women experience more depression than do men. • The prevalence of depression varies across cultures and historical time periods.

The Challenges of Studying Psychology

Understanding and attempting to alleviate the costs of psychological disorders such as depression is not easy because psychological experiences are extremely complex. The questions psychologists pose are as difficult as those posed by doctors, biologists, chemists, physicists, and other scientists, if not more so (Wilson, 1998).

A major goal of psychology is to predict behaviour by understanding its causes. Making predictions is difficult, in part because people vary and respond differently in different situations. **Individual differences** are *the variations among people on physical or psychological dimensions.* For instance, although many people experience at least some symptoms of depression at some times in their lives, the experience varies dramatically among people. Some people experience major negative events, such as severe physical injuries or the loss of significant others, without experiencing much depression, whereas other people experience severe depression for no apparent reason. Other important individual differences that we will discuss in the chapters to come include differences in extraversion, intelligence, self-esteem, anxiety, aggression, and conformity.

Because of the many individual difference variables that influence behaviour, we cannot always predict who will become aggressive or who will perform best in graduate school or on the job. The predictions made by psychologists (and most other scientists) are only probabilistic. We can say, for instance, that people who score higher on an intelligence test will, on average, do better than people who score lower on the same test, but we cannot make very accurate predictions about exactly how any one person will perform.

Another reason that it is difficult to predict behaviour is that almost all behaviour is **multiply determined**, or *produced by many factors*. And these factors occur at different levels of explanation. We have seen, for instance, that depression is caused by lower-level genetic factors, by medium-level personal factors, and by higher-level social and cultural factors. You should always be skeptical about people who attempt to explain important human behaviours, such as violence, child abuse, poverty, anxiety, or depression, in terms of a single cause.

Furthermore, these multiple causes are not independent of one another; they are associated such that when one cause is present, other causes tend to be present as well. This overlap makes it difficult to pinpoint which cause or causes are operating. For instance, some people may be depressed because of biological imbalances in neurotransmitters in their brain. The resulting depression may lead them to act more negatively toward other people around them, which then leads those other people to respond more negatively to them, which then increases their depression. As a result, the biological determinants of depression become intertwined with the social responses of other people, making it difficult to disentangle the effects of each cause.

Another difficulty in studying psychology is that much human behaviour is caused by factors that are outside our conscious awareness, making it impossible for us, as individuals, to really understand them. The role of unconscious processes was emphasized in the theorizing of the Austrian neurologist Sigmund Freud (1856-1939), who argued that many psychological

disorders were caused by memories that we have **repressed** and thus *remain outside our consciousness*. Unconscious processes will be an important part of our study of psychology, and we will see that current research has supported many of Freud's ideas about the importance of the unconscious in guiding behaviour.

Key Takeaways

- Psychology is the scientific study of mind and behaviour.
- Though it is easy to think that everyday situations have commonsense answers, scientific studies have found that people are not always as good at predicting outcomes as they think they are.
- The hindsight bias leads us to think that we could have predicted events that we actually could not have predicted.
- People are frequently unaware of the causes of their own behaviours.
- Psychologists use the scientific method to collect, analyze, and interpret evidence.
- Employing the scientific method allows the scientist to collect empirical data objectively, which adds to the accumulation of scientific knowledge.
- Psychological phenomena are complex, and making predictions about them is difficult because of individual differences and because they are multiply determined at different levels of explanation.

Exercises and Critical Thinking

1. Can you think of a time when you used your intuition to analyze an outcome, only to be surprised later to find that your explanation was completely incorrect? Did this surprise help you understand how intuition may sometimes lead us astray?
2. Describe the scientific method in a way that someone who knows nothing about science could understand it.
3. Consider a behaviour that you find to be important and think about its potential causes at different levels of explanation. How do you think psychologists would study this behaviour?

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1.3: The Evolution of Psychology- History, Approaches, and Questions

Charles Stangor and Jennifer Walinga

Learning Objectives

- Explain how psychology changed from a philosophical to a scientific discipline.
- List some of the most important questions that concern psychologists.
- Outline the basic schools of psychology and how each school has contributed to psychology.

In this section we will review the history of psychology with a focus on the important questions that psychologists ask and the major approaches (or schools) of psychological inquiry. The schools of psychology that we will review are summarized in Table 1.3, "The Most Important Approaches (Schools) of Psychology," while Table 1.4, "History of Psychology," presents a timeline of some of the most important psychologists, beginning with the early Greek philosophers and extending to the present day. Table 1.3 and Table 1.4 both represent a selection of the most important schools and people; to mention all the approaches and all the psychologists who have contributed to the field is not possible in one chapter. The approaches that psychologists have used to assess the issues that interest them have changed dramatically over the history of psychology. Perhaps most importantly, the field has moved steadily from speculation about behaviour toward a more objective and scientific approach as the technology available to study human behaviour has improved (Benjamin & Baker, 2004). There has also been an influx of women into the field. Although most early psychologists were men, now most psychologists, including the presidents of the most important psychological organizations, are women.

Table 1.3 The Most Important Approaches (Schools) of Psychology.

School of Psychology	Description	Important Contributors
Structuralism	Uses the method of introspection to identify the basic elements or "structures" of psychological experience	Wilhelm Wundt, Edward B. Titchener
Functionalism	Attempts to understand why animals and humans have developed the particular psychological aspects that they currently possess	William James
Psychodynamic	Focuses on the role of our unconscious thoughts, feelings, and memories and our early childhood experiences in determining behaviour	Sigmund Freud, Carl Jung, Alfred Adler, Erik Erickson
Behaviourism	Based on the premise that it is not possible to objectively study the mind, and therefore that psychologists should limit their attention to the study of behaviour itself	John B. Watson, B. F. Skinner
Cognitive	The study of mental processes, including perception, thinking, memory, and judgments	Hermann Ebbinghaus, Sir Frederic Bartlett, Jean Piaget
Social-cultural	The study of how the social situations and the cultures in which people find themselves influence thinking and behaviour	Fritz Heider, Leon Festinger, Stanley Schachter

Although most of the earliest psychologists were men, women are increasingly contributing to psychology. Here are some examples:

- 1968: Mary Jean Wright became the first woman president of the Canadian Psychological Association.
- 1970: Virginia Douglas became the second woman president of the Canadian Psychological Association.
- 1972: The Underground Symposium was held at the Canadian Psychological Association Convention. After having their individual papers and then a symposium rejected by the Program Committee, a group of six graduate students and non-tenured faculty, including Sandra Pyke and Esther Greenglass, held an independent research symposium that showcased work being done in the field of the psychology of women.
- 1976: The Canadian Research Institute for the Advancement of Women was founded.
- 1987: Janet Stoppard led the Women and Mental Health Committee of the Canadian Mental Health Association.

Although it cannot capture every important psychologist, the following timeline shows some of the most important contributors to the history of psychology. (Adapted by J. Walinga.)

Table 1.4 History of Psychology.

Date	Psychologist(s)	Description
428 to 347 BCE	Plato	Greek philosopher who argued for the role of nature in psychological development.
384 to 432 BCE	Aristotle	Greek philosopher who argued for the role of nurture in psychological development.
1588 to 1679 CE	Thomas Hobbes	English philosopher.
1596 to 1650	René Descartes	French philosopher.
1632 to 1704	John Locke	English philosopher.
1712 to 1778	Jean-Jacques Rousseau	French philosopher.
1801 to 1887	Gustav Fechner	German experimental psychologist who developed the idea of the “just noticeable difference” (JND), which is considered to be the first empirical psychological measurement.
1809 to 1882	Charles Darwin	British naturalist whose theory of natural selection influenced the functionalist school and the field of evolutionary psychology.
1832 to 1920	Wilhelm Wundt	German psychologist who opened one of the first psychology laboratories and helped develop the field of structuralism.
1842 to 1910	William James	American psychologist who opened one of the first psychology laboratories and helped develop the field of functionalism.
1849 to 1936	Ivan Pavlov	Russian psychologist whose experiments on learning led to the principles of classical conditioning.
1850 to 1909	Hermann Ebbinghaus	German psychologist who studied the ability of people to remember lists of nonsense syllables under different conditions.
1856 to 1939	Sigmund Freud	Austrian psychologist who founded the field of psychodynamic psychology.
1867 to 1927	Edward Bradford Titchener	American psychologist who contributed to the field of structuralism.
1878 to 1958	John B. Watson	American psychologist who contributed to the field of behavioralism.
1886 to 1969	Sir Frederic Bartlett	British psychologist who studied the cognitive and social processes of remembering.
1896 to 1980	Jean Piaget	Swiss psychologist who developed an important theory of cognitive development in children.
1904 to 1990	B. F. Skinner	American psychologist who contributed to

Date	Psychologist(s)	Description
		the school of behaviourism.
1926 to 1993	Donald Broadbent	British cognitive psychologist who was pioneer in the study of attention.
20th and 21st centuries	Linda Bartoshuk; Daniel Kahneman; Elizabeth Loftus; Geroge Miller.	American psychologists who contributed to the cognitive school of psychology by studying learning, memory, and judgment. An important contribution is the advancement of the field of neuroscience. Daniel Kahneman won the Nobel Prize in Economics for his work on psychological decision making.
1850	Dorothea Dix	Canadian psychologist known for her contributions to mental health and opened one of the first mental hospitals in Halifax, New Brunswick.
1880	William Lyall; James Baldwin	Canadian psychologists who wrote early psychology texts and created first Canadian psychology lab at the University of Toronto.
1950	James Olds; Brenda Milner; Wilder Penfield; Donald Hebb; Endel Telving	Canadian psychologists who contributed to neurological psychology and opened the Montreal Neurological Institute.
1960	Albert Bandura	Canadian psychologist who developed 'social learning theory' with his Bobo doll studies illustrating the impact that observation and interaction has on learning.
1970	Hans Selye	Canadian psychologist who contributed significantly in the area of psychology of stress.

Although psychology has changed dramatically over its history, the most important questions that psychologists address have remained constant. Some of these questions follow, and we will discuss them both in this chapter and in the chapters to come:

- *Nature versus nurture.* Are genes or environment most influential in determining the behaviour of individuals and in accounting for differences among people? Most scientists now agree that both genes and environment play crucial roles in most human behaviours, and yet we still have much to learn about how nature (our biological makeup) and nurture (the experiences that we have during our lives) work together (Harris, 1998; Pinker, 2002). *The proportion of the observed differences of characteristics among people (e.g., in terms of their height, intelligence, or optimism) that is due to genetics* is known as the **heritability of the characteristic**, and we will make much use of this term in the chapters to come. We will see, for example, that the heritability of intelligence is very high (about .85 out of 1.0) and that the heritability of extraversion is about .50. But we will also see that nature and nurture interact in complex ways, making the question "Is it nature or is it nurture?" very difficult to answer.
- *Free will versus determinism.* This question concerns the extent to which people have control over their own actions. Are we the products of our environment, guided by forces out of our control, or are we able to choose the behaviours we engage in? Most of us like to believe in free will, that we are able to do what we want—for instance, that we could get up right now and go fishing. And our legal system is premised on the concept of free will; we punish criminals because we believe that they have choice over their behaviours and freely choose to disobey the law. But as we will discuss later in the research focus in this

section, recent research has suggested that we may have less control over our own behaviour than we think we do (Wegner, 2002).

- *Accuracy versus inaccuracy.* To what extent are humans good information processors? Although it appears that people are good enough to make sense of the world around them and to make decent decisions (Fiske, 2003), they are far from perfect. Human judgment is sometimes compromised by inaccuracies in our thinking styles and by our motivations and emotions. For instance, our judgment may be affected by our desires to gain material wealth and to see ourselves positively and by emotional responses to the events that happen to us. Many studies have explored decision making in crisis situations such as natural disasters, or human error or criminal action, such as in the cases of the Tylenol poisoning, the Maple Leaf meats listeriosis outbreak, the SARS epidemic or the Lac-Mégantic train derailment (Figure 1.2).



Figure 1.2 Lac-Mégantic Derailment. Psychologists study the causes of poor judgments such as those made by executives like the three criminally charged in relation to the Lac-Mégantic train derailment in 2013. This picture was taken from a Sûreté du Québec helicopter on the day of the derailment.

- *Conscious versus unconscious processing.* To what extent are we conscious of our own actions and the causes of them, and to what extent are our behaviours caused by influences that we are not aware of? Many of the major theories of psychology, ranging from the Freudian psychodynamic theories to contemporary work in cognitive psychology, argue that much of our behaviour is determined by variables that we are not aware of.
- *Differences versus similarities.* To what extent are we all similar, and to what extent are we different? For instance, are there basic psychological and personality differences between men and women, or are men and women by and large similar? And what about people from different ethnicities and cultures? Are people around the world generally the same, or are they influenced by their backgrounds and environments in different ways? Personality, social, and cross-cultural psychologists attempt to answer these classic questions.

Early Psychologists

The earliest psychologists that we know about are the Greek philosophers Plato (428-347 BC) and Aristotle (384-322 BC). These philosophers (see Figure 1.3) asked many of the same questions that today's psychologists ask; for instance, they questioned the distinction between nature and nurture and the existence of free will. In terms of the former, Plato argued on the nature side, believing that certain kinds of knowledge are innate or inborn, whereas Aristotle was more on the nurture side, believing that each child is born as an "empty slate" (in Latin, a *tabula rasa*) and that knowledge is primarily acquired through learning and experience.

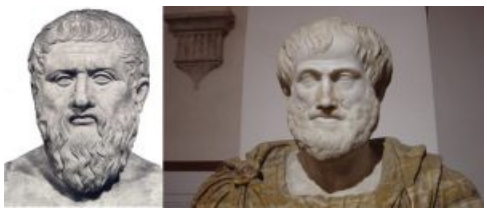


Figure 1.3 Early Psychologists. The earliest psychologists were the Greek Philosophers Plato (left) and Aristotle (right). Plato believed that much knowledge was innate, whereas Aristotle thought that each child was born as an "empty slate" and that knowledge was primarily acquired through learning and experience.

European philosophers continued to ask these fundamental questions during the Renaissance. For instance, the French philosopher René Descartes (1596-1650) also considered the issue of free will, arguing in its favour and believing that the mind controls the body through the pineal gland in the brain (an idea that made some sense at the time but was later proved incorrect). Descartes also believed in the existence of innate natural abilities. A scientist as well as a philosopher, Descartes dissected animals and was among the first to understand that the nerves controlled the muscles. He also addressed the relationship between mind (the mental aspects of life) and body (the physical aspects of life). Descartes believed in the principle of **dualism**: *that the mind is fundamentally different from the mechanical body*. Other European philosophers, including Thomas Hobbes (1588-1679), John Locke (1632-1704), and Jean-Jacques Rousseau (1712-1778), also weighed in on these issues. The fundamental problem that these philosophers faced was that they had few methods for settling their claims. Most philosophers didn't conduct any research on these questions, in part because they didn't yet know how to do it, and in part because they weren't sure it was even possible to objectively study human experience. But dramatic changes came during the 1800s with the help of the first two research psychologists: the German psychologist Wilhelm Wundt (1832-1920), who developed a psychology laboratory in Leipzig, Germany, and the American psychologist William James (1842-1910), who founded a psychology laboratory at Harvard University.

Structuralism: Introspection and the Awareness of Subjective Experience

Wundt's research in his laboratory in Leipzig focused on the nature of consciousness itself. Wundt and his students believed that it was possible to analyze the basic elements of the mind and to classify our conscious experiences scientifically. Wundt began the field known as **structuralism**, *a school of psychology whose goal was to identify the basic elements or structures of psychological experience*. Its goal was to create a periodic table of the elements of sensations, similar to the periodic table of elements that had recently been created in chemistry. Structuralists used the method of *introspection* to attempt to create a map of the elements of consciousness. **Introspection** involves *asking research participants to describe exactly what they experience as they work on mental tasks*, such as viewing colours, reading a page in a book, or performing a math problem. A participant who is reading a book might report, for instance, that he saw some black and coloured straight and curved marks on a white background. In other studies the structuralists used newly invented reaction time instruments to systematically assess not only what the participants were thinking but how long it took them to do so. Wundt discovered that it took people longer to report what sound they had just heard than to simply respond that they had heard the sound. These studies marked the first time researchers realized that there is a difference between the *sensation* of a stimulus and the *perception* of that stimulus, and the idea of using reaction times to study mental events has now become a mainstay of cognitive psychology.



Figure 1.4 Wundt and Titchener. Wilhelm Wundt (seated at left) and Edward Titchener (right) helped create the structuralist school of psychology. Their goal was to classify the elements of sensation through introspection.

Perhaps the best known of the structuralists was Edward Bradford Titchener (1867-1927). Titchener was a student of Wundt's who came to the United States in the late 1800s and founded a laboratory at Cornell University (Figure 1.4). (Titchener was later rejected by McGill University (1903). Perhaps he was ahead of his time; Brenda Milner did not open the Montreal Neurological Institute until 1950.) In his research using introspection, Titchener and his students claimed to have identified more than 40,000 sensations, including those relating to vision, hearing, and taste. An important aspect of the structuralist approach was that it was rigorous and scientific. The research marked the beginning of psychology as a science, because it demonstrated that mental events could be quantified. But the structuralists also discovered the limitations of introspection. Even highly trained research participants were often unable to report on their subjective experiences. When the participants were asked to do simple math problems, they could easily do them, but they could not easily answer how they did them. Thus the structuralists were the first to realize the importance of unconscious processes—that many important aspects of human psychology occur outside our conscious awareness, and that psychologists cannot expect research participants to be able to accurately report on all of their experiences.

Functionalism and Evolutionary Psychology

In contrast to Wundt, who attempted to understand the nature of consciousness, William James and the other members of the **school of functionalism** aimed *to understand why animals and humans have developed the particular psychological aspects that they currently possess* (Hunt, 1993). For James, one's thinking was relevant only to one's behaviour. As he put it in his psychology textbook, "My thinking is first and last and always for the sake of my doing" (James, 1890). James and the other members of the functionalist school (Figure 1.5) were influenced by Charles Darwin's (1809-1882) **theory of natural selection**, which *proposed that the physical characteristics of animals and humans evolved because they were useful, or functional*. The functionalists believed that Darwin's theory applied to psychological characteristics too. Just as some animals have developed strong muscles to allow them to run fast, the human brain, so functionalists thought, must have adapted to serve a particular function in human experience.

Figure 1.5 Functionalist School. The functionalist school of psychology, founded by the American psychologist William James (left), was influenced by the work of Charles Darwin (right).

Although functionalism no longer exists as a school of psychology, its basic principles have been absorbed into psychology and continue to influence it in many ways. The work of the functionalists has developed into the field of **evolutionary psychology**, *a branch of psychology that applies the Darwinian theory of natural selection to human and animal behaviour* (Dennett, 1995; Tooby & Cosmides, 1992). Evolutionary psychology accepts the functionalists' basic assumption, namely that many human psychological systems, including memory, emotion, and personality, serve key adaptive functions. As we will see in the chapters to come, evolutionary psychologists use evolutionary theory to understand many different behaviours, including romantic attraction, stereotypes and prejudice, and even the causes of many psychological disorders. A key component of the ideas of evolutionary psychology is *fitness*. **Fitness** refers to *the extent to which having a given characteristic helps the individual organism survive and reproduce at a higher rate than do other members of the species who do not have the characteristic*. Fitter organisms pass on their genes more successfully to later generations, making the characteristics that produce fitness more likely to become part of the organism's nature than characteristics that do not produce fitness. For example, it has been argued that the emotion of jealousy has survived over time in men because men who experience jealousy are more fit than men who do not. According to this idea, the experience of jealousy leads men to be more likely to protect their mates and guard against rivals, which increases their reproductive success (Buss, 2000). Despite its importance in psychological theorizing, evolutionary psychology also has some limitations. One problem is that many of its predictions are extremely difficult to test. Unlike the fossils that are used to learn about the physical evolution of species, we cannot know which psychological characteristics our ancestors possessed or did not possess; we can only make guesses about this. Because it is difficult to directly test evolutionary theories, it is always possible that the explanations we apply are made up after the fact to account for observed data (Gould & Lewontin, 1979). Nevertheless, the evolutionary approach is important to psychology because it provides logical explanations for why we have many psychological characteristics.

Psychodynamic Psychology

Perhaps the school of psychology that is most familiar to the general public is the *psychodynamic approach* to understanding behaviour, which was championed by Sigmund Freud (1856-1939) and his followers. **Psychodynamic psychology** is an *approach to understanding human behaviour that focuses on the role of unconscious thoughts, feelings, and memories*. Freud (Figure 1.6) developed his theories about behaviour through extensive analysis of the patients that he treated in his private clinical practice.

Freud believed that many of the problems that his patients experienced, including anxiety, depression, and sexual dysfunction, were the result of the effects of painful childhood experiences that they could no longer remember.

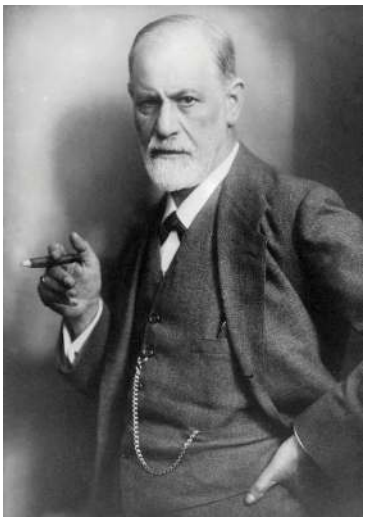


Figure 1.6 Sigmund Freud. Sigmund Freud and the other psychodynamic psychologists believed that many of our thoughts and emotions are unconscious. Psychotherapy was designed to help patients recover and confront their "lost" memories.

Freud's ideas were extended by other psychologists whom he influenced, including Carl Jung (1875-1961), Alfred Adler (1870-1937), Karen Horney (1855-1952), and Erik Erikson (1902-1994). These and others who follow the psychodynamic approach believe that it is possible to help the patient if the unconscious drives can be remembered, particularly through a deep and thorough exploration of the person's early sexual experiences and current sexual desires. These explorations are *revealed through talk therapy and dream analysis in a process called* **psychoanalysis**. The founders of the school of psychodynamics were primarily practitioners who worked with individuals to help them understand and confront their psychological symptoms. Although they did not conduct much research on their ideas, and although later, more sophisticated tests of their theories have not always supported their proposals, psychodynamics has nevertheless had substantial impact on the field of psychology, and indeed on thinking about human behaviour more generally (Moore & Fine, 1995). The importance of the unconscious in human behaviour, the idea that early childhood experiences are critical, and the concept of therapy as a way of improving human lives are all ideas that are derived from the psychodynamic approach and that remain central to psychology.

Behaviourism and the Question of Free Will

Although they differed in approach, both structuralism and functionalism were essentially studies of the mind. The psychologists associated with the school of *behaviourism*, on the other hand, were reacting in part to the difficulties psychologists encountered when they tried to use introspection to understand behaviour. **Behaviourism** is *a school of psychology that is based on the premise that it is not possible to objectively study the mind, and therefore that psychologists should limit their attention to the study of behaviour itself*. Behaviourists believe that the human mind is a black box into which stimuli are sent and from which responses are received. They argue that there is no point in trying to determine what happens in the box because we can successfully predict behaviour without knowing what happens inside the mind. Furthermore, behaviourists believe that it is possible to develop laws of learning that can explain all behaviours. The first behaviourist was the American psychologist John B. Watson (1878-1958). Watson was influenced in large part by the work of the Russian physiologist Ivan Pavlov (1849-1936), who had discovered that dogs would salivate at the sound of a tone that had previously been associated with the presentation of food. Watson and the other behaviourists began to use these ideas to explain how events that people and other organisms experienced in their environment (*stimuli*) could produce specific behaviours (*responses*). For instance, in Pavlov's research the *stimulus* (either the food or, after learning, the tone) would produce the *response* of salivation in the dogs. In his research Watson found that systematically exposing a child to fearful stimuli in the presence of objects that did not themselves elicit fear could lead the child to respond with a fearful behaviour to the presence of the objects (Watson & Rayner, 1920; Beck, Levinson, & Irons, 2009). In the best known of his studies, an eight-month-old boy named Little Albert was used as the subject. Here is a summary of the findings: The boy was placed in the middle of a room; a white laboratory rat was placed near him and he was allowed to play with it. The child showed no fear of the

rat. In later trials, the researchers made a loud sound behind Albert's back by striking a steel bar with a hammer whenever the baby touched the rat. The child cried when he heard the noise. After several such pairings of the two stimuli, the child was again shown the rat. Now, however, he cried and tried to move away from the rat. In line with the behaviourist approach, the boy had learned to associate the white rat with the loud noise, resulting in crying.

Figure 1.7 Skinner. B. F. Skinner was a member of the behaviourist school of psychology. He argued that free will is an illusion and that all behaviour is determined by environmental factors.

The most famous behaviourist was Burrhus Frederick (B. F.) Skinner (1904 to 1990), who expanded the principles of behaviourism and also brought them to the attention of the public at large. Skinner (Figure 1.7) used the ideas of stimulus and response, along with the application of rewards or *reinforcements*, to train pigeons and other animals. And he used the general principles of behaviourism to develop theories about how best to teach children and how to create societies that were peaceful and productive. Skinner even developed a method for studying thoughts and feelings using the behaviourist approach (Skinner, 1957, 1972).

Research Focus: Do We Have Free Will?

The behaviourist research program had important implications for the fundamental questions about nature and nurture and about free will. In terms of the nature-nurture debate, the behaviourists agreed with the nurture approach, believing that we are shaped exclusively by our environments. They also argued that there is no free will, but rather that our behaviours are determined by the events that we have experienced in our past. In short, this approach argues that organisms, including humans, are a lot like puppets in a show who don't realize that other people are controlling them. Furthermore, although we do not cause our own actions, we nevertheless believe that we do because we don't realize all the influences acting on our behaviour.

Recent research in psychology has suggested that Skinner and the behaviourists might well have been right, at least in the sense that we overestimate our own free will in responding to the events around us (Libet, 1985; Matsuhashi & Hallett, 2008; Wegner, 2002). In one demonstration of the misperception of our own free will, neuroscientists Soon, Brass, Heinze, and Haynes (2008) placed their research participants in a *functional magnetic resonance imaging (fMRI)* brain scanner while they presented them with a series of letters on a computer screen. The letter on the screen changed every half second. The participants were asked, whenever they decided to, to press either of two buttons. Then they were asked to indicate which letter was showing on the screen when they decided to press the button. The researchers analyzed the brain images to see if they could predict which of the two buttons the participant was going to press, even before the letter at which he or she had indicated the decision to press a button. Suggesting that the intention to act occurred in the brain before the research participants became aware of it, the researchers found that the prefrontal cortex region of the brain showed activation that could be used to predict the button pressed as long as 10 seconds before the participants said that they had decided which button to press.

Research has found that we are more likely to think that we control our behaviour when the desire to act occurs immediately prior to the outcome, when the thought is consistent with the outcome, and when there are no other apparent causes for the behaviour. Aarts, Custers, and Wegner (2005) asked their research participants to control a rapidly moving square along with a computer that was also controlling the square independently. The participants pressed a button to stop the movement. When participants were exposed to words related to the location of the square just before they stopped its movement, they became

more likely to think that they controlled the motion, even when it was actually the computer that stopped it. And Dijksterhuis, Preston, Wegner, and Aarts (2008) found that participants who had just been exposed to first-person singular pronouns, such as "I" and "me," were more likely to believe that they controlled their actions than were people who had seen the words "computer" or "God." The idea that we are more likely to take ownership for our actions in some cases than in others is also seen in our attributions for success and failure. Because we normally expect that our behaviours will be met with success, when we are successful we easily believe that the success is the result of our own free will. When an action is met with failure, on the other hand, we are less likely to perceive this outcome as the result of our free will, and we are more likely to blame the outcome on luck or our teacher (Wegner, 2003).

The behaviourists made substantial contributions to psychology by identifying the principles of learning. Although the behaviourists were incorrect in their beliefs that it was not possible to measure thoughts and feelings, their ideas provided new ideas that helped further our understanding regarding the nature-nurture debate and the question of free will. The ideas of behaviourism are fundamental to psychology and have been developed to help us better understand the role of prior experiences in a variety of areas of psychology.

The Cognitive Approach and Cognitive Neuroscience

Science is always influenced by the technology that surrounds it, and psychology is no exception. Thus it is no surprise that beginning in the 1960s, growing numbers of psychologists began to think about the brain and about human behaviour in terms of the computer, which was being developed and becoming publicly available at that time. The analogy between the brain and the computer, although by no means perfect, provided part of the impetus for a new school of psychology called *cognitive psychology*. **Cognitive psychology** is *a field of psychology that studies mental processes, including perception, thinking, memory, and judgment*. These actions correspond well to the processes that computers perform. Although cognitive psychology began in earnest in the 1960s, earlier psychologists had also taken a cognitive orientation. Some of the important contributors to cognitive psychology include the German psychologist Hermann Ebbinghaus (1850-1909), who studied the ability of people to remember lists of words under different conditions, and the English psychologist Sir Frederic Bartlett (1886-1969), who studied the cognitive and social processes of remembering. Bartlett created short stories that were in some ways logical but also contained some very unusual and unexpected events. Bartlett discovered that people found it very difficult to recall the stories exactly, even after being allowed to study them repeatedly, and he hypothesized that the stories were difficult to remember because they did not fit the participants' expectations about how stories should go. The idea that our memory is influenced by what we already know was also a major idea behind the cognitive-developmental stage model of Swiss psychologist Jean Piaget (1896-1980). Other important cognitive psychologists include Donald E. Broadbent (1926-1993), Daniel Kahneman (1934-), George Miller (1920-2012), Eleanor Rosch (1938-), and Amos Tversky (1937-1996).

The War of the Ghosts

The War of the Ghosts is a story that was used by Sir Frederic Bartlett to test the influence of prior expectations on memory. Bartlett found that even when his British research participants were allowed to read the story many times, they still could not remember it well, and he believed this was because it did not fit with their prior knowledge. One night two young men from Egulac went down to the river to hunt seals, and while they were there it became foggy and calm. Then they heard war-cries, and they thought: "Maybe this is a war-party." They escaped to the shore, and hid behind a log. Now canoes came up, and they heard the noise of paddles and saw one canoe coming up to them. There were five men in the canoe, and they said: "What do you think? We wish to take you along. We are going up the river to make war on the people." One of the young men said, "I have no arrows." "Arrows are in the canoe," they said. "I will not go along. I might be killed. My relatives do not know where I have gone. But you," he said, turning to the other, "may go with them." So one of the young men went, but the other returned home. And the warriors went on up the river to a town on the other side of Kalama. The people came down to the water and they began to fight, and many were killed. But presently the young man heard one of the warriors say, "Quick, let us go home: that Indian has been hit." Now he thought: "Oh, they are ghosts." He did not feel sick, but they said he had been shot. So the canoes went back to Egulac and the young man went ashore to his house and made a fire. And he told everybody and said: "Behold I accompanied the ghosts, and we went to fight. Many of our fellows were killed, and many of those who attacked us were killed. They said I was hit, and I did not feel sick." He told it all, and then he became quiet. When the sun rose he fell

> down. Something black came out of his mouth. His face became contorted. The people jumped up and cried. He was dead. (Bartlett, 1932)

In its argument that our thinking has a powerful influence on behaviour, the cognitive approach provided a distinct alternative to behaviourism. According to cognitive psychologists, ignoring the mind itself will never be sufficient because people interpret the stimuli that they experience. For instance, when a boy turns to a girl on a date and says, "You are so beautiful," a behaviourist would probably see that as a reinforcing (positive) stimulus. And yet the girl might not be so easily fooled. She might try to understand why the boy is making this particular statement at this particular time and wonder if he might be attempting to influence her through the comment. Cognitive psychologists maintain that when we take into consideration how stimuli are evaluated and interpreted, we understand behaviour more deeply. Cognitive psychology remains enormously influential today, and it has guided research in such varied fields as language, problem solving, memory, intelligence, education, human development, social psychology, and psychotherapy. The cognitive revolution has been given even more life over the past decade as the result of recent advances in our ability to see the brain in action using *neuroimaging* techniques. **Neuroimaging** is *the use of various techniques to provide pictures of the structure and function of the living brain* (Ilardi & Feldman, 2001). These images are used to diagnose brain disease and injury, but they also allow researchers to view information processing as it occurs in the brain, because the processing causes the involved area of the brain to increase metabolism and show up on the scan. We have already discussed the use of one neuroimaging technique, functional magnetic resonance imaging (fMRI), in the research focus earlier in this section, and we will discuss the use of neuroimaging techniques in many areas of psychology in the chapters to follow.

Social-Cultural Psychology

A final school, which takes a higher level of analysis and which has had substantial impact on psychology, can be broadly referred to as the *social-cultural approach*. The field of **social-cultural psychology** is *the study of how the social situations and the cultures in which people find themselves influence thinking and behaviour*. Social-cultural psychologists are particularly concerned with how people perceive themselves and others, and how people influence each other's behaviour. For instance, social psychologists have found that we are attracted to others who are similar to us in terms of attitudes and interests (Byrne, 1969), that we develop our own beliefs and attitudes by comparing our opinions to those of others (Festinger, 1954), and that *we frequently change our beliefs and behaviours to be similar to those of the people we care about*—a process known as **conformity**. An important aspect of social-cultural psychology are **social norms**—*the ways of thinking, feeling, or behaving that are shared by group members and perceived by them as appropriate* (Asch, 1952; Cialdini, 1993). Norms include customs, traditions, standards, and rules, as well as the general values of the group. Many of the most important social norms are determined by the *culture* in which we live, and these cultures are studied by *cross-cultural psychologists*. A **culture** represents *the common set of social norms, including religious and family values and other moral beliefs, shared by the people who live in a geographical region* (Fiske, Kitayama, Markus, & Nisbett, 1998; Markus, Kitayama, & Heiman, 1996; Matsumoto, 2001). Cultures influence every aspect of our lives, and it is not inappropriate to say that our culture defines our lives just as much as does our evolutionary experience (Mesoudi, 2009). Psychologists have found that there is a fundamental difference in social norms between Western cultures (including those in Canada, the United States, Western Europe, Australia, and New Zealand) and East Asian cultures (including those in China, Japan, Taiwan, Korea, India, and Southeast Asia). Norms in Western cultures are primarily oriented toward **individualism**, which is about *valuing the self and one's independence from others*. Children in Western cultures are taught to develop and to value a sense of their personal self, and to see themselves in large part as separate from the other people around them. Children in Western cultures feel special about themselves; they enjoy getting gold stars on their projects and the best grade in the class. Adults in Western cultures are oriented toward promoting their own individual success, frequently in comparison to (or even at the expense of) others. Norms in the East Asian culture, on the other hand, are oriented toward interdependence or **collectivism**. In these cultures children are taught to *focus on developing harmonious social relationships with others.* The predominant norms relate to group togetherness and connectedness, and duty and responsibility to one's family and other groups. When asked to describe themselves, the members of East Asian cultures are more likely than those from Western cultures to indicate that they are particularly concerned about the interests of others, including their close friends and their colleagues (Figure 1.8, "East vs West").



Figure 1.8 East vs West. In Western cultures social norms promote a focus on the self (individualism), whereas in Eastern cultures the focus is more on families and social groups (collectivism).

Another important cultural difference is the extent to which people in different cultures are bound by social norms and customs, rather than being free to express their own individuality without considering social norms (Chan, Gelfand, Triandis, & Tzeng, 1996). Cultures also differ in terms of personal space, such as how closely individuals stand to each other when talking, as well as the communication styles they employ. It is important to be aware of cultures and cultural differences because people with different cultural backgrounds increasingly come into contact with each other as a result of increased travel and immigration and the development of the Internet and other forms of communication. In Canada, for instance, there are many different ethnic groups, and the proportion of the population that comes from minority (non-White) groups is increasing from year to year. The social-cultural approach to understanding behaviour reminds us again of the difficulty of making broad generalizations about human nature. Different people experience things differently, and they experience them differently in different cultures.

The Many Disciplines of Psychology

Psychology is not one discipline but rather a collection of many subdisciplines that all share at least some common approaches and that work together and exchange knowledge to form a coherent discipline (Yang & Chiu, 2009). Because the field of psychology is so broad, students may wonder which areas are most suitable for their interests and which types of careers might be available to them. Table 1.5, “Some Career Paths in Psychology,” will help you consider the answers to these questions. You can learn more about these different fields of psychology and the careers associated with them at http://www.psyccareers.com/.

Table 1.5 Some Career Paths in Psychology.

Psychology field	Description	Career opportunities
Biopsychology and neuroscience	This field examines the physiological bases of behaviour in animals and humans by studying the functioning of different brain areas and the effects of hormones and neurotransmitters on behaviour.	Most biopsychologists work in research settings—for instance, at universities, for the federal government, and in private research labs.
Clinical and counselling psychology	These are the largest fields of psychology. The focus is on the assessment, diagnosis, causes, and treatment of mental disorders.	Clinical and counseling psychologists provide therapy to patients with the goal of improving their life experiences. They work in hospitals, schools, social agencies, and private practice. Because the demand for this career is high, entry to academic programs is highly competitive.
Cognitive psychology	This field uses sophisticated research methods, including reaction time and brain imaging, to study memory, language, and thinking of humans.	Cognitive psychologists work primarily in research settings, although some (such as those who specialize in human-computer interactions) consult for businesses.
Developmental psychology	These psychologists conduct research on the cognitive, emotional, and social changes that occur across the lifespan.	Many work in research settings, although others work in schools and community agencies to help improve and evaluate the effectiveness of intervention programs such as Head Start.
Forensic psychology	Forensic psychologists apply psychological principles to understand the behaviour of judges, lawyers, courtroom juries, and others in the criminal justice system.	Forensic psychologists work in the criminal justice system. They may testify in court and may provide information about the reliability of eyewitness testimony and jury selection.
Health psychology	Health psychologists are concerned with understanding how biology, behaviour, and the social situation influence health and illness.	Health psychologists work with medical professionals in clinical settings to promote better health, conduct research, and teach at universities.
Industrial-organizational and environmental psychology	Industrial-organizational psychology applies psychology to the workplace with the goal of improving the performance and well-being of employees.	There are a wide variety of career opportunities in these fields, generally working in businesses. These psychologists help select employees, evaluate employee performance, and examine the effects of different working conditions on behaviour. They may also work to design equipment and environments that improve employee performance and reduce accidents.
Personality psychology	These psychologists study people and the differences among them. The goal is to develop theories that explain the psychological processes of individuals, and to focus on individual differences.	Most work in academic settings, but the skills of personality psychologists are also in demand in business—for instance, in advertising and marketing. PhD programs in personality psychology are often connected with programs in social psychology.
School and educational psychology	This field studies how people learn in	School psychologists work in elementary

Psychology field	Description	Career opportunities
	school, the effectiveness of school programs, and the psychology of teaching.	and secondary schools or school district offices with students, teachers, parents, and administrators. They may assess children's psychological and learning problems and develop programs to minimize the impact of these problems.
Social and cross-cultural psychology	This field examines people's interactions with other people. Topics of study include conformity, group behaviour, leadership, attitudes, and personal perception.	Many social psychologists work in marketing, advertising, organizational, systems design, and other applied psychology fields.
Sports psychology	This field studies the psychological aspects of sports behaviour. The goal is to understand the psychological factors that influence performance in sports, including the role of exercise and team interactions.	Sports psychologists work in gyms, schools, professional sports teams, and other areas where sports are practiced.

Psychology in Everyday Life: How to Effectively Learn and Remember

One way that the findings of psychological research may be particularly helpful to you is in terms of improving your learning and study skills. Psychological research has provided a substantial amount of knowledge about the principles of learning and memory. This information can help you do better in this and other courses, and can also help you better learn new concepts and techniques in other areas of your life. The most important thing you can learn in college is how to better study, learn, and remember. These skills will help you throughout your life, as you learn new jobs and take on other responsibilities. There are substantial individual differences in learning and memory, such that some people learn faster than others. But even if it takes you longer to learn than you think it should, the extra time you put into studying is well worth the effort. And you can learn to learn—learning to study effectively and to remember information is just like learning any other skill, such as playing a sport or a video game.

To learn well, you need to be ready to learn. You cannot learn well when you are tired, when you are under stress, or if you are abusing alcohol or drugs. Try to keep a consistent routine of sleeping and eating. Eat moderately and nutritiously, and avoid drugs that can impair memory, particularly alcohol. There is no evidence that stimulants such as caffeine, amphetamines, or any of the many "memory-enhancing drugs" on the market will help you learn (Gold, Cahill, & Wenk, 2002; McDaniel, Maier, & Einstein, 2002). Memory supplements are usually no more effective than drinking a can of sugared soda, which releases glucose and thus improves memory slightly.

Psychologists have studied the ways that best allow people to acquire new information, to retain it over time, and to retrieve information that has been stored in our memories. One important finding is that learning is an active process. To acquire information most effectively, we must actively manipulate it. One active approach is rehearsal—repeating the information that is to be learned over and over again. Although simple repetition does help us learn, psychological research has found that we acquire information most effectively when we actively think about or elaborate on its meaning and relate the material to something else. When you study, try to elaborate by connecting the information to other things that you already know. If you want to remember the different schools of psychology, for instance, try to think about how each of the approaches is different from the others. As you compare the approaches, determine what is most important about each one and then relate it to the features of the other approaches.

In an important study showing the effectiveness of elaborative encoding, Rogers, Kuiper, and Kirker (1977) found that students learned information best when they related it to aspects of themselves (a phenomenon known as the *self-reference effect*). This research suggests that imagining how the material relates to your own interests and goals will help you learn it. An approach known as the *method of loci* involves linking each of the pieces of information that you need to remember to places that you are familiar with. You might think about the house that you grew up in and the rooms in it. You could put the behaviourists in the bedroom, the structuralists in the living room, and the functionalists in the kitchen. Then when you need to remember the information, you retrieve the mental image of your house and should be able to "see" each of the people in each of the areas.

One of the most fundamental principles of learning is known as the *spacing effect*. Both humans and animals more easily remember or learn material when they study the material in several shorter study periods over a longer period of time, rather than studying it just once for a long period of time. Cramming for an exam is a particularly ineffective way to learn. Psychologists have also found that performance is improved when people set difficult yet realistic goals for themselves (Locke & Latham, 2006). You can use this knowledge to help you learn. Set realistic goals for the time you are going to spend studying and what you are going to learn, and try to stick to those goals. Do a small amount every day, and by the end of the week you will have accomplished a lot.

Our ability to adequately assess our own knowledge is known as *metacognition*. Research suggests that our metacognition may make us overconfident, leading us to believe that we have learned material even when we have not. To counteract this problem, don't just go over your notes again and again. Instead, make a list of questions and then see if you can answer them. Study the information again and then test yourself again after a few minutes. If you made any mistakes, study again. Then wait for a half hour and test yourself again. Then test again after one day and after two days. Testing yourself by attempting to retrieve information in an active manner is better than simply studying the material because it will help you determine if you really know it. In summary, everyone can learn to learn better. Learning is an important skill, and following the previously mentioned guidelines will likely help you learn better.

Key Takeaways

- The first psychologists were philosophers, but the field became more empirical and objective as more sophisticated scientific approaches were developed and employed.
- Some basic questions asked by psychologists include those about nature versus nurture, free will versus determinism, accuracy versus inaccuracy, and conscious versus unconscious processing.
- The structuralists attempted to analyze the nature of consciousness using introspection.
- The functionalists based their ideas on the work of Darwin, and their approaches led to the field of evolutionary psychology.
- The behaviourists explained behaviour in terms of stimulus, response, and reinforcement, while denying the presence of free will.
- Cognitive psychologists study how people perceive, process, and remember information.
- Psychodynamic psychology focuses on unconscious drives and the potential to improve lives through psychoanalysis and psychotherapy.
- The social-cultural approach focuses on the social situation, including how cultures and social norms influence our behaviour.

Exercises and Critical Thinking

1. What type of questions can psychologists answer that philosophers might not be able to answer as completely or as accurately? Explain why you think psychologists can answer these questions better than philosophers can.
2. Choose one of the major questions of psychology and provide some evidence from your own experience that supports one side or the other.
3. Choose two of the fields of psychology discussed in this section and explain how they differ in their approaches to understanding behaviour and the level of explanation at which they are focused.

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1.4: Summary, Key Terms, and Self-Test

Charles Stangor, Jennifer Walinga, and Jorden A. Cummings

Summary

Psychology is the scientific study of mind and behaviour. Most psychologists work in research laboratories, hospitals, and other field settings where they study the behaviour of humans and animals. Some psychologists are researchers and others are practitioners, but all psychologists use scientific methods to inform their work.

Although it is easy to think that everyday situations have common sense answers, scientific studies have found that people are not always as good at predicting outcomes as they often think they are. The hindsight bias leads us to think that we could have predicted events that we could not actually have predicted.

Employing the scientific method allows psychologists to objectively and systematically understand human behaviour.

Psychologists study behaviour at different levels of explanation, ranging from lower biological levels to higher social and cultural levels. The same behaviours can be studied and explained within psychology at different levels of explanation.

The first psychologists were philosophers, but the field became more objective as more sophisticated scientific approaches were developed and employed. Some of the most important historical schools of psychology include structuralism, functionalism, behaviourism, and psychodynamic psychology. Cognitive psychology, evolutionary psychology, and social-cultural psychology are some important contemporary approaches.

Some of the basic questions asked by psychologists, both historically and currently, include those about the relative roles of nature versus nurture in behaviour, free will versus determinism, accuracy versus inaccuracy, and conscious versus unconscious processing.

Psychological phenomena are complex, and making predictions about them is difficult because they are multiply determined at different levels of explanation. Research has found that people are frequently unaware of the causes of their own behaviours.

There are a variety of available career choices within psychology that provide employment in many different areas of interest.

Key Terms

- Behaviourism
- Cognitive psychology
- Collectivism
- Conformity
- Culture
- Data
- Depression
- Dualism
- Empirical methods
- Evolutionary psychology
- Facts
- Fitness
- Heritability of the characteristic
- Hindsight bias
- Individual differences
- Individualism
- Introspection
- Levels of explanation
- Multiply determined
- Neuroimaging
- Psychoanalysis

- Psychodynamic psychology
- Psychologist-practitioners
- Psychology
- Repressed
- Research psychologists
- School of functionalism
- Scientific method
- Social norms
- Social-cultural psychology
- Structuralism
- Theory of natural selection

Self Test

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CHAPTER OVERVIEW

2: Introduction to Major Perspectives

2.1: Introduction
2.2: Biological Psychology
2.3: Psychodynamic Psychology
2.4: Behaviourist Psychology
2.5: Humanist, Cognitive, and Evolutionary Psychology
2.6: Summary, Key Terms, and Self-Test

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2.1: Introduction

Jennifer Walinga

Scientific areas of study are often guided by a **paradigm** (*prevailing model*). In astronomy, Ptolemy placed Earth at the centre of the universe and thereby shaped the way people conceived of all things related to that science. Later, the Copernican paradigm placed the Sun at the centre of the universe, which shifted perspectives and understandings. A paradigm presents a generally accepted approach to the whole field during a particular era. A paradigm equips scientists and practitioners with a set of assumptions about what is to be studied as well as a set of research methods for how those phenomena should be examined. In physics, the Aristotelian view of the composition of matter prevailed until Newton's 17th-century mechanical model emerged and overtook it, which in turn was expanded by Einstein's 20th-century relativity paradigm (Watson, 1967). With each shift in knowledge and insight, a form of revolution occurs (Kuhn, 1970).

However, psychology lacks a guiding or prevailing paradigm due to its youth and scope. Instead, the field of psychology has travelled the course of several movements, schools of thought, or perspectives, which provide frameworks for organizing data and connecting theories but no overall guidance or stance. In psychology, each new line of thinking emerges in response to another. New ideas or ways of thinking challenge prior thinking and require further research in order to resolve, clarify, or expand tensions between concepts. Often, new **methodologies**[1] emerge as well, and new questions demand new tools or approaches in order to be answered.

Major psychological perspectives discussed by researchers and practitioners today include biological, psychodynamic, behaviouristic, humanistic, cognitive, and evolutionary perspectives (Figure 2.1, "Major Psychological Perspectives Timeline"). It appears that a new perspective emerges every 20 to 30 years.



Figure 2.1 Major Psychological Perspectives Timeline [Long Description] (by J. Walinga)

This list of perspectives changes, of course, as the field of psychology grows and evolves, and as our conceptualization of psychology expands and develops. The first structuralist psychologists, such as Wilhelm Wundt and Edward B. Titchener of the late 1800s, thought of psychology in biological or physiological terms and focused on the elements of human experience and sensation — the "what" of human experience. But the wave of functionalist, behavioural, and cognitive psychologists to follow began to include the "how" of human experience. Influenced by Charles Darwin's theories, William James and others later began to consider the "why" of human experience by focusing on interactions between mind and body, including perceptions and emotions, as well as the influence of environment on human experience (Figure 2.2, "The Elements of Psychology").

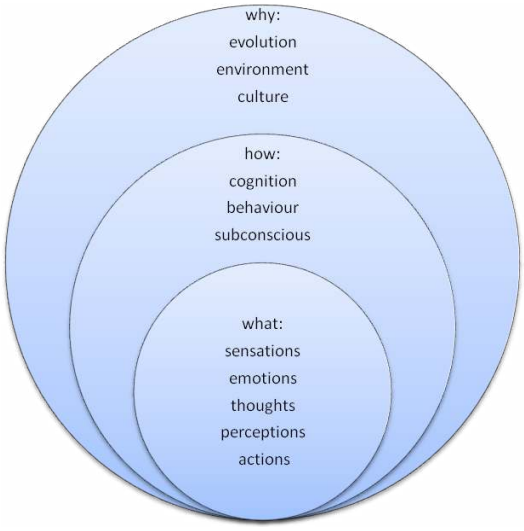


Figure 2.2 The Elements of Psychology [Long Description] (by J. Walinga)

Reflecting on psychological developments today (e.g., positive psychology, multiple intelligences, systems thinking), we can foresee psychology moving toward an integrative approach that incorporates much of the prior learning that has come before it. Dr. Evan Thompson, a professor of philosophy at the University of British Columbia, who works in the fields of cognitive science, philosophy of mind, phenomenology, and cross-cultural philosophy, especially Asian philosophy and contemporary Buddhist philosophy in dialogue with Western philosophy and science, speaks and writes about an **integrative psychology**, which is *psychology that combines the nature and actions of mind, body, and spirit* (Varela, Rosch, & Thompson, 1992). Perhaps an integrative perspective will be the next developmental stage for the field of psychology and will move the field that much closer to its own established paradigm.

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Long Descriptions

Figure 2.1 Long Description – Major Psychological Perspectives Timeline.

Physiological Perspective	Year	Person
Biological – Physiological Psychology	1874	Wundt
	1898	Titchener
Phsychodynamic – Interpretation of Dreams	1990	Freud
Behaviouristic – Stimulus and Response	1927	Pavlov
	1938	Skinner
Humanistic – Self Actualization	1942	Rogers
	1954	Maslow
Cognitive – Information Processing	1967	Neisser
Evolutionary – Adaptation	1999	Buss

Figure 2.2 long description

There are three elements of psychology: Why? How? and What? “Why” deals with things like evolution, environment, and culture. “How” deals with things like cognition, behaviour, and subconscious. “What” deals with sensations, emotions, thoughts, perceptions, and actions.

Footnote

1. Research study design principles.

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2.2: Biological Psychology

Jennifer Walinga

Learning Objectives

- Understand the core premises of biological psychology and the early thinkers.
- Critically evaluate empirical support for various biological psychology theories.
- Explore applications and implications of key concepts from this perspective.

Biological psychologists *are interested in measuring biological, physiological, or genetic variables in an attempt to relate them to psychological or behavioural variables.* Because all behaviour is controlled by the central nervous system, biological psychologists seek to understand how the brain functions in order to understand behaviour. Key areas of focus include sensation and perception; motivated behaviour (such as hunger, thirst, and sex); control of movement; learning and memory; sleep and biological rhythms; and emotion. As technical sophistication leads to advancements in research methods, more advanced topics such as language, reasoning, decision making, and consciousness are now being studied.

Biological psychology has its roots in early structuralist and functionalist psychological studies, and as with all of the major perspectives, it has relevance today. In section 1.2, we discuss the history and development of functionalism and structuralism. In this chapter, we extend this discussion to include the theoretical and methodological aspects of these two approaches within the biological perspective and provide examples of relevant studies.

The early structural and functional psychologists believed that the study of conscious thoughts would be the key to understanding the mind. Their approaches to the study of the mind were based on systematic and rigorous observation, laying the foundation for modern psychological experimentation. In terms of research focus, Wundt and Titchener explored topics such as attention span, reaction time, vision, emotion, and time perception, all of which are still studied today.

Wundt's primary method of research was **introspection**, which involves training people to *concentrate and report on their conscious experiences as they react to stimuli.* This approach is still used today in modern neuroscience research; however, many scientists criticize the use of introspection for its lack of empirical approach and objectivity. Structuralism was also criticized because its subject of interest – the conscious experience – was not easily studied with controlled experimentation. Structuralism's reliance on introspection, despite Titchener's rigid guidelines, was criticized for its lack of reliability. Critics argued that self-analysis is not feasible, and that introspection can yield different results depending on the subject. Critics were also concerned about the possibility of retrospection, or the memory of sensation rather than the sensation itself.

Today, researchers argue for introspective methods as crucial for understanding certain experiences and contexts.Two Minnesota researchers (Jones & Schmid, 2000) used **autoethnography,** *a narrative approach to introspective analysis* (Ellis, 1999), to study the phenomenological experience of the prison world and the consequent adaptations and transformations that it evokes. Jones, serving a year-and-a-day sentence in a maximum security prison, relied on his personal documentation of his experience to later study the psychological impacts of his experience.

From Structuralism to Functionalism

As structuralism struggled to survive the scrutiny of the scientific method, new approaches to studying the mind were sought. One important alternative was functionalism, founded by William James in the late 19th century, described and discussed in his two-volume publication *The Principles of Psychology* (1890) (see Chapter 1.2 for details). Built on structuralism's concern for the anatomy of the mind, functionalism led to greater concern about the functions of the mind, and later on to behaviourism.

One of James's students, James Angell, captured the functionalist perspective in relation to a discussion of free will in his 1906 text *Psychology: An Introductory Study of the Structure and Function of Human Consciousness*:

> *Inasmuch as consciousness is a systematising, unifying activity, we find that with increasing maturity our impulses are commonly coordinated with one another more and more perfectly. We thus come to acquire definite and reliable habits of action. Our wills*

> *become formed. Such fixation of modes of willing constitutes character. The really good man is not obliged to hesitate about stealing. His moral habits all impel him immediately and irrepressibly away from such actions. If he does hesitate, it is in order to be sure that the suggested act is stealing, not because his character is unstable. From one point of view the development of character is never complete, because experience is constantly presenting new aspects of life to us, and in consequence of this fact we are always engaged in slight reconstructions of our modes of conduct and our attitude toward life. But in a practical common-sense way most of our important habits of reaction become fixed at a fairly early and definite time in life.*

Functionalism considers mental life and behaviour in terms of active adaptation to the person's environment. As such, it provides the general basis for developing psychological theories not readily testable by controlled experiments such as applied psychology. William James's functionalist approach to psychology was less concerned with the composition of the mind than with examining the ways in which the mind adapts to changing situations and environments. In functionalism, the brain is believed to have evolved for the purpose of bettering the survival of its carrier by acting as an **information processor**.[1] In processing information the brain is considered to execute functions similar to those executed by a computer and much like what is shown in Figure 2.3 below of a complex adaptive system.

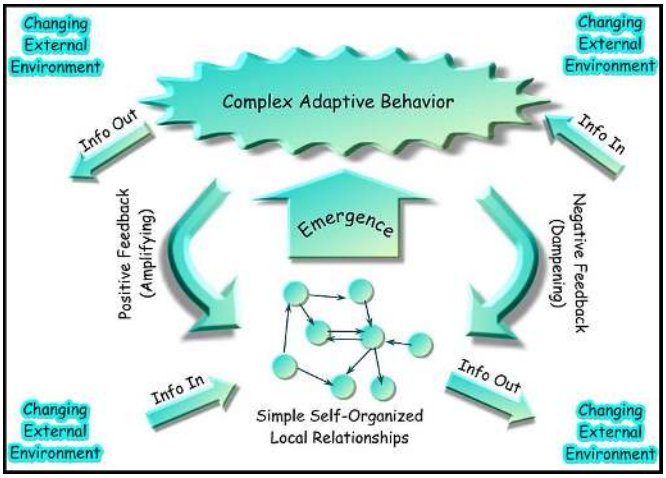


Figure 2.3 Complex Adaptive System. Behaviour is influenced by information gathered from a changing external environment.

The functionalists retained an emphasis on conscious experience. John Dewey, George Herbert Mead, Harvey A. Carr, and especially James Angell were the additional proponents of functionalism at the University of Chicago. Another group at Columbia University, including James McKeen Cattell, Edward L. Thorndike, and Robert S. Woodworth, shared a functionalist perspective.

Biological psychology is also considered *reductionist*. For the **reductionist**, *the simple is the source of the complex*. In other words, to explain a complex phenomenon (like human behaviour) a person needs to reduce it to its elements. In contrast, for the **holist**, *the whole is more than the sum of the parts*. Explanations of a behaviour at its simplest level can be deemed reductionist. The experimental and laboratory approach in various areas of psychology (e.g., behaviourist, biological, cognitive) reflects a reductionist position. This approach inevitably must reduce a complex behaviour to a simple set of variables that offer the possibility of identifying a cause and an effect (i.e., the biological approach suggests that psychological problems can be treated like a disease and are therefore often treatable with drugs).

The brain and its functions (Figure 2.4) garnered great interest from the biological psychologists and continue to be a focus for psychologists today. **Cognitive psychologists** *rely on the functionalist insights in discussing how* **affect,** or *emotion*, and *environment or events interact and result in specific perceptions*. Biological psychologists study the human brain in terms of specialized parts, or systems, and their exquisitely complex relationships. Studies have shown **neurogenesis**[2] in the hippocampus (Gage, 2003). In this respect, the human brain is not a static mass of nervous tissue. As well, it has been found that influential

environmental factors operate throughout the life span. Among the most negative factors, traumatic injury and drugs can lead to serious destruction. In contrast, a healthy diet, regular programs of exercise, and challenging mental activities can offer long-term, positive impacts on the brain and psychological development (Kolb, Gibb, & Robinson, 2003).

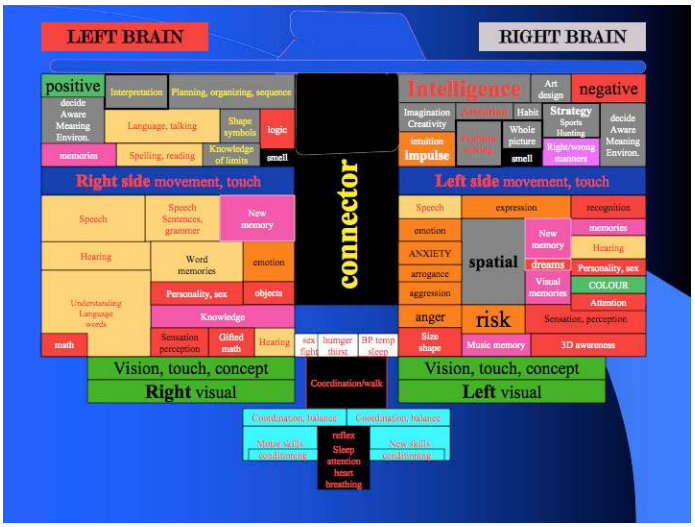


Figure 2.4 Functions of the Brain. Different parts of the brain are responsible for different things.

The brain comprises four lobes:

1. **Frontal lobe:** *also known as the motor cortex, this portion of the brain is involved in motor skills, higher level cognition, and expressive language*.
2. **Occipital lobe:** *also known as the visual cortex, this portion of the brain is involved in interpreting visual stimuli and information*.
3. **Parietal lobe:** *also known as the somatosensory cortex, this portion of the brain is involved in the processing of other tactile sensory information such as pressure, touch, and pain.*
4. **Temporal lobe:** *also known as the auditory cortex, this portion of the brain is involved in the interpretation of the sounds and language we hear*.

Another important part of the nervous system is the **peripheral nervous system**, which is divided into two parts:

1. The **somatic nervous system,** which *controls the actions of skeletal muscles*.
2. The **autonomic nervous system,** which *regulates automatic processes such as heart rate, breathing, and blood pressure*. The autonomic nervous system, in turn has two parts:
   a. The **sympathetic nervous system**, which controls the **fight-or-flight response**, a *reflex that prepares the body to respond to danger in the environment*.
   b. The **parasympathetic nervous system**, which works to bring the body back to its normal state after a fight-or-flight response.

Research Focus: Internal versus External Focus and Performance

Within the realm of sport psychology, Gabrielle Wulf and colleagues from the University of Las Vegas Nevada have studied the role of internal and external focus on physical performance outcomes such as balance, accuracy, speed, and endurance. In one experiment they used a ski-simulator and directed participants' attention to either the pressure they exerted on the wheels of the platform on which they were standing (external focus), or to their feet that were exerting the force (internal focus). On a retention test, the external focus group demonstrated superior learning (i.e., larger movement amplitudes) compared with both the internal focus group and a control group without focus instructions. The researchers went on to replicate findings in a subsequent experiment that involved balancing on a stabilometer. Again, directing participants' attention externally, by keeping markers on the balance platform horizontal, led to more effective balance learning than inducing an internal focus, by asking them to try to keep their feet horizontal. The researchers showed that balance performance or learning, as measured by deviations from a balanced position, is enhanced when the performers' attention is directed to minimizing movements of the

platform or disk as compared to those of their feet. Since the initial studies, numerous researchers have replicated the benefits of an external focus for other balance tasks (Wulf, Höß, & Prinz, 1998).

Another balance task, riding a paddle boat, was used by Totsika and Wulf (2003). With instructions to focus on pushing the pedals forward, participants showed more effective learning compared to participants with instructions to focus on pushing their feet forward. This subtle difference in instructions is important for researchers of attentional focus. The first instruction to push the pedal is external, with the participant focusing on the pedal and allowing the body to figure out how to push the pedal. The second instruction to push the feet forward is internal, with the participant concentrating on making his or her feet move.

In further biologically oriented psychological research at the University of Toronto, Schmitz, Cheng, and De Rosa (2010) showed that **visual attention** — *the brain's ability to selectively filter unattended or unwanted information from reaching awareness* — diminishes with age, leaving older adults less capable of filtering out distracting or irrelevant information. This age-related "leaky" attentional filter fundamentally impacts the way visual information is encoded into memory. Older adults with impaired visual attention have better memory for "irrelevant" information. In the study, the research team examined brain images using functional magnetic resonance imaging (fMRI) on a group of young (mean age = 22 years) and older adults (mean age = 77 years) while they looked at pictures of overlapping faces and places (houses and buildings). Participants were asked to pay attention only to the faces and to identify the gender of the person. Even though they could see the place in the image, it was not relevant to the task at hand (Read about the study's findings at http://www.artsci.utoronto.ca/main/newsitems/brains-ability).

The authors noted:

> *In young adults, the brain region for processing faces was active while the brain region for processing places was not. However, both the face and place regions were active in older people. This means that even at early stages of perception, older adults were less capable of filtering out the distracting information. Moreover, on a surprise memory test 10 minutes after the scan, older adults were more likely to recognize what face was originally paired with what house.*

The findings suggest that under attentionally demanding conditions, such as a person looking for keys on a cluttered table, age-related problems with "tuning in" to the desired object may be linked to the way in which information is selected and processed in the sensory areas of the brain. Both the relevant sensory information — the keys — and the irrelevant information — the clutter — are perceived and encoded more or less equally. In older adults, these changes in visual attention may broadly influence many of the cognitive deficits typically observed in normal aging, particularly memory.

Key Takeaways

- Biological psychology – also known as biopsychology or psychobiology – is the application of the principles of biology to the study of mental processes and behaviour.
- Biological psychology as a scientific discipline emerged from a variety of scientific and philosophical traditions in the 18th and 19th centuries.
- In *The Principles of Psychology* (1890), William James argued that the scientific study of psychology should be grounded in an understanding of biology.
- The fields of behavioural neuroscience, cognitive neuroscience, and neuropsychology are all subfields of biological psychology.
- Biological psychologists are interested in measuring biological, physiological, or genetic variables in an attempt to relate them to psychological or behavioural variables.

Exercises and Critical Thinking

1. Try this exercise with your group: Take a short walk together without talking to or looking at one another. When you return to the classroom, have each group member write down what they saw, felt, heard, tasted, and smelled. Compare and discuss reflecting on some of the assumptions and beliefs of the structuralists. Consider what might be the reasons for the differences and similarities.

2. Where can you see evidence of insights from biological psychology in some of the applications of psychology that you commonly experience today (e.g., sport, leadership, marketing, education)?
3. Study the functions of the brain and reflect on whether you tend toward left- or right-brain tendencies.

Image Attributions

Figure 2.3: Complex Adaptive System by Acadac (http://commons.wikimedia.org/wiki/Fi...ive-system.jpg) is in the public domain.

Figure 2.4: Left and Right Brain by Webber (http://commons.wikimedia.org/wiki/Fi...ight_Brain.jpg) is in the public domain.

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Footnotes

1. A system for taking information in one form and transforming it into another.
2. The generation or growth of new brain cells, specifically when neurons are created from neural stem cells.

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2.3: Psychodynamic Psychology

Jennifer Walinga

Learning Objectives

- Understand some of the psychological forces underlying human behaviour.
- Identify levels of consciousness.
- Critically discuss various models and theories of psychodynamic and behavioural psychology.
- Understand the concept of psychological types and identify applications and examples in daily life.

Sigmund Freud

The psychodynamic perspective in psychology proposes that there are psychological forces underlying human behaviour, feelings, and emotions. Psychodynamics originated with Sigmund Freud (Figure 2.5) in the late 19th century, who suggested that psychological processes are flows of psychological energy (libido) in a complex brain. In response to the more reductionist approach of biological, structural, and functional psychology movements, the psychodynamic perspective marks a pendulum swing back toward more holistic, systemic, and abstract concepts and their influence on the more concrete behaviours and actions. Freud's theory of psychoanalysis assumes that much of mental life is unconscious, and that past experiences, especially in early childhood, shape how a person feels and behaves throughout life.

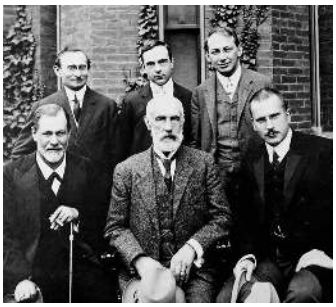


Figure 2.5 Group Photo. Front row (left to right): Sigmund Freud, G. Stanley Hall, Carl Jung; Back row (left to right): Abraham A. Brill, Ernest Jones, Sándor Ferenczi.

Consciousness is the *awareness of the self in space and time*. It can be defined as human awareness of both internal and external stimuli. Researchers study states of human consciousness and differences in perception in order to understand how the body works to produce conscious awareness. Consciousness varies in both arousal and content, and there are two types of conscious experience: **phenomenal**, or *in the moment*, and **access**, which *recalls experiences from memory*.

First appearing in the historical records of the ancient Mayan and Incan civilizations, various theories of multiple levels of consciousness have pervaded spiritual, psychological, medical, and moral speculations in both Eastern and Western cultures. The ancient Mayans were among the first to propose an organized sense of each level of consciousness, its purpose, and its temporal connection to humankind. Because consciousness incorporates stimuli from the environment as well as internal stimuli, the Mayans believed it to be the most basic form of existence, capable of evolution. The Incas, however, considered consciousness to be a progression, not only of awareness but of concern for others as well.

Sigmund Freud divided human consciousness into three levels of awareness: the *conscious*, *preconscious*, and *unconscious*. Each of these levels corresponds to and overlaps with Freud's ideas of the id, ego, and superego. The **conscious** level consists of *all those things we are aware of*, including things that we know about ourselves and our surroundings. The **preconscious** consists of *those things we could pay conscious attention to if we so desired, and where many memories are stored for easy retrieval*. Freud saw the **preconscious** as *those thoughts that are unconscious at the particular moment in question, but that are not repressed and are therefore available for recall and easily capable of becoming conscious* (e.g., the "tip of the tongue" effect). The **unconscious** consists of *those things that are outside of conscious awareness, including many memories, thoughts, and urges of which we are not aware*. Much of what is stored in the unconscious is thought to be unpleasant or conflicting; for example, sexual impulses that

are deemed “unacceptable.” While these elements are stored out of our awareness, they are nevertheless thought to influence our behaviour.

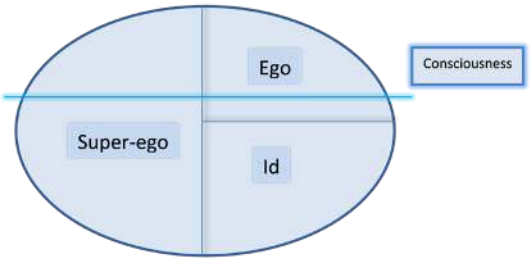


Figure 2.6 The Levels of Consciousness.

Figure 2.6 illustrates the respective levels of id, ego, and superego. In this diagram, the bright blue line represents the divide between consciousness (above) and unconsciousness (below). Below this line, but above the id, is the preconscious level. The lowest segment is the unconscious. Like the ego, the superego has conscious and unconscious elements, while the id is completely unconscious. When all three parts of the personality are in dynamic equilibrium, the individual is thought to be mentally healthy. However if the ego is unable to mediate between the id and the superego, an imbalance occurs in the form of psychological distress.

While Freud’s theory remains one of the best known, various schools within the field of psychology have developed their own perspectives. For example:

- **Developmental psychologists** view consciousness not as a single entity, but as a developmental process with potential higher stages of cognitive, moral, and spiritual quality.
- **Social psychologists** view consciousness as a product of cultural influence having little to do with the individual.
- **Neuropsychologists** view consciousness as ingrained in neural systems and organic brain structures.
- **Cognitive psychologists** base their understanding of consciousness on computer science.

Most psychodynamic approaches use *talk therapy*, or *psychoanalysis*, to examine maladaptive functions that developed early in life and are, at least in part, unconscious. **Psychoanalysis** is *a type of analysis that involves attempting to affect behavioural change through having patients talk about their difficulties*. Practising psychoanalysts today collect their data in much the same way as Freud did, through case studies, but often without the couch. The analyst listens and observes, gathering information about the patient. Psychoanalytic scientists today also collect data in formal laboratory experiments, studying groups of people in more restricted, controlled ways (Cramer, 2000; Westen, 1998).

Carl Jung

Carl Jung (1875-1961) expanded on Freud’s theories, introducing the concepts of the *archetype*, the *collective unconscious*, and *individuation* — or the psychological process of integrating the opposites, including the conscious with the unconscious, while still maintaining their relative autonomy (Figure 2.7). Jung focused less on infantile development and conflict between the id and superego, and more on integration between different parts of the person.

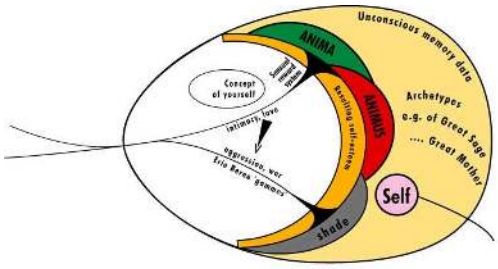


Figure 2.7 Jung’s Theory.

The following are Jung’s concepts that are still prevalent today:

Active imagination: This refers to activating our imaginal processes in waking life in order to tap into the unconscious meanings of our symbols.

Archetypes: These primordial images reflect basic patterns or universal themes common to us all and that are present in the unconscious. These symbolic images exist outside space and time. Examples are the shadow, animus, anima, the old wise person, and the innocent child. There are also nature archetypes, like fire, ocean, river, mountain.

1. **Anima** is the *archetype symbolizing the unconscious female component of the male psyche*. Tendencies or qualities often thought of as feminine.
2. **Animus** is the *archetype symbolizing the unconscious male component of the female psyche*. Tendencies or qualities often thought of as masculine.
3. **Self** is the *archetype symbolizing the totality of the personality*. It represents the striving for unity, wholeness, and integration.
4. **Persona** is the *mask or image a person presents to the world*. It is designed to make a particular impression on others, while concealing a person's true nature.
5. **Shadow** is the *side of a personality that a person does not consciously display in public*. It may have positive or negative qualities.
6. **Dreams** are *specific expressions of the unconscious that have a definite, purposeful structure indicating an underlying idea or intention*. The general function of dreams is to restore a person's total psychic equilibrium.
7. **Complexes** are usually *unconscious and repressed emotionally toned symbolic material that is incompatible with consciousness*. Complexes can cause constant psychological disturbances and symptoms of neurosis. With intervention, they can become conscious and greatly reduced in their impact.

Individuation: Jung believed that a human being is inwardly whole, but that most people have lost touch with important parts of themselves. Through listening to the messages of our dreams and waking imagination, we can contact and reintegrate our different parts. The goal of life is individuation, which is *the process of integrating the conscious with the unconscious, synergizing the many components of the psyche.* Jung asserted: "Trust that which gives you meaning and accept it as your guide" (Jung, 1951, p. 3). Each human being has a specific nature and calling uniquely his or her own, and unless these are fulfilled through a union of conscious and unconscious, the person can become sick. Today, the term "individuation" is used in the media industry to describe new printing and online technologies that permit "mass customization" of media (newspaper, online, television) so that its contents match each individual user's unique interests, shifting from the mass media practice of producing the same contents for all readers, viewers, listeners, or online users (Chen, Wang, & Tseng, 2009). Marshall McLuhan, the communications theorist, alluded to this trend in customization when discussing the future of printed books in an electronically interconnected world (McLuhan & Nevitt, 1972).

Mandala: For Jung, the mandala (which is the Sanskrit word for "circle") was a *symbol of wholeness, completeness, and perfection*, and symbolized the self.

Mystery: For Jung, life was a great mystery, and he believed that humans know and understand very little of it. He never hesitated to say, "I don't know," and he always admitted when he came to the end of his understanding.

Neurosis: Jung had a hunch that what passed for normality often was the very force that shattered the personality of the patient. He proposed that trying to be "normal" violates a person's inner nature and is itself a form of pathology. In the psychiatric hospital, he wondered why psychiatrists were not interested in what their patients had to say.

Story: Jung concluded that every person has a story, and when derangement occurs, it is because the personal story has been denied or rejected. Healing and integration come when the person discovers or rediscovers his or her own personal story.

Symbol: A symbol is a name, term, or picture that is familiar in daily life, but for Jung it had other connotations besides its conventional and obvious meaning. To Jung, a symbol implied something vague and partially unknown or hidden, and was never precisely defined. Dream symbols carried messages from the unconscious to the rational mind.

Unconscious: This basic tenet, as expressed by Jung, states that all products of the unconscious are symbolic and can be taken as guiding messages. Within this concept, there are two types:

1. **Personal unconscious:** This aspect of the psyche does not usually enter an individual's awareness, but, instead, appears in overt behaviour or in dreams.

2. **Collective unconscious:** This aspect of the unconscious manifests in universal themes that run through all human life. The idea of the collective unconscious assumes that the history of the human race, back to the most primitive times, lives on in all people.

Word association test: This is a *research technique that Jung used to explore the complexes in the personal unconscious*. It consisted of reading 100 words to someone, one at a time, and having the person respond quickly with a word of his or her own.

Psychological Types

According to Jung, people differ in certain basic ways, even though the instincts that drive us are the same. Jung distinguished two general attitudes–introversion and extraversion–and four functions–thinking, feeling, sensing, and intuiting:

1. **Introvert:** *Inner-directed*; needs privacy and space; chooses solitude to recover energy; often reflective.
2. **Extravert:** *Outer-directed*; needs sociability; chooses people as a source of energy; often action-oriented.
3. **Thinking function:** *Logical*; sees cause and effect relations; cool, distant, frank, and questioning.
4. **Feeling function:** *Creative, warm, intimate*; has a sense of valuing positively or negatively. (Note that this is not the same as emotion.)
5. **Sensing function:** *Sensory*; oriented toward the body and senses; detailed, concrete, and present.
6. **Intuitive:** *Sees many possibilities in situations*; goes with hunches; impatient with earthy details; impractical; sometimes not present

The **Myers-Briggs Type Indicator** (MBTI) assessment is a *psychometric questionnaire designed to measure psychological preferences in how people perceive the world and make decisions*. The original developers of the Myers-Briggs personality inventory were Katharine Cook Briggs and her daughter, Isabel Briggs-Myers (1980, 1995). Having studied the work of Jung, the mother-daughter team turned their interest in human behaviour into a practical application of the theory of psychological types. They began creating the indicator during World War II, believing that a knowledge of personality preferences would help women who were entering the industrial workforce for the first time to identify the sort of wartime jobs that would be “most comfortable and effective.”

The initial questionnaire became the Myers-Briggs Type Indicator (MBTI), first published in 1962 and emphasizing the value of naturally occurring differences (CAPT, 2012). These preferences were extrapolated from the typological theories proposed by Jung and first published in his 1921 book *Psychological Types* (Adler & Hull, 2014). Jung theorized that there are four principal psychological functions by which we experience the world: sensation, intuition, feeling, and thinking, with one of these four functions being dominant most of the time. The MBTI provides individuals with a measure of their dominant preferences based on the Jungian functions.

Research Focus: The Theory of Buyer Behaviour

Jungian theory influenced a whole realm of social psychology called Consumer Behaviour (Howard & Sheth, 1968). Consumer behaviour is the study of individuals, groups, or organizations and the processes they use to select, secure, and dispose of products, services, experiences, or ideas to satisfy needs, and the impacts that these processes have on the consumer and society. Blending psychology, sociology, social anthropology, marketing, and economics, the study of consumer behaviour attempts to understand the decision-making processes of buyers, such as how emotions affect buying behaviour (Figure 2.8); it also studies characteristics of individual consumers, such as demographics, and behavioural variables and external influences, such as family, education, and culture, in an attempt to understand people’s desires.

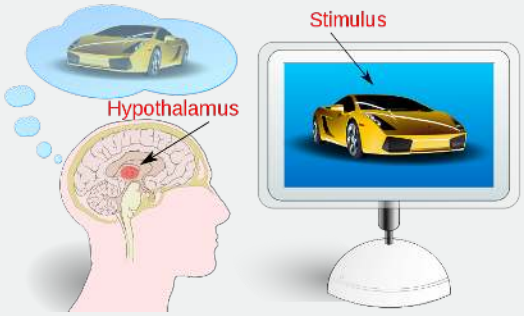


Figure 2.8 Neuromarketing.

The **black box model** (Sandhusen, 2000) captures this *interaction of stimuli, consumer characteristics, decision processes, and consumer responses*. Stimuli can be experienced as interpersonal stimuli (between people) or intrapersonal stimuli (within people). The black box model is related to the black box theory of behaviourism, where the focus is set not on the processes inside a consumer, but on the relation between the stimuli and the response of the consumer. The marketing stimuli are planned and processed by the companies, whereas the environmental stimuli are based on social, economic, political, and cultural circumstances of a society. The buyer's black box contains the buyer characteristics and the decision process, which determines the buyer's response (Table 2.1).

Table 2.1 Environmental Factors and Buyer's Black Box [1]

Environmental Factors		Buyer's Black Box		Buyer's Response
Marketing Stimuli	Environmental Stimuli	Buyer Characteristics	Decision Process	
• product • price • place • promotion	• economic • technological • political • cultural • demographic • natural	• attitudes • motivation • perceptions • personality • lifestyle • knowledge	• problem recognition • information search • alternative evaluation • purchase decision • post-purchase behaviour	• product choice • brand choice • dealer choice • purchase timing • purchase amount

Dreaming and Psychodynamic Psychology

Freud showed a great interest in the interpretation of human dreams, and his theory centred on the notion of repressed longing — the idea that dreaming allows us to sort through unresolved, repressed wishes. Freud's theory described dreams as having both latent and manifest content. **Latent content** relates to *deep unconscious wishes or fantasies*, while **manifest content** is *superficial and meaningless*. Manifest content often masks or obscures latent content.

Theories emerging from the work of Freud include the following:

Threat-simulation theory *suggests that dreaming should be seen as an ancient biological defence mechanism*. Dreams are thought to provide an evolutionary advantage because of their capacity to repeatedly simulate potential threatening events. This process enhances the neurocognitive mechanisms required for efficient threat perception and avoidance. During much of human evolution, physical and interpersonal threats were serious enough to reward reproductive advantage to those who survived them. Therefore, dreaming evolved to replicate these threats and continually practice dealing with them. This theory suggests that dreams serve the purpose of allowing for the rehearsal of threatening scenarios in order to better prepare an individual for real-life threats.

Expectation fulfillment theory *posits that dreaming serves to discharge emotional arousals (however minor) that haven't been expressed during the day*. This practice frees up space in the brain to deal with the emotional arousals of the next day and allows instinctive urges to stay intact. In effect, the expectation is fulfilled (i.e., the action is completed) in the dream, but only in a metaphorical form so that a false memory is not created. This theory explains why dreams are usually forgotten immediately afterwards.

Other neurobiological theories also exist:

Activation-synthesis theory: One prominent neurobiological theory of dreaming is the activation-synthesis theory, which states that *dreams don't actually mean anything*. They are merely electrical brain impulses that pull random thoughts and imagery from our memories. The theory posits that humans construct dream stories after they wake up, in a natural attempt to make sense of the nonsensical. However, given the vast documentation of realistic aspects to human dreaming as well as indirect experimental evidence that other mammals (e.g., cats) also dream, evolutionary psychologists have theorized that dreaming does indeed serve a purpose.

Continual-activation theory: The continual-activation theory of dreaming proposes that *dreaming is a result of brain activation and synthesis*. Dreaming and REM sleep are simultaneously controlled by different brain mechanisms. The hypothesis states that the function of sleep is to process, encode, and transfer data from short-term memory to long-term memory through a process called "consolidation." However, there is not much evidence to back up consolidation as a theory. **NREM (non-rapid eye movement or non-REM) sleep** *processes the conscious-related memory (declarative memory)*, and **REM (rapid eye movement) sleep** *processes the unconscious-related memory (procedural memory)*.

The underlying assumption of continual-activation theory is that during REM sleep, the unconscious part of a brain is busy processing procedural memory. Meanwhile, the level of activation in the conscious part of the brain descends to a very low level as the inputs from the senses are basically disconnected. This triggers the "continual-activation" mechanism to generate a data stream from the memory stores to flow through to the conscious part of the brain.

Nielsen and colleagues (2003) investigated the dimensional *structure of dreams* by administering the Typical Dreams Questionnaire (TDQ) to 1,181 first-year university students in three Canadian cities. A profile of themes was found that varied little by age, gender, or region; however, differences that were identified correlated with developmental milestones, personality attributes, or sociocultural factors. Factor analysis found that women's dreams related mostly to negative factors (failure, loss of control, snakes/insects), while men's dreams related primarily to positive factors (magic/myth, alien life).

Research Focus: Can Dreaming Enhance Problem Solving?

Stemming from Freudian and Jungian theories of dream states, researchers in Lancaster, UK (Sio & Ormerod, 2009; Sio Monaghan, & Ormerod, 2013) and in Alberta, Canada (Both, Needham, & Wood, 2004) explored the role of "incubation" in facilitating problem solving. Incubation is the concept of "sleeping on a problem," or disengaging from actively and consciously trying to solve a problem, in order to allow, as the theory goes, the unconscious processes to work on the problem. Incubation can take a variety of forms, such as taking a break, sleeping, or working on another kind of problem either more difficult or less challenging. Findings suggest that incubation can, indeed, have a positive impact on problem-solving outcomes. Interestingly, lower-level cognitive tasks (e.g., simple math or language tasks, vacuuming, putting items away) resulted in higher problem-solving outcomes than more challenging tasks (e.g., crossword puzzles, math problems). Educators have also found that taking active breaks increases children's creativity and problem-solving abilities in classroom settings.

There are several hypotheses that aim to explain the conscious-unconscious effects on problem solving:

1. **Spreading activation**: When problem solvers disengage from the problem-solving task, they naturally expose themselves to more information that can serve to inform the problem-solving process. Solvers are sensitized to certain information and can benefit from conceptual combination of disparate ideas related to the problem.
2. **Selective forgetting:** Once disengaged from the problem-solving process, solvers are freer to let go of certain ideas or concepts that may be inhibiting the problem-solving process, allowing a cleaner, fresher view of the problem and revealing clearer pathways to solution.
3. **Problem restructuring**: When problem solvers let go of the initial problem, they are then freed to restructure or reorganize their representation of the problem and thereby capitalize on relevant information not previously noticed, switch strategies, or rearrange problem information in a manner more conducive to solution pathways.

The study of **neural correlates of consciousness (NCC)** seeks to *link activity within the brain to subjective human experiences in the physical world*. Progress in **neurophilosophy** has come from *focusing on the body rather than the mind* (Squire, 2008). In this context, the neuronal correlates of consciousness may be viewed as its causes, and consciousness may be thought of as a state-dependent property of some undefined complex, adaptive, and highly interconnected biological system. The NCC constitute the smallest set of neural events and structures sufficient for a given conscious percept or explicit memory (Figure 2.9).

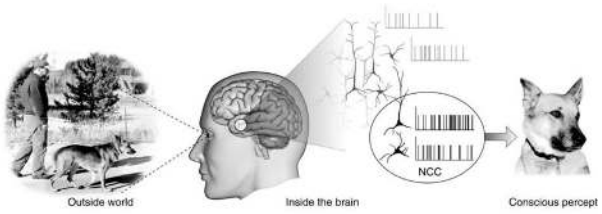


Figure 2.9 The Neuronal Correlates of Consciousness.

In the investigation into the NCC, our capacity to manipulate visual percepts in time and space has made vision a focus of study. Psychologists have perfected a number of techniques in which the seemingly simple relationship between a physical stimulus in the world and its associated principle in the subject's mind is disturbed and therefore open for understanding. In this manner the neural mechanisms can be isolated, permitting visual consciousness to be tracked in the brain. In a perceptual illusion, the physical stimulus remains fixed while the perception fluctuates. The best known example is the Necker Cube (Koch, 2004): the 12 lines in the cube can be perceived in one of two different ways in depth (Figure 2.10).

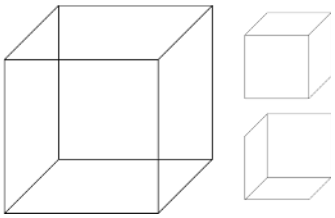


Figure 2.10 The Necker Cube.

A number of functional magnetic resonance imaging (fMRI) experiments have identified the activity underlying visual consciousness in humans and demonstrated quite conclusively that activity in various areas of the brain follows the mental perception and not the retinal stimulus (Rees & Frith, 2007), making it possible to link brain activity with perception (Figure 2.11).

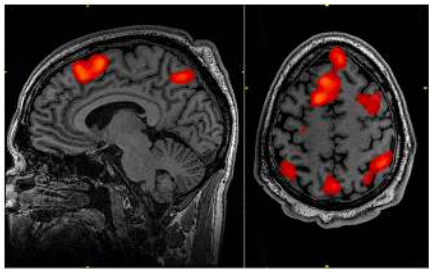


Figure 2.11 fMRI scan.

Key Takeaways

- Psychodynamic psychology emphasizes the systematic study of the psychological forces that underlie human behaviour, feelings, and emotions and how they might relate to early experience.
- Consciousness is the awareness of the self in space and time and is defined as human awareness to both internal and external stimuli.
- Sigmund Freud divided human consciousness into three levels of awareness: the conscious, preconscious, and unconscious. Each of these levels corresponds and overlaps with his ideas of the id, ego, and superego.
- Most psychodynamic approaches use talk therapy to examine maladaptive functions that developed early in life and are, at least in part, unconscious.
- Carl Jung expanded upon Freud's theories, introducing the concepts of the archetype, the collective unconscious, and individuation.
- Freud's theory describes dreams as having both latent and manifest content. Latent content relates to deep unconscious wishes or fantasies while manifest content is superficial and meaningless.

- Unconscious processing includes several theories: threat simulation theory, expectation fulfillment theory, activation synthesis theory, continual activation theory.
- One application of unconscious processing includes incubation as it relates to problem solving: the concept of "sleeping on a problem" or disengaging from actively and consciously trying to solve a problem in order to allow one's unconscious processes to work on the problem.
- The study of neural correlates of consciousness seeks to link activity within the brain to subjective human experiences in the physical world.
- In a perceptual illusion, like the Necker Cube, the physical stimulus remains fixed while the perception fluctuates, allowing the neural mechanisms to be isolated and permitting visual consciousness to be tracked in the brain.
- Activity in the brain can be studied and captured using functional magnetic resonance imaging (fMRI) scans.

Exercises and Critical Thinking

1. Utilize the principles of the psychodynamic school of thought to reflect on a recent dream you experienced. What might the dream imply or represent? Try to trace one of your qualities or characteristics to a prior experience or learning.
2. Jung has influenced a variety of practices in psychology today including therapeutic and organizational. Can you identify other areas of society where "archetypes" may play a role?
3. Debate with your group the value or danger of "mass customization." What issues or controversies does the concept of customized marketing and product development pose?

Image Attributions

Figure 2.5: Freud Jung in front of Clark Hall (http://upload.wikimedia.org/wikipedi...t_of_Clark.jpg) is in the public domain.

Figure 2.6: Visual representation of Freud's id, ego and superego and the level of consciousness (http://commons.wikimedia.org/wiki/Fi...o_superego.png) used under CC BY SA 3.0 license (http://creativecommons.org/licenses/by-sa/3.0/deed.en).

Figure 2.7: Graphical model of Carl Jung's theory – English version by Andrzej Brodziak (http://commons.wikimedia.org/wiki/Fi...cheme-Jung.jpg) used under CC-BY-SA 2.5 Generic license (http://creativecommons.org/licenses/by-sa/2.5/deed.en).

Figure 2.8: Neuromarketing schema by Benoit Rochon (http://commons.wikimedia.org/wiki/Fi...rketing_fr.svg) used under CC BY 3.0 license (http://creativecommons.org/licenses/by/3.0/deed.en).

Figure 2.9: Neural Correlates Of Consciousness by Christof Koch (http://commons.wikimedia.org/wiki/Fi...sciousness.jpg) used under CC BY SA 3.0 license (http://creativecommons.org/licenses/by-sa/3.0/deed.en).

Figure 2.10: Necker's cube, a type of optical illusion by Stevo-88 (http://commons.wikimedia.org/wiki/Fi...r%27s_cube.svg) is in the public domain.

Figure 2.11: FMRI scan during working memory tasks by John Graner (http://commons.wikimedia.org/wiki/Fi...mory_tasks.jpg) is in the public domain.

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Footnotes

1. Adapted from http://en.wikipedia.org/wiki/Consumer_behaviour by J. Walinga.

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2.4: Behaviourist Psychology

Jennifer Walinga

Learning Objectives

- Understand the principles of behaviourist psychology and how these differ from psychodynamic principles in terms of theory and application.
- Distinguish between classical and operant conditioning.
- Become familiar with key behaviourist theorists and approaches.
- Identify applications of the behaviourist models in modern life.

Emerging in contrast to psychodynamic psychology, **behaviourism** *focuses on observable behaviour as a means to studying the human psyche*. The primary tenet of behaviourism is that psychology should concern itself with the observable behaviour of people and animals, not with unobservable events that take place in their minds. The behaviourists criticized the mentalists for their inability to demonstrate empirical evidence to support their claims. The behaviourist school of thought maintains that behaviours can be described scientifically without recourse either to internal physiological events or to hypothetical constructs such as thoughts and beliefs, making behaviour a more productive area of focus for understanding human or animal psychology.

The main influences of behaviourist psychology were Ivan Pavlov (1849-1936), who investigated classical conditioning though often disagreeing with behaviourism or behaviourists; Edward Lee Thorndike (1874-1949), who introduced the concept of reinforcement and was the first to apply psychological principles to learning; John B. Watson (1878-1958), who rejected introspective methods and sought to restrict psychology to experimental methods; and B.F. Skinner (1904-1990), who conducted research on operant conditioning.

The first of these, Ivan Pavlov, is known for his work on one important type of learning, **classical conditioning**. *As we learn, we alter the way we perceive our environment, the way we interpret the incoming stimuli, and therefore the way we interact, or behave*. Pavlov, a Russian physiologist, actually discovered classical conditioning accidentally while doing research on the digestive patterns in dogs. During his experiments, he would put meat powder in the mouth of a dog who had tubes inserted into various organs to measure bodily responses. Pavlov discovered that the dog began to salivate before the meat powder was presented to it. Soon the dog began to salivate as soon as the person feeding it entered the room. Pavlov quickly began to gain interest in this phenomenon and abandoned his digestion research in favour of his now famous classical conditioning study.

Basically, Pavlov's findings support the idea that we develop responses to certain stimuli that are not naturally occurring. When we touch a hot stove, our reflex pulls our hand back. We do this instinctively with no learning involved. The reflex is merely a survival instinct. Pavlov discovered that we make associations that cause us to generalize our response to one stimuli onto a neutral stimuli it is paired with. In other words, hot burner = ouch; stove = burner; therefore, stove = ouch.

In his research with the dogs, Pavlov began pairing a bell sound with the meat powder and found that even when the meat powder was not presented, a dog would eventually begin to salivate after hearing the bell. In this case, since the meat powder naturally results in salivation, these two variables are called the *unconditioned stimulus* (UCS) and the *unconditioned response* (UCR), respectively. In the experiment, the bell and salivation are *not* naturally occurring; the dog is conditioned to respond to the bell. Therefore, the bell is considered the *conditioned stimulus* (CS), and the salivation to the bell, the *conditioned response* (CR).

Many of our behaviours today are shaped by the pairing of stimuli. The smell of a cologne, the sound of a certain song, or the occurrence of a specific day of the year can trigger distinct memories, emotions, and associations. *When we make these types of associations*, we are experiencing **classical conditioning**.

Operant conditioning is another type of learning that refers to *how an organism operates on the environment or how it responds to what is presented to it in the environment* (Figure 2.12).

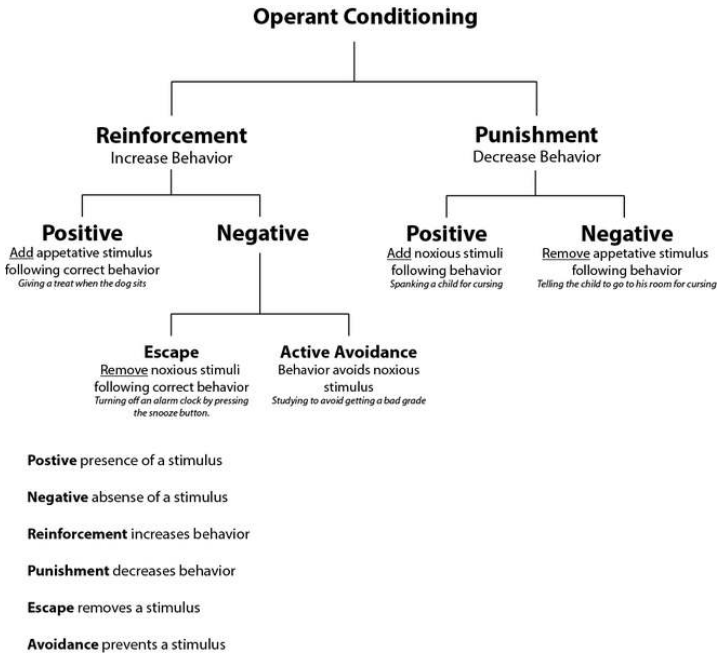


Figure 2.12 Operant Conditioning.

Examples of operant conditioning include the following:

Reinforcement means to strengthen, and is used in psychology to *refer to any stimulus which strengthens or increases the probability of a specific response*. For example, if you want your dog to sit on command, you may give him a treat every time he sits for you. The dog will eventually come to understand that sitting when told to will result in a treat. This treat is reinforcing the behaviour because the dog likes it and will result in him sitting when instructed to do so. There are four types of reinforcement: positive, negative, punishment, and extinction.

- **Positive reinforcement** involves *adding something in order to increase a response*. For example, adding a treat will increase the response of sitting; adding praise will increase the chances of your child cleaning his or her room. The most common types of positive reinforcement are praise and reward, and most of us have experienced this as both the giver and receiver.
- **Negative reinforcement** involves *taking something negative away in order to increase a response*. Imagine a teenager who is nagged by his parents to take out the garbage week after week. After complaining to his friends about the nagging, he finally one day performs the task and, to his amazement, the nagging stops. The elimination of this negative stimulus is reinforcing and will likely increase the chances that he will take out the garbage next week.
- **Punishment** refers to *adding something aversive in order to decrease a behaviour*. The most common example of this is disciplining (e.g., spanking) a child for misbehaving. The child begins to associate being punished with the negative behaviour. The child does not like the punishment and, therefore, to avoid it, he or she will stop behaving in that manner.
- **Extinction** involves *removing something in order to decrease a behaviour.* By having something taken away, a response is decreased.

Research has found positive reinforcement is the most powerful of any of these types of operant conditioning responses. Adding a positive to increase a response not only works better, but allows both parties to focus on the positive aspects of the situation. Punishment, when applied immediately following the negative behaviour, can be effective, but results in extinction when it is not applied consistently. Punishment can also invoke other negative responses such as anger and resentment.

Thorndike's (1898) work with cats and puzzle boxes illustrates the concept of conditioning. The puzzle boxes were approximately 50 cm long, 38 cm wide, and 30 cm tall (Figure 2.13). Thorndike's puzzle boxes were built so that the cat, placed inside the box, could escape only if it pressed a bar or pulled a lever, which caused the string attached to the door to lift the weight and open the door. Thorndike measured the time it took the cat to perform the required response (e.g., pulling the lever). Once it had learned the response he gave the cat a reward, usually food.

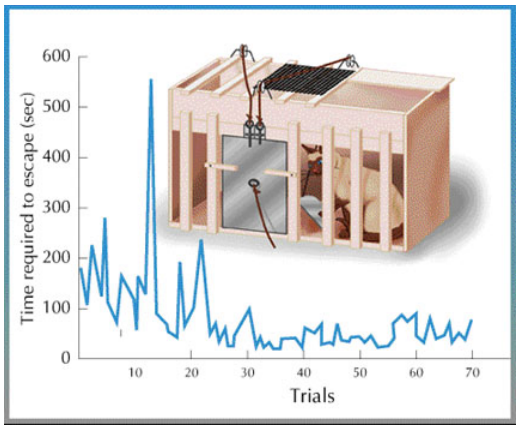


Figure 2.13 Thorndike's Puzzle Box.

Thorndike found that once a cat accidentally stepped on the switch, it would then press the switch faster in each succeeding trial inside the puzzle box. By observing and recording how long it took a variety of animals to escape through several trials, Thorndike was able to graph the learning curve (graphed as an S-shape). He observed that most animals had difficulty escaping at first, then began to escape faster and faster with each successive puzzle box trial, and eventually levelled off in their escape times. The learning curve also suggested that different species learned in the same way but at different speeds. His finding was that cats, for instance, consistently showed gradual learning.

From his research with puzzle boxes, Thorndike was able to create his own theory of learning (1932):

1. Learning is incremental.
2. Learning occurs automatically.
3. All animals learn the same way.
4. **Law of effect.** *If an association is followed by satisfaction, it will be strengthened, and if it is followed by annoyance, it will be weakened.*
5. **Law of use.** *The more often an association is used, the stronger it becomes.*
6. **Law of disuse.** *The longer an association is unused, the weaker it becomes.*
7. **Law of recency.** *The most recent response is most likely to reoccur.*
8. **Multiple response.** *An animal will try multiple responses (trial and error) if the first response does not lead to a specific state of affairs.*
9. **Set or attitude**. *Animals are predisposed to act in a specific way.*
10. **Prepotency of elements.** *A subject can filter out irrelevant aspects of a problem and focus on and respond to significant elements of a problem.*
11. **Response by analogy**. *Responses from a related or similar context may be used in a new context.*
12. **Identical elements theory of transfer**. *The more similar the situations are, the greater the amount of information that will transfer.* Similarly, if the situations have nothing in common, information learned in one situation will not be of any value in the other situation.
13. **Associative shifting**. *It is possible to shift any response from occurring with one stimulus to occurring with another stimulus.* Associative shift maintains that a response is first made to situation A, then to AB, and then finally to B, thus shifting a response from one condition to another by associating it with that condition.
14. **Law of readiness**. *A quality in responses and connections that results in readiness to act*. Behaviour and learning are influenced by the readiness or unreadiness of responses, as well as by their strength.
15. **Identifiability.** *Identification or placement of a situation is a first response of the nervous system, which can recognize it.* Then connections may be made to one another or to another response, and these connections depend on the original identification. Therefore, a large amount of learning is made up of changes in the identifiability of situations.
16. **Availability**. *The ease of getting a specific response*. For example, it would be easier for a person to learn to touch his or her nose or mouth with closed eyes than it would be to draw a line five inches long with closed eyes.

John B. Watson promoted a change in psychology through his address, Psychology as the Behaviorist Views It (1913), delivered at Columbia University. Through his behaviourist approach, Watson conducted research on animal behaviour, child rearing, and advertising while gaining notoriety for the controversial “Little Albert” experiment. Immortalized in introductory psychology textbooks, this experiment set out to show how the recently discovered principles of classical conditioning could be applied to condition fear of a white rat into Little Albert, an 11-month-old boy. Watson and Rayner (1920) first presented to the boy a white rat and observed that the boy was not afraid. Next they presented him with a white rat and then clanged an iron rod. Little Albert responded by crying. This second presentation was repeated several times. Finally, Watson and Rayner presented the white rat by itself and the boy showed fear. Later, in an attempt to see if the fear transferred to other objects, Watson presented Little Albert with a rabbit, a dog, and a fur coat. He cried at the sight of all of them. This study demonstrated how emotions could become conditioned responses.

Burrhus Frederic Skinner called his particular brand of behaviourism *radical behaviourism* (1974). **Radical behaviourism** is the *philosophy of the science of behaviour*. It seeks to understand behaviour as a function of environmental histories of reinforcing consequences. This applied behaviourism does not accept private events such as thinking, perceptions, and unobservable emotions in a causal account of an organism’s behaviour.

While a researcher at Harvard, Skinner invented the *operant conditioning chamber*, popularly referred to as the **Skinner box** (Figure 2.14), *used to measure responses of organisms* (most often rats and pigeons) *and their orderly interactions with the environment*. The box had a lever and a food tray, and a hungry rat inside the box could get food delivered to the tray by pressing the lever. Skinner observed that when a rat was first put into the box, it would wander around, sniffing and exploring, and would usually press the bar by accident, at which point a food pellet would drop into the tray. After that happened, the rate of bar pressing would increase dramatically and remain high until the rat was no longer hungry.

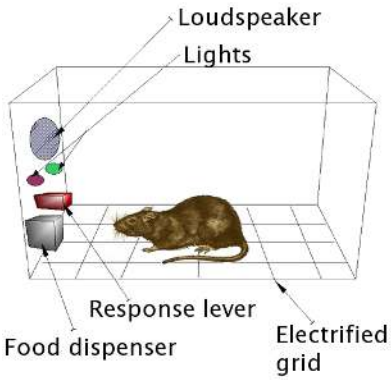


Figure 2.14 Skinner Box.

Negative reinforcement was also exemplified by Skinner placing rats into an electrified chamber that delivered unpleasant shocks. Levers to cut the power were placed inside these boxes. By running a current through the box, Skinner noticed that the rats, after accidentally pressing the lever in a frantic bid to escape, quickly learned the effects of the lever and consequently used this knowledge to stop the currents both during and prior to electrical shock. These two learned responses are known as **escape learning** and **avoidance learning** (Skinner, 1938). The operant chamber for pigeons involved a plastic disk in which the pigeon pecked in order to open a drawer filled with grain. The Skinner box led to the principle of reinforcement, which is the probability of something occurring based on the consequences of a behaviour.

Research Focus

Applying game incentives such as prompts, competition, badges, and rewards to ordinary activities, or **gamification,** is a growing approach to behaviour modification today. Health care has also applied some early innovative uses of gamification — from a Sony PS3 Move motion controller used to help children diagnosed with cancer to the launch of *Games for Health*, the first peer-reviewed journal dedicated to the research and design of health games and behavioural health strategies. Gamification is the process of taking an ordinary activity (like jogging or car sharing) and adding game mechanisms to it, including prompts, rewards, leader-boards, and competition between different players.

When used in social marketing and online health-promotion campaigns, gamification can be used to encourage a new, healthy behaviour such as regular exercise, improved diet, or completing actions required for treatment. Typically, gamification is web-based, usually with a mobile app or as a micro-site. Behavioural change campaigns require an understanding of human psychology, specifically the benefits and barriers associated with a behaviour. There have been several campaigns using gamification techniques that have had remarkable results. For example, organizations that wanted employees to exercise regularly have installed gyms in their offices and created a custom application that rewards employees for "checking in" to the gyms. Employees can form regionally based teams, check in to workouts, and chart their team's progress on a leader-board. This has a powerful effect on creating and sustaining a positive behavioural change.

Similar game mechanics have been used in sustainability campaigns aimed at increasing household environmental compliance. Such sites use game mechanics such as points, challenges, and rewards to increase daily "green" habits like recycling and conserving water. Other behavioural change campaigns that have applied social gaming include using cameras to record speeding cars, which reduce the incidence of speeding, and offering products that allow users to track their healthy behaviours through the day, including miles travelled, calories burned, and stairs climbed.

Key Takeaways

- Behaviourist psychology should concern itself with the observable behaviour of people and animals, not with unobservable events that take place in their minds.
- The main influences of behaviourist psychology were Ivan Pavlov (1849-1936), Edward Lee Thorndike (1874-1949), John B. Watson (1878-1958), and B.F. Skinner (1904-1990).
- The idea that we develop responses to certain stimuli that are not naturally occurring is called "classical conditioning."
- Operant conditioning refers to how an organism operates on the environment or how it responds to what is presented to it in the environment.
- Reinforcement means to strengthen, and is used in psychology to refer to any stimulus that strengthens or increases the probability of a specific response.
- There are four types of reinforcement: positive, negative, punishment, and extinction.
- Behaviourist researchers used experimental methods (puzzle box, operant conditioning or Skinner box, Little Albert experiment) to investigate learning processes.
- Today, behaviourism is still prominent in applications such as gamification.

Exercises and Critical Thinking

1. Reflect on your educational experience and try to determine what aspects of behaviourism were employed.
2. Research Skinner's other inventions, such as the "teaching machine" or the "air crib," and discuss with a group the underlying principles, beliefs, and values governing such "machines." Do you disagree or agree with their use?
3. What might be some other applications for gamification behavioural change strategies? Design a campaign or strategy for changing a behaviour of your choice (e.g., health, work, addiction, or sustainable practice).

Image Attributions

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Figure 2.13: Thorndike's Puzzle Box. by Jacob Sussman (http://commons.wikimedia.org/wiki/File:Puzzle_box.jpg) is in the public domain.

Figure 2.14: Skinner box scheme 01 by Andreas1 (http://commons.wikimedia.org/wiki/Fi..._scheme_01.png) used under CC BY SA 3.0 license (http://creativecommons.org/licenses/by-sa/3.0/deed.en).

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2.5: Humanist, Cognitive, and Evolutionary Psychology

Jennifer Walinga

Learning Objectives

- Understand the key principles of humanistic psychology.
- Differentiate humanistic psychology from biological, psychodynamic, and behaviourist psychology.
- Critically discuss and differentiate between key humanistic concepts such as motivation, need, adaptation, and perception.
- Identify how humanistic psychology, and its related streams of cognitive and evolutionary psychology, have influenced aspects of daily life and work.

Humanistic psychology emerged as the **third force** in psychology after psychodynamic and behaviourist psychology. **Humanistic psychology** holds *a hopeful, constructive view of human beings and of their substantial capacity to be self-determining*. This wave of psychology is guided by a conviction that intentionality and ethical values are the key psychological forces determining human behaviour. Humanistic psychologists strive to enhance the human qualities of choice, creativity, the interaction of the body, mind, and spirit, and the capacity to become more aware, free, responsible, life-affirming, and trustworthy.

Emerging in the late 1950s, humanistic psychology began as a reaction against the two schools of thought then dominating American psychology. Behaviourism's insistence on applying the methods of physical science to human behaviour caused adherents to neglect crucial subjective data, humanists believed. Similarly, psychoanalysis's emphasis on unconscious drives relegated the conscious mind to relative unimportance.

The early humanistic psychologists sought to restore the importance of consciousness and offer a more holistic view of human life. Humanistic psychology acknowledges that the mind is strongly influenced by determining forces in society and the unconscious, and emphasizes the conscious capacity of individuals to develop personal competence and self-respect. The humanistic orientation has led to the development of therapies to facilitate personal and interpersonal skills and to enhance the quality of life. During the 1950s and 1960s, Carl Rogers, for instance, introduced what he called **person** or **client-centred therapy**, which *relies on clients' capacity for self-direction, empathy, and acceptance to promote clients' development*. Abraham Maslow (1908-1970) developed a *hierarchy of motivation* or *hierarchy of needs* culminating in *self-actualization*. Rollo May (1909 – 1994) brought European *existential psychotherapy* and phenomenology into the field by acknowledging human choice and the tragic aspects of human existence, and Fritz Perls developed *gestalt therapy* in his workshops and training programs at the Esalan Institute and elsewhere.

During the 1970s and 1980s, the ideas and values of humanistic psychology spread into many areas of society. As a result, humanistic psychology has many branches and extensions, as outlined in Table 2.2.

Table 2.2 Humanistic Therapies and their Theorists.[1]

Humanistic Therapies	Theorists
Analytical and Archetypal Psychology	C.G. Jung, James Hillman
Authentic Movement	Mary Whitehouse
Encounter	Carl Rogers, Will Schultz
Existential Analysis	Rollo May, James F.T Bugental
Focusing	Eugene Gendin
Gestalt Art Therapy	Janie Rhyne
Logotherapy	Viktor Frankl
Neuro-Linguistic Programming	Richard Bandler, John Grinder
Psychosynthesis	Roberto Assagioli
Rational-Emotive Therapy	Albert Ellis
Reality Therapy	William Glasser
Self-Disclosure	Sidney Jourard
Sensory Awareness though Movement	Moshe Feldenkreis

Client-centred therapy provides a *supportive environment in which clients can re-establish their true identity*. Central to this thinking is the idea that the world is judgmental, and many people fear that if they share with the world their true identity, it would judge them relentlessly. People tend to suppress their beliefs, values, or opinions because they are not supported, not socially acceptable, or negatively judged. To re-establish a client's true identity, the therapist relies on the techniques of unconditional positive regard and empathy. These two techniques are central to client-centred therapy because they build trust between the client and therapist by creating a nonjudgmental and supportive environment for the client.

Existential therapy contrasts the psychoanalysts' focus on the self and *focuses instead on "man in the world."* The counsellor and the client may reflect on how the client has answered life's questions in the past, but attention ultimately emphasizes the choices to be made in the present and future and enabling a new freedom and responsibility to act. By accepting limitations and mortality, a client can overcome anxieties and instead view life as moments in which he or she is fundamentally free.

Gestalt therapy focuses on *the skills and techniques that permit an individual to be more aware of their feelings*. According to this approach, it is much more important to understand what patients are feeling and how they are feeling rather than to identify what is causing their feelings. Supporters of gestalt therapy argued that earlier theories spent an unnecessary amount of time making assumptions about what causes behaviour. Instead, gestalt therapy focuses on the here and now.

Research Focus

In his seminal work "Significant Aspects of Client-Centered Therapy," Rogers described the discovery of the "capacity of the client" (1946):

Naturally the question is raised, what is the reason for this predictability in a type of therapeutic procedure in which the therapist serves only a catalytic function? Basically the reason for the predictability [page 418] of the therapeutic process lies in the discovery — and I use that word intentionally — that within the client reside constructive forces whose strength and uniformity have been either entirely unrecognized or grossly underestimated. It is the clearcut and disciplined reliance by the therapist upon those forces within the client, which seems to account for the orderliness of the therapeutic process, and its consistency from one client to the next.

I mentioned that I regarded this as a discovery. I would like to amplify that statement. We have known for centuries that catharsis and emotional release were helpful. Many new methods have been and are being developed to bring about release, but the principle is not new. Likewise, we have known since Freud's time that insight, if it is accepted and assimilated by the

client, is therapeutic. The principle is not new. Likewise we have realized that revised action patterns, new ways of behaving, may come about as a result of insight. The principle is not new.

But we have not known or recognized that in most if not all individuals there exist growth forces, tendencies toward self-actualization, which may act as the sole motivation for therapy. We have not realized that under suitable psychological conditions these forces bring about emotional release in those areas and at those rates which are most beneficial to the individual. These forces drive the individual to explore his own attitudes and his relationship to reality, and to explore these areas effectively.

We have not realized that the individual is capable of exploring his attitudes and feelings, including those which have been denied to consciousness, at a rate which does not cause panic, and to the depth required for comfortable adjustment. The individual is capable of discovering and perceiving, truly and spontaneously, the interrelationships between his own attitudes, and the relationship of himself to reality. The individual has the capacity and the strength to devise, quite unguided, the steps which will lead him to a more mature and more comfortable relationship to his reality. It is the gradual and increasing recognition of these capacities within the individual by the client-centered therapist that rates, I believe, the term discovery. All of these capacities I have described are released in the individual if a suitable psychological atmosphere is provided.

Rogers identified five characteristics of the fully functioning person:

1. Open to experience: Both positive and negative emotions are accepted. Negative feelings are not denied, but worked through (rather than resort to ego defence mechanisms).
2. Existential living: Being in touch with different experiences as they occur in life, avoiding prejudging and preconceptions. Being able to live in and fully appreciate the present, not always looking back to the past or forward to the future (i.e., living for the moment).
3. Trust feelings: Feelings, instincts, and gut-reactions are paid attention to and trusted. A person's own decisions are the right ones and we should trust ourselves to make the right choices.
4. Creativity: Creative thinking and risk taking are features of a person's life. A person does not play it safe all the time. This involves the ability to adjust and change and seek new experiences.
5. Fulfilled life: A person is happy and satisfied with life, and always looking for new challenges and experiences.

Humanistic psychology recognizes that human existence consists of multiple layers of reality: the physical, the organic, and the symbolic. It contests the idea — traditionally held by the behavioural sciences — that the only legitimate research method is an experimental test using quantitative data. It argues for the use of additional methods specifically designed to study qualitative factors such as subjective experience, emotion, perception, memory, values, and beliefs. Whereas other approaches take an objective view of people — in essence asking, What is this person like? — humanistic psychologists give priority to understanding people's subjectivity, asking, What is it like to be this person? (Clay, 2002).

Humanistic psychology has, of course, quietly influenced North American psychology and culture over many decades by informing the civil rights debate and the women's rights movement, for example. In the academic world, however, humanistic psychology's rejection of quantitative research in favour of qualitative methods caused its reputation to suffer and its adherents to be marginalized. But in recent years, there's mounting evidence of renewal in the field itself.

Abraham Maslow's view of human needs was more complex than Rogers's. While Rogers believed that people needed unconditional positive regard, Maslow acknowledged that people have a variety of needs that differ in timing and priority (Figure 2.15).

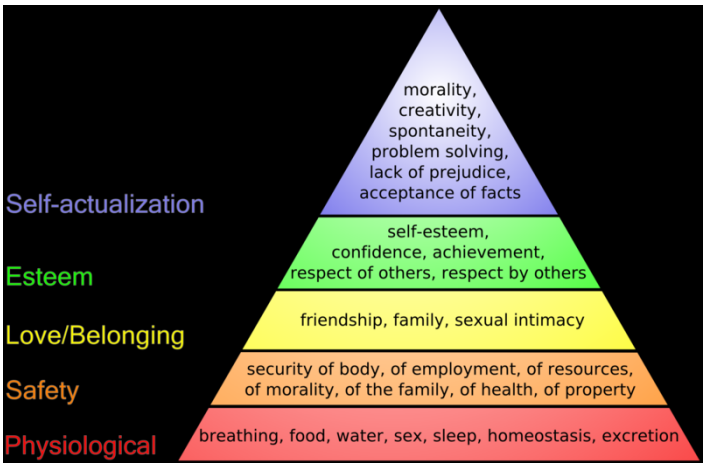


Figure 2.15 Maslow's Hierarchy of Needs. [Long Description]

Maslow called the bottom four levels of the pyramid **deficiency needs** because *a person does not feel anything if they are met, but becomes anxious if they are not*. Thus, physiological needs such as eating, drinking, and sleeping are deficiency needs, as are safety needs, social needs such as friendship and sexual intimacy, and ego needs such as self-esteem and recognition. In contrast, Maslow called the fifth level of the pyramid a **growth need**[2] because it enables a person to **self-actualize** or *reach his or her fullest potential as a human being*. Once a person has met the deficiency needs, he or she can attend to self-actualization; however, only a small minority of people are able to self-actualize because self-actualization requires uncommon qualities such as honesty, independence, awareness, objectivity, creativity, and originality.

Frederick Taylor's **scientific management** principles of the early 1900s, born of the industrial revolution and focused on scientific study of productivity in the workplace, fostered the development of **motivation theory**, which held that *all work consisted largely of simple, uninteresting tasks, and that the only viable method to get people to undertake these tasks was to provide incentives and monitor them carefully*. In order to get as much productivity out of workers as possible, it was believed that a person must reward the desired behaviour and punish the rejected behaviour — otherwise known as the "carrot-and-stick" approach.

During this time, scientists believed in two main drives powering human behaviour: the **biological drive**, including hunger, thirst, and intimacy; and the **reward-punishment drive**. However, scientists began to encounter situations during their experiments where the reward-punishment drive wasn't producing the expected performance results. In 1949, Harry F. Harlow, professor of psychology at the University of Wisconsin, began to argue for a third drive: **intrinsic motivation** — *the joy of the task itself*.

Harlow's theory (1950) was based on studies of primate behaviour when solving puzzles. He found that when presented with a puzzle, monkeys seemed to enjoy solving the puzzles without the presence or expectation of rewards. He found these monkeys, driven by intrinsic motivation, solved the puzzles quicker and more accurately than monkeys that received food rewards.

Edward Deci and Richard Ryan (1985) went on to explore and replicate these findings with humans many times over in their studies of families, classrooms, teams, organizations, clinics, and cultures. They concluded that conditions supporting the individual's experience of autonomy, competence, and relatedness foster the greatest motivation for and engagement in activities while enhancing performance, persistence, and creativity.

Dan Pink (2010) provides ample evidence to support the notion that a traditional carrot-and-stick approach can result in:

- Diminished intrinsic motivation (the third drive)
- Lower performance
- Less creativity
- Crowding out of good behaviour
- Unethical behaviour
- Addictions
- Short-term thinking

Research Focus: When the Lights Went on

The term “Hawthorne Effect” was coined in 1950 by Henry A. Landsberger when analyzing earlier experiments from 1924 to 1932 at the Hawthorne Works (a Western Electric factory outside Chicago). The Hawthorne Works had commissioned a study to see if their workers would become more productive in higher or lower levels of light. (Most industrial/occupational psychology and organizational behaviour textbooks refer to these illumination studies.) In these lighting studies, light intensity was altered to examine its effect on worker productivity. The workers’ productivity seemed to improve when changes were made, and slumped when the study ended. It was suggested that the productivity gain occurred as a result of the motivational effect on the workers of the interest being shown in them. George Elton Mayo (1945) described the Hawthorne Effect in terms of a positive emotional effect due to the perception of a sympathetic or interested observer. Although illumination research of workplace lighting formed the basis of the Hawthorne Effect, other changes such as maintaining clean work stations, clearing floors of obstacles, and even relocating work stations resulted in increased productivity for short periods. Today the term is used to identify any type of short-lived increase in productivity based on attention to human needs.

Humanistic psychology gave birth to the self-help movement, with concepts grounded in emotion and intuition. The recent **positive psychology** movement is one form of neo-humanistic psychology that *combines emotion and intuition with reason and research*. Similarly, modern crisis counselling’s emphasis on empathetic listening finds its roots in Rogers’s humanistic psychology work. In the wider culture, the growing popularity of personal and executive coaching also points to humanistic psychology’s success. Humanistic psychology’s principles may become increasingly relevant as the nation ages, creating a culture preoccupied with facing death and finding meaning in life.

In 1998, a paradigm shift in thinking occurred when University of Pennsylvania psychologist Martin Seligman, in his presidential address to the American Psychological Association (APA), urged psychology to “turn toward understanding and building the human strengths to complement our emphasis on healing damage” (1998b). Though not denying humanity’s flaws, the new approach suggested by positive psychologists recommends focusing on people’s strengths and virtues as a point of departure. Rather than analyze the psychopathology underlying alcoholism, for example, positive psychologists might study the resilience of those who have managed a successful recovery through Alcoholics Anonymous. Instead of viewing religion as a delusion and a crutch, as did Freud, they might identify the mechanisms through which a spiritual practice like meditation enhances mental and physical health. Their lab experiments might seek to define not the conditions that induce depraved behaviour, but those that foster generosity, courage, creativity, and laughter.

Seligman developed the concepts of learned optimism (1998a) and authentic happiness (2002). Learned optimism follows an ABCDE model:

- A=Adversity
- B=Belief
- C=Consequence
- D=Disputation
- E=Energization

In this model, when faced with adversity (A) such as a criticism or failure, a person might form the belief (B) that he or she is underperforming or incapable, and consider the consequence (C) of quitting. However, disputation (D) would challenge the underlying assumptions or beliefs that have formed. The person would then form a new belief in his or her capacity to grow from the critique or learn from the failure. From there, the person would become energized (E) as he or she pursues a new performance path.

In collaboration with Seligman, and within the positive psychology framework, Dr. Mihalyi Csikszentmihályi from Claremont University developed the *theory of flow* (1988; 1990). **Flow** is a *state of optimal performance*. A flow state can be entered while performing any activity, although it is most likely to occur when a person is wholeheartedly performing a task or activity for intrinsic purposes. Csikszentmihályi identified the following six factors as encompassing an experience of flow:

1. Intense and focused concentration on the present moment
2. Merging of action and awareness
3. Loss of reflective self-consciousness

4. Sense of personal control or agency over the situation or activity
5. Distortion of temporal experience (i.e., a person's subjective experience of time being altered)
6. Experience of the activity being intrinsically rewarding (also referred to as an *autotelic experience*)

Flow theory suggests that three conditions have to be met to achieve a flow state. First, a person must be involved in an activity with a clear set of goals and progress. This adds direction and structure to the task. Second, the task at hand must have clear and immediate feedback. This helps the person negotiate any changing demands and allows him or her to adjust performance to maintain the flow state. And last, a person must have a good balance between the perceived challenges of the task at hand and his or her own perceived skills. The person must have confidence in his or her ability to complete the task at hand (Figure 2.16).

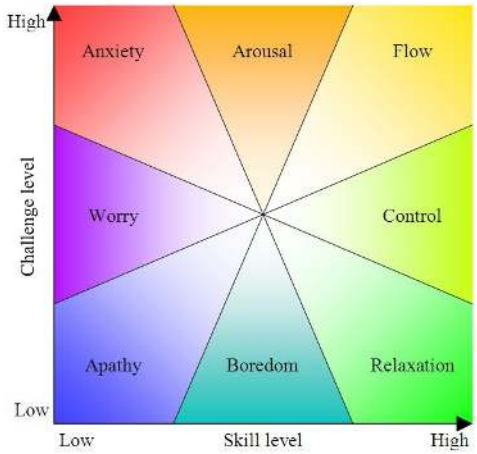


Figure 2.16 Factors of Flow State. [Long Description]

Cognitive Psychology

Cognitive psychology is *the study of mental processes such as attention, memory, perception, language use, problem solving, creativity, and thinking*. Much of the work derived from cognitive psychology has been integrated into various other modern disciplines of psychological study including social psychology, personality psychology, abnormal psychology, developmental psychology, educational psychology, and economics.

Ulric Neisser (1928-2012) is credited with formally coining the term cognitive psychology and defining it as *"all processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used"* (1967, page 4). Cognition came to be seen as involved in everything a human being might possibly do: every psychological phenomenon is a cognitive phenomenon. Theories of cognition include developmental, cultural, neural, computational, and moral perspectives.

While behaviourism and cognitive schools of psychological thought may not agree theoretically, they have complemented each other in practical therapeutic applications, such as in *cognitive-behavioural therapy* (CBT) that has demonstrable utility in treating certain pathologies, such as simple phobias, post-traumatic stress disorder (PTSD), and addiction. CBT replaces maladaptive strategies with more adaptive ones by challenging ways of thinking and reacting. **CBT** techniques focus on *helping individuals challenge their patterns and beliefs and replace erroneous thinking*, such as overgeneralizing, magnifying negatives, or catastrophizing, with more realistic and effective thoughts, thus decreasing self-defeating emotions and behaviour and breaking what can otherwise become a negative cycle. These errors in thinking are known as "cognitive distortions." CBT helps individuals take a more open, mindful, and aware posture toward their distorted thoughts and feelings so as to diminish their impact (Hayes, Villatte, Levin, & Hildebrandt, 2011).

Attention

The psychological definition of **attention** is a *state of focused awareness on a subset of the available perceptual information*. The key function of attention is to filter out irrelevant data, enabling the desired data to be distributed to the other mental processes. The human brain may, at times, simultaneously receive inputs in the form of auditory, visual, olfactory, taste, and tactile information. Without the ability to filter out some or most of that simultaneous information and focus on one or typically two inputs at most, the brain would become overloaded as a person attempted to process all the information.

Memory

Modern conceptions of memory typically break it down into three main subclasses:

1. **Procedural memory:** *memory for the performance of particular types of action*, is often activated on a subconscious level, or at most requires a minimal amount of conscious effort (e.g., driving to work along the same route).
2. **Semantic memory:** *the encyclopedic knowledge* that a person possesses, such as what the Eiffel Tower looks like, or the name of a friend from Grade 6.
3. **Episodic memory:** *memory of autobiographical events that can be explicitly stated*, contains all memories that are temporal in nature, such as when you last brushed your teeth, or where you were when you heard about a major news event.

Perception

Perception involves both the physical senses (sight, smell, hearing, taste, touch, and proprioception) as well as the cognitive processes involved in selecting and interpreting those senses. It is how people come to understand the world around them through interpretation of stimuli.

Language use

Cognitive psychologists began exploring the cognitive processes involved with language in the 1870s when Carl Wernicke (1848-1905) proposed a model for the mental processing of language (1875/1995). Significant work has been done recently on understanding the timing of language acquisition and how it can be used to determine if a child has, or is at risk of developing, a learning disability.

Problem solving

Metacognition involves *conscious thought about thought processes* and might include monitoring a person's performance on a given task, understanding a person's capabilities on particular mental tasks, or observing a person's ability to apply cognitive strategies. Much of the current study regarding metacognition within the field of cognitive psychology deals with its application within the area of education. Educators strive to increase students' metacognitive abilities in order to enhance their learning, study habits, goal setting, and self-regulation.

Research Focus: Divided Attention

Relating to the field of cognitive psychology is the concept of **divided attention**, which refers to a person's *ability to focus on two or more things at one time.* A number of early studies dealt with the ability of a person wearing headphones to discern meaningful conversation when presented with different messages in each ear. Key findings demonstrated the mind's ability to focus on one message, while still being somewhat aware of information taken in by the ear that was not consciously attended to. Participants who were wearing earphones were told that they would be hearing separate messages in each ear and that they were expected to attend only to information related to basketball. When the experiment started, the message about basketball was presented to the left ear, and non-relevant information was presented to the right ear. At some point the message related to basketball was switched to the right ear, and the non-relevant information to the left ear. When this happened, the listener was usually able to repeat the entire message at the end, having attended to the left or right ear only when it was appropriate (Glucksberg & Cowan, 1970).

Evolutionary Psychology

Evolutionary psychology has emerged as a major perspective in psychology. It *seeks to develop and understand ways of expanding the emotional connection between individuals and the natural world*, thereby assisting individuals with developing sustainable lifestyles and remedying alienation from nature. The main premise of evolutionary psychology is that while today the human mind is shaped by the modern social world, it is adapted to the natural environment in which it evolved. According to the hypothesis of biologist E.O. Wilson, human beings have an innate instinct to connect emotionally with nature. What distinguishes evolutionary psychologists from many cognitive psychologists is the proposal that the relevant internal mechanisms are **adaptations** — *products of natural selection* — that helped our ancestors get around the world, survive, and reproduce. Evolutionary psychology is founded on several core premises:

- The brain is an information-processing device, and it produces behaviour in response to external and internal inputs.

- The brain's adaptive mechanisms were shaped by natural selection.
- Different neural mechanisms are specialized for solving problems in humanity's evolutionary past.
- The brain has evolved specialized neural mechanisms that were designed for solving problems that recurred over deep evolutionary time, giving modern humans stone-age minds.
- Most contents and processes of the brain are unconscious; and most mental problems that seem easy to solve are actually extremely difficult problems that are solved unconsciously by complicated neural mechanisms.
- Human psychology consists of many specialized mechanisms, each sensitive to different classes of information or inputs. These mechanisms combine to produce manifest behaviour.

Evolutionary psychologists sometimes present their approach as potentially unifying, or providing a foundation for, all other work that aims to explain human behaviour (Tooby & Cosmides, 1992). This claim has been met with skepticism by many social scientists who see a role for multiple types of explanation of human behaviour, some of which are not reducible to biological explanations of any sort.

Key Takeaways

- Humanistic psychology emerged as the "third force" in psychology after psychodynamic and behaviourist psychologies.
- The key principles of humanistic psychology include human capacity for self-actualization, self-direction, and choice.
- Carl Rogers identified five principles of a fully functioning person as open, present, trusting, creative, and fulfilled.
- Humanistic psychology relies on subjective factors and utilizes qualitative methods of study.
- Abraham Maslow introduced a hierarchy of human needs including physiological, safety, belonging, esteem, and self-actualization.
- With the advance of humanistic psychology, human motivation theory shifted from a purely external or extrinsic focus to the acknowledgment of an intrinsic focus.
- Positive psychology recommends focusing on people's strengths and virtues as a point of departure rather than analyzing the underlying psychopathology.
- Flow is a state of optimal performance that can be entered when a person is wholeheartedly performing a task or activity for intrinsic purposes.
- Cognitive psychology is the study of mental processes such as attention, memory, perception, language use, problem solving, creativity, and thinking.
- The main premise of evolutionary psychology is that while today the human mind is shaped by the modern social world, it is adapted to the natural environment in which it evolved.

Exercises and Critical Thinking

1. What model do you believe the current educational system follows? Are students trained according to the behavioural model or do educators also address the subjective beliefs, thoughts, and feelings of the student?
2. What are some of the psychological traits you possess that might contribute to your survival or "fitness"? Can you provide an example of when this trait contributed to your success?
3. Can you see applications for the principles of evolutionary psychology in the workplace or community (e.g., certain psychological qualities will ensure that you perform more effectively in a job interview)?
4. Conduct a cultural analysis of your family, cohort, or social group. What are some of the values and beliefs communicated in your family or group? In what shape or form are these values manifested or expressed? Through what ways of doing, artifacts, activities, and/or traditions are these values communicated or expressed?

Image Attributions

Figure 2.15: Diagram of Maslow's hierarchy of needs. by J. Finkelstein (http://commons.wikimedia.org/wiki/File:Maslow's_hierarchy_of_needs.png) used under CC BY SA 3.0 license (http://creativecommons.org/licenses/by-sa/3.0/deed.en).

Figure 2.16: Challenge vs skill Commons by Dr. enh (http://commons.wikimedia.org/wiki/Fi...ll_Commons.jpg) is in the public domain.

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Long Descriptions

Figure 2.15 long description: In Maslow's hierarchy of needs, there are five levels.

1. Physiological needs: Breathing, food, water, sex, sleep, homeostasis, excretion.
2. Safety needs: Security of body, of employment, of resources, of morality, of the family, of health, of property.
3. Long and belonging needs: Friendship, family, sexual intimacy.
4. Esteem needs: Self-esteem, confidence, chievement, respect of others, respect by others.
5. Self-Actualization: Morality, creativity, spontaneity, problem solving, lack of prejudice, acceptance of facts.

Figure 2.16 long description: Factors of Flow State.

	Low Skill Level	Medium Skill Level	High Skill Level
Low Challenge	Apathy	Boredom	Relaxation
Medium Challenge	Worry		Control
High Challenge	Anxiety	Arousal	***Flow***

Footnotes

1. Adapted by J. Walinga.
2. A growth need allows one to reach full potential as a human being.

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2.6: Summary, Key Terms, and Self-Test

Jennifer Walinga and Lee Sanders

Summary

There are many different ways to think about human experience, thought, and behaviour. The multiple perspectives in modern psychology provide researchers and students a variety of ways to approach problems and to understand, explain, predict, and resolve human thought and behaviour.

Perhaps the field of psychology struggles to find a unifying paradigm because human beings are so multifaceted, and human experience so diverse and complex. As with many areas of life, psychology is perhaps best understood through its complexity: psychology seems to move between poles and require a dialectical examination. Human beings are complex systems living within complex adaptive systems (Figure 2.17), possessing multiple ways of knowing and learning and therefore requiring multiple perspectives in order to shed light on the meaning of any one human experience.

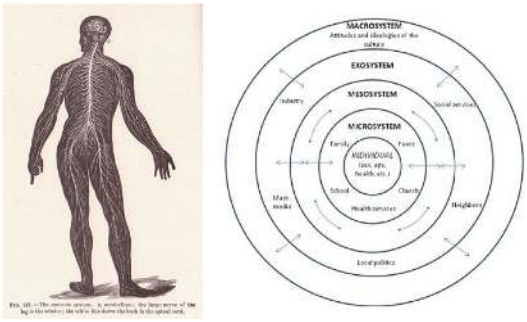


Figure 2.17 Complex Adaptive Systems. [Long Description]

The greatest challenge of modern psychology may be holding the whole of human system experience in our minds – biology, cognition, emotion, and belief over time and within an environment and culture – and distilling an understanding from the complex interactions of so many factors.

Key Terms

- Access
- Activation-synthesis theory
- Active Imagination
- Adaptations
- Affect
- Anima
- Animus
- Archetypes
- Associative shifting
- Attention
- Authoethnography
- Autonomic nervous system
- Availability
- Avoidance learning
- Behaviourism
- Biological drive
- Biological psychology
- Black box model
- Classical conditioning
- Client- or person-centred therapy
- Cognitive-behavioural therapy (CBT)
- Cognitive psychology
- Collective unconscious
- Complexes
- Conscious
- Consciousness
- Continual-activation theory
- Deficiency needs
- Divided attention
- Dreams
- Episodic memory
- Escape learning
- Evolutionary psychology
- Existential therapy
- Expectation fulfillment theory
- Extinction
- Extravert
- Feeling function
- Fight-or-flight response
- Frontal lobe
- Functionalism (or school of functionalism)
- Gamification
- Gestalt therapy
- Growth need
- Holist
- Humanistic psychology
- Identical elements theory of transfer
- Identifiability
- Law of use
- Mandala
- Manifest content
- Methodologies
- Metacognition
- Motivation theory
- Multiple response
- Myers-Briggs Type Indicator
- Mystery
- Negative reinforcement
- Neural correlates of consciousness (NCC)
- Neurogenesis
- Neurophilosophy
- Neurosis
- Non-rapid eye movement or non-REM (NREM) sleep
- Occipital lobe
- Operant conditioning
- Paradigm
- Parasympathetic nervous system
- Peripheral nervous system
- Persona
- Personal unconscious
- Phenomenal
- Positive psychology
- Positive reinforcement
- Preconscious
- Prepotency of elements
- Problem restructuring
- Procedural memory
- Psychoanalysis
- Psychodynamic psychology
- Punishment
- Radical behaviourism
- Rapid eye movement (REM) sleep
- Reductionist
- Reinforcement
- Response by analogy
- Scientific management
- Selective forgetting
- Self
- Self-actualize
- Semantic memory
- Sensing function
- Set or attitude
- Shadow
- Skinner box
- Story
- Structuralism

- Individuation
- Information Processor
- Integrative Psychology
- Intrinsic motivation
- Introspection
- Introvert
- Intuitive
- Latent content
- Law of disuse
- Law of effect
- Law of readiness
- Law of recency
- Somatic nervous system
- Spreading activation
- Symbol
- Sympathetic nervous system
- Temporal lobe
- Thinking function
- Third force
- Threat-simulation theory
- Unconscious
- Visual attention
- Word association test

Self-Test

Image Attributions

Figure 2.17: body by Sue Clark (http://commons.wikimedia.org/wiki/Fi...ous_System.jpg) is in the public domain; bullseye from Wikipedia (http://en.wikipedia.org/wiki/Ecologi...systems_theory) used under a CC-BY-SA license 3.0 Unported license (http://creativecommons.org/licenses/by-sa/3.0/).

Long Description

Figure 2.17 long description: The individual is surrounded by multiple systems which exercise influence on the individual.

1. An individual's sex, age, health, etc.
2. Microsystem: Family, peers, church, health services, school.
3. Mesosystem.
4. Exosystem: Social services, neighbours, local politics, mass media, industry.
5. Macrosystem: Attitudes and ideologies of the culture.

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CHAPTER OVERVIEW

3: Psychological Science and Research

3.1: Introduction
3.2: Psychologists Use the Scientific Method to Guide Their Research
3.3: Moral Foundations of Ethical Research
3.4: From Moral Principles to Ethics Codes
3.5: Putting Ethics into Practice
3.6: Psychologists Use Descriptive, Correlational, and Experimental Research Designs to Understand Behaviour
3.7: You Can Be an Informed Consumer of Psychological Research
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3.9: Summary, Key Terms, and Self-Test

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3.1: Introduction

Charles Stangor, Jennifer Walinga, Jorden A. Cummings, and Lee Sanders

Psychologists study the behaviour of both humans and animals. The main purpose of this research is to help us understand people and to improve the quality of human lives. The results of psychological research are relevant to problems such as learning and memory, homelessness, psychological disorders, family instability, and aggressive behaviour and violence. Psychological research is used in a range of important areas, from public policy to driver safety. It guides court rulings with respect to racism and sexism (Brown v. Board of Education, 1954; Fiske, Bersoff, Borgida, Deaux, & Heilman, 1991), as well as court procedure, in the use of lie detectors during criminal trials, for example (Saxe, Dougherty, & Cross, 1985). Psychological research helps us understand how driver behaviour affects safety (Fajen & Warren, 2003), which methods of educating children are most effective (Alexander & Winne, 2006; Woolfolk-Hoy, 2005), how to best detect deception (DePaulo et al., 2003), and the causes of terrorism (Borum, 2004).

Some psychological research is basic research. **Basic research** is *research that answers fundamental questions about behaviour*. For instance, biopsychologists study how nerves conduct impulses from the receptors in the skin to the brain, and cognitive psychologists investigate how different types of studying influence memory for pictures and words. There is no particular reason to examine such things except to acquire a better knowledge of how these processes occur. **Applied research** is *research that investigates issues that have implications for everyday life and provides solutions to everyday problems*. Applied research has been conducted to study, among many other things, the most effective methods for reducing depression, the types of advertising campaigns that serve to reduce drug and alcohol abuse, the key predictors of managerial success in business, and the indicators of effective government programs.

Basic research and applied research inform each other, and advances in science occur more rapidly when each type of research is conducted (Lewin, 1999). For instance, although research concerning the role of practice on memory for lists of words is basic in orientation, the results could potentially be applied to help children learn to read. Correspondingly, psychologist-practitioners who wish to reduce the spread of AIDS or to promote volunteering frequently base their programs on the results of basic research. This basic AIDS or volunteering research is then applied to help change people's attitudes and behaviours.

Psychological studies start with a **research design,** which is *the specific method a researcher uses to collect, analyze, and interpret data*. Psychologists use three major types of research designs in their research, and each provides an essential avenue for scientific investigation. **Descriptive research** is *research designed to provide a snapshot of the current state of affairs*. **Correlational research** is *research designed to discover relationships among variables and to allow the prediction of future events from present knowledge*. **Experimental research** is *research in which initial equivalence among research participants in more than one group is created, followed by a manipulation of a given experience for these groups and a measurement of the influence of the manipulation.* Each of the three research designs varies according to its strengths and limitations, and it is important to understand how each differs.

It is important that research in psychology is conducted in an ethical, moral, and responsible manner. Our research ethics are interpreted by important moral principles like respecting people's rights and dignity. These moral principles are then translated into ethical codes – or set of rules – that researchers must follow. These codes have developed over time, often in response to historical and scientific events. One example rule is that participants must give informed consent before participating in a research study. That is, they must be aware of the procedure, potential risks, and benefits before explicitly stating if they wish to participate.

The results of psychological research are reported primarily in research articles published in scientific journals, and your instructor may require you to read some of these. The research reported in scientific journals has been evaluated, critiqued, and improved by scientists in the field through the process of *peer review*. In this book there are many citations of original research articles, and I encourage you to read those reports when you find a topic interesting. Most of these papers are readily available online through your college or university library. It is only by reading the original reports that you will really see how the research process works. A list of some of the most important journals in psychology is provided here for your information.

Psychology is not without its share of contentious issues, like many areas of scientific inquiry. One of the most recent debates is about replicability – or ability for findings to be supported by multiple studies and generalize across time and situations – and whether or not replicability should even be a goal of psychological science. We will discuss this issue and its impact on our field.

Psychological Journals

The following is a list of some of the most important journals in various subdisciplines of psychology. The research articles in these journals are likely to be available in your college or university library. You should try to read the primary source material in these journals when you can.

General Psychology

- American Journal of Psychology
- American Psychologist
- Behavioral and Brain Sciences
- Canadian Journal of Behavioural Science
- Canadian Journal of Experimental Psychology
- Canadian Psychology
- Psychological Bulletin
- Psychological Methods
- Psychological Review
- Psychological Science

Biopsychology and Neuroscience

- Behavioral Neuroscience
- Journal of Comparative Psychology
- Psychophysiology

Clinical and Counselling Psychology

- Journal of Abnormal Psychology
- Journal of Consulting and Clinical Psychology
- Journal of Counselling Psychology

Cognitive Psychology

- Canadian Journal of Experimental Psychology
- Cognition
- Cognitive Psychology
- Journal of Memory and Language
- Perception & Psychophysics

Cross-Cultural, Personality, and Social Psychology

- Journal of Cross-Cultural Psychology
- Journal of Experimental Social Psychology
- Journal of Personality
- Journal of Personality and Social Psychology
- Personality and Social Psychology Bulletin

Developmental Psychology

- Child Development
- Developmental Psychology

Educational and School Psychology

- Educational Psychologist
- Journal of Educational Psychology
- Review of Educational Research

Environmental, Industrial, and Organizational Psychology

- Journal of Applied Psychology

- Organizational Behavior and Human Decision Processes
- Organizational Psychology
- Organizational Research Methods
- Personnel Psychology

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Fajen, B. R., & Warren, W. H. (2003). Behavioral dynamics of steering, obstacle avoidance, and route selection. *Journal of Experimental Psychology: Human Perception and Performance*, *29*(2), 343–362.

Fiske, S. T., Bersoff, D. N., Borgida, E., Deaux, K., & Heilman, M. E. (1991). Social science research on trial: Use of sex stereotyping research in Price Waterhouse v. Hopkins. *American Psychologist*, *46*(10), 1049–1060.

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3.2: Psychologists Use the Scientific Method to Guide Their Research

Charles Stangor, Jennifer Walinga, and Jorden A. Cummings

Learning Objectives

- Describe the principles of the scientific method and explain its importance in conducting and interpreting research.
- Differentiate laws from theories and explain how research hypotheses are developed and tested.
- Discuss the procedures that researchers use to ensure that their research with humans and with animals is ethical.

Psychologists aren't the only people who seek to understand human behaviour and solve social problems. Philosophers, religious leaders, and politicians, among others, also strive to provide explanations for human behaviour. But psychologists believe that research is the best tool for understanding human beings and their relationships with others. Rather than accepting the claim of a philosopher that people do (or do not) have free will, a psychologist would collect data to empirically test whether or not people are able to actively control their own behaviour. Rather than accepting a politician's contention that creating (or abandoning) a new centre for mental health will improve the lives of individuals in the inner city, a psychologist would empirically assess the effects of receiving mental health treatment on the quality of life of the recipients. The statements made by psychologists are **empirical,** which means they are *based on systematic collection and analysis of data*.

The Scientific Method

All scientists (whether they are physicists, chemists, biologists, sociologists, or psychologists) are engaged in the basic processes of collecting data and drawing conclusions about those data. The methods used by scientists have developed over many years and provide a common framework for developing, organizing, and sharing information. The **scientific method** is *the set of assumptions, rules, and procedures scientists use to conduct research*.

In addition to requiring that science be empirical, the scientific method demands that the procedures used be **objective**, or *free from the personal bias or emotions of the scientist*. The scientific method proscribes how scientists collect and analyze data, how they draw conclusions from data, and how they share data with others. These rules increase objectivity by placing data under the scrutiny of other scientists and even the public at large. Because data are reported objectively, other scientists know exactly how the scientist collected and analyzed the data. This means that they do not have to rely only on the scientist's own interpretation of the data; they may draw their own, potentially different, conclusions.

Most new research is designed to **replicate** — that is, *to repeat, add to, or modify* — previous research findings. The scientific method therefore results in an accumulation of scientific knowledge through the reporting of research and the addition to and modification of these reported findings by other scientists.

Laws and Theories as Organizing Principles

One goal of research is to organize information into meaningful statements that can be applied in many situations. *Principles that are so general as to apply to all situations in a given domain of inquiry* are known as **laws**. There are well-known laws in the physical sciences, such as the law of gravity and the laws of thermodynamics, and there are some universally accepted laws in psychology, such as the law of effect and Weber's law. But because laws are very general principles and their validity has already been well established, they are themselves rarely directly subjected to scientific test.

The next step down from laws in the hierarchy of organizing principles is theory. A **theory** is *an integrated set of principles that explains and predicts many, but not all, observed relationships within a given domain of inquiry*. One example of an important theory in psychology is the **stage theory of cognitive development** proposed by the Swiss psychologist Jean Piaget. The theory *states that children pass through a series of cognitive stages as they grow, each of which must be mastered in succession before movement to the next cognitive stage can occur*. This is an extremely useful theory in human development because it can be applied to many different content areas and can be tested in many different ways.

Good theories have four important characteristics. First, good theories are **general**, meaning *they summarize many different outcomes*. Second, they are **parsimonious**, meaning *they provide the simplest possible account of those outcomes*. The stage theory of cognitive development meets both of these requirements. It can account for developmental changes in behaviour across a wide

variety of domains, and yet it does so parsimoniously — by hypothesizing a simple set of cognitive stages. Third, good theories provide ideas for future research. The stage theory of cognitive development has been applied not only to learning about cognitive skills, but also to the study of children's moral (Kohlberg, 1966) and gender (Ruble & Martin, 1998) development.

Finally, good theories are **falsifiable** (Popper, 1959), which means *the variables of interest can be adequately measured and the relationships between the variables that are predicted by the theory can be shown through research to be incorrect*. The stage theory of cognitive development is falsifiable because the stages of cognitive reasoning can be measured and because if research discovers, for instance, that children learn new tasks before they have reached the cognitive stage hypothesized to be required for that task, then the theory will be shown to be incorrect.

No single theory is able to account for all behaviour in all cases. Rather, theories are each limited in that they make accurate predictions in some situations or for some people but not in other situations or for other people. As a result, there is a constant exchange between theory and data: existing theories are modified on the basis of collected data, and the new modified theories then make new predictions that are tested by new data, and so forth. When a better theory is found, it will replace the old one. This is part of the accumulation of scientific knowledge.

The Research Hypothesis

Theories are usually framed too broadly to be tested in a single experiment. Therefore, scientists use a more precise statement of the presumed relationship between specific parts of a theory — a research hypothesis — as the basis for their research. A **research hypothesis** is *a specific and falsifiable prediction about the relationship between or among two or more variables*, where a **variable** is *any attribute that can assume different values among different people or across different times or places*. The research hypothesis states the existence of a relationship between the variables of interest and the specific direction of that relationship. For instance, the research hypothesis "Using marijuana will reduce learning" predicts that there is a relationship between one variable, "using marijuana," and another variable called "learning." Similarly, in the research hypothesis "Participating in psychotherapy will reduce anxiety," the variables that are expected to be related are "participating in psychotherapy" and "level of anxiety."

When stated in an abstract manner, the ideas that form the basis of a research hypothesis are known as conceptual variables. **Conceptual variables** are *abstract ideas that form the basis of research hypotheses*. Sometimes the conceptual variables are rather simple — for instance, age, gender, or weight. In other cases the conceptual variables represent more complex ideas, such as anxiety, cognitive development, learning, self-esteem, or sexism.

The first step in testing a research hypothesis involves turning the conceptual variables into **measured variables**, which are *variables consisting of numbers that represent the conceptual variables*. For instance, the conceptual variable "participating in psychotherapy" could be represented as the measured variable "number of psychotherapy hours the patient has accrued," and the conceptual variable "using marijuana" could be assessed by having the research participants rate, on a scale from 1 to 10, how often they use marijuana or by administering a blood test that measures the presence of the chemicals in marijuana.

Psychologists use the term **operational definition** to refer to *a precise statement of how a conceptual variable is turned into a measured variable*. The relationship between conceptual and measured variables in a research hypothesis is diagrammed in Figure 3.1. The conceptual variables are represented in circles at the top of the figure (Psychotherapy and anxiety), and the measured variables are represented in squares at the bottom (number of hours the patient has spent in psychotherapy and anxiety concerns as reported by the patient). The two vertical arrows, which lead from the conceptual variables to the measured variables, represent the operational definitions of the two variables. The arrows indicate the expectation that changes in the conceptual variables (psychotherapy and anxiety) will cause changes in the corresponding measured variables (number of hours in psychotherapy and reported anxiety concerns). The measured variables are then used to draw inferences about the conceptual variables.

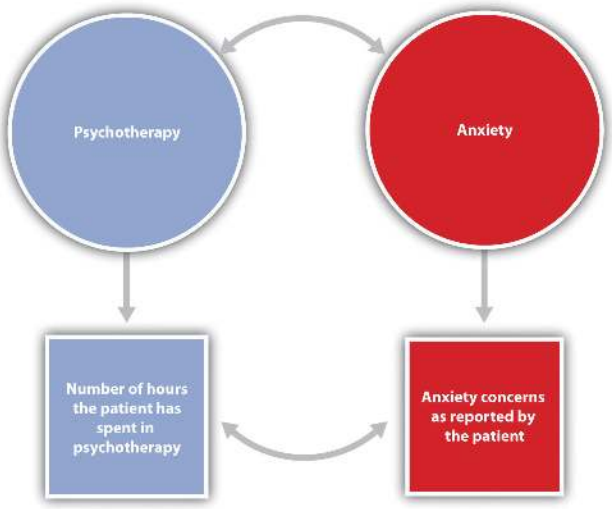


Figure 3.1. Research Hypothesis. In this research hypothesis, the conceptual variable of attending psychotherapy is operationalized using the number of hours of psychotherapy the client has completed, and the conceptual variable of anxiety is operationalized using self-reported levels of anxiety. The research hypothesis is that more psychotherapy will be related to less reported anxiety.

Table 3.1 lists some potential operational definitions of conceptual variables that have been used in psychological research. As you read through this list, note that in contrast to the abstract conceptual variables, the measured variables are very specific. This specificity is important for two reasons. First, more specific definitions mean that there is less danger that the collected data will be misunderstood by others. Second, specific definitions will enable future researchers to replicate the research.

Table 3.1 Examples of the Operational Definitions of Conceptual Variables that Have Been Used in Psychological Research

Conceptual variable	Operational definitions
Aggression	• Number of presses of a button that administers shock to another student • Number of seconds taken to honk the horn at the car ahead after a stoplight turns green
Interpersonal attraction	• Number of inches that an individual places his or her chair away from another person • Number of millimeters of pupil dilation when one person looks at another
Employee satisfaction	• Number of days per month an employee shows up to work on time • Rating of job satisfaction from 1 (*not at all satisfied*) to 9 (*extremely satisfied*)
Decision-making skills	• Number of groups able to correctly solve a group performance task • Number of seconds in which a person solves a problem
Depression	• Number of negative words used in a creative story • Number of appointments made with a psychotherapist

Characteristics of an Ethical Research Project Using Human Participants

- Trust and positive rapport are created between the researcher and the participant.
- The rights of both the experimenter and participant are considered, and the relationship between them is mutually beneficial.

- The experimenter treats the participant with concern and respect and attempts to make the research experience a pleasant and informative one.
- Before the research begins, the participant is given all information relevant to his or her decision to participate, including any possibilities of physical danger or psychological stress.
- The participant is given a chance to have questions about the procedure answered, thus guaranteeing his or her free choice about participating.
- After the experiment is over, any deception that has been used is made public, and the necessity for it is explained.
- The experimenter carefully debriefs the participant, explaining the underlying research hypothesis and the purpose of the experimental procedure in detail and answering any questions.
- The experimenter provides information about how he or she can be contacted and offers to provide information about the results of the research if the participant is interested in receiving it. (Stangor, 2011)

This list presents some of the most important factors that psychologists take into consideration when designing their research. The most direct ethical concern of the scientist is to prevent harm to the research participants. One example is the well-known research of Stanley Milgram (1974) investigating obedience to authority. In these studies, participants were induced by an experimenter to administer electric shocks to another person so that Milgram could study the extent to which they would obey the demands of an authority figure. Most participants evidenced high levels of stress resulting from the psychological conflict they experienced between engaging in aggressive and dangerous behaviour and following the instructions of the experimenter. Studies such as those by Milgram are no longer conducted because the scientific community is now much more sensitized to the potential of such procedures to create emotional discomfort or harm.

Another goal of ethical research is to guarantee that participants have free choice regarding whether they wish to participate in research. Students in psychology classes may be allowed, or even required, to participate in research, but they are also always given an option to choose a different study to be in, or to perform other activities instead. And once an experiment begins, the research participant is always free to leave the experiment if he or she wishes to. Concerns with free choice also occur in institutional settings, such as in schools, hospitals, corporations, and prisons, when individuals are required by the institutions to take certain tests, or when employees are told or asked to participate in research.

Researchers must also protect the privacy of the research participants. In some cases data can be kept anonymous by not having the respondents put any identifying information on their questionnaires. In other cases the data cannot be anonymous because the researcher needs to keep track of which respondent contributed the data. In this case, one technique is to have each participant use a unique code number to identify his or her data, such as the last four digits of the student ID number. In this way the researcher can keep track of which person completed which questionnaire, but no one will be able to connect the data with the individual who contributed them.

Perhaps the most widespread ethical concern to the participants in behavioural research is the extent to which researchers employ deception. **Deception** *occurs whenever research participants are not completely and fully informed about the nature of the research project before participating in it*. Deception may occur in an active way, such as when the researcher tells the participants that he or she is studying learning when in fact the experiment really concerns obedience to authority. In other cases the deception is more passive, such as when participants are not told about the hypothesis being studied or the potential use of the data being collected.

Some researchers have argued that no deception should ever be used in any research (Baumrind, 1985). They argue that participants should always be told the complete truth about the nature of the research they are in, and that when participants are deceived there will be negative consequences, such as the possibility that participants may arrive at other studies already expecting to be deceived. Other psychologists defend the use of deception on the grounds that it is needed to get participants to act naturally and to enable the study of psychological phenomena that might not otherwise get investigated. They argue that it would be impossible to study topics such as altruism, aggression, obedience, and stereotyping without using deception because if participants were informed ahead of time what the study involved, this knowledge would certainly change their behaviour. The codes of ethics of the Canadian Psychological Association and the Tri-Council Policy Statement of Canada's three federal research agencies (the Canadian Institute of Health Research [CIHR], the Natural Sciences and Engineering Research Council of Canada [NSERC], and the Social Sciences and Humanities Research Council of Canada [SSHRC] or "the Agencies") allow researchers to use deception, but these codes also require them to explicitly consider how their research might be conducted without the use of deception.

Research with Animals

Because animals make up an important part of the natural world, and because some research cannot be conducted using humans, animals are also participants in psychological research (Figure 3.3). Most psychological research using animals is now conducted with rats, mice, and birds, and the use of other animals in research is declining (Thomas & Blackman, 1992). As with ethical decisions involving human participants, a set of basic principles has been developed that helps researchers make informed decisions about such research; a summary is shown below.

Canadian Psychological Association Guidelines on Humane Care and Use of Animals in Research

The following are some of the most important ethical principles from the Canadian Psychological Association's (CPA) guidelines on research with animals.

- II.45 Not use animals in their research unless there is a reasonable expectation that the research will increase understanding of the structures and processes underlying behaviour, or increase understanding of the particular animal species used in the study, or result eventually in benefits to the health and welfare of humans or other animals.
- II.46 Use a procedure subjecting animals to pain, stress, or privation only if an alternative procedure is unavailable and the goal is justified by its prospective scientific, educational, or applied value.
- II.47 Make every effort to minimize the discomfort, illness, and pain of animals. This would include performing surgical procedures only under appropriate anaesthesia, using techniques to avoid infection and minimize pain during and after surgery and, if disposing of experimental animals is carried out at the termination of the study, doing so in a humane way. (Canadian Code of Ethics for Psychologists)
- II.48 Use animals in classroom demonstrations only if the instructional objectives cannot be achieved through the use of video-tapes, films, or other methods, and if the type of demonstration is warranted by the anticipated instructional gain (Canadian Psychological Association, 2000).



Figure 3.2 Animal Research. Psychologists may use animals in their research, but they make reasonable efforts to minimize the discomfort the animals experience.

Because the use of animals in research involves a personal value, people naturally disagree about this practice. Although many people accept the value of such research (Plous, 1996), a minority of people, including animal-rights activists, believe that it is ethically wrong to conduct research on animals. This argument is based on the assumption that because animals are living creatures just as humans are, no harm should ever be done to them.

Most scientists, however, reject this view. They argue that such beliefs ignore the potential benefits that have come, and continue to come, from research with animals. For instance, drugs that can reduce the incidence of cancer or AIDS may first be tested on animals, and surgery that can save human lives may first be practised on animals. Research on animals has also led to a better understanding of the physiological causes of depression, phobias, and stress, among other illnesses. In contrast to animal-rights activists, then, scientists believe that because there are many benefits that accrue from animal research, such research can and should continue as long as the humane treatment of the animals used in the research is guaranteed.

Key Takeaways

- Psychologists use the scientific method to generate, accumulate, and report scientific knowledge.

- Basic research, which answers questions about behaviour, and applied research, which finds solutions to everyday problems, inform each other and work together to advance science.
- Research reports describing scientific studies are published in scientific journals so that other scientists and laypersons may review the empirical findings.
- Organizing principles, including laws, theories, and research hypotheses, give structure and uniformity to scientific methods.
- Concerns for conducting ethical research are paramount. Researchers ensure that participants are given free choice to participate and that their privacy is protected. Informed consent and debriefing help provide humane treatment of participants.
- A **cost-benefit analysis** is used to determine what research should and should not be allowed to proceed.

Exercises and Critical Thinking

1. Give an example from personal experience of how you or someone you know has benefited from the results of scientific research.
2. Find and discuss a research project that in your opinion has ethical concerns. Explain why you find these concerns to be troubling.
3. Indicate your personal feelings about the use of animals in research. When should and should not animals be used? What principles have you used to come to these conclusions?

Image Attributions

Figure 3.2: "Wistar rat" by Janet Stephens (http://en.wikipedia.org/wiki/File:Wistar_rat.jpg) is in the public domain.

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3.3: Moral Foundations of Ethical Research

Paul C. Price, Rajiv S. Jhangiani, I-Chant A. Chiang, Dana C. Leighton, and Carrie Cuttler

Learning Objectives

- Describe a simple framework for thinking about ethical issues in psychological research.
- Give examples of several ethical issues that arise in psychological research—including ones that affect research participants, the scientific community, and society more generally.

In 1998 a medical journal called *The Lancet* published an article of interest to many psychologists. The researchers claimed to have shown a statistical relationship between receiving the combined measles, mumps, and rubella (MMR) vaccine and the development of autism—suggesting furthermore that the vaccine might even cause autism. One result of this report was that many parents decided not to have their children vaccinated, which of course put them at higher risk for measles, mumps, and rubella. However, follow-up studies by other researchers consistently failed to find a statistical relationship between the MMR vaccine and autism—and it is widely accepted now in the scientific community that there is no relationship. In addition, several more serious problems with the original research were uncovered. Among them were that the lead researcher stood to gain financially from his conclusions because he had patented a competing measles vaccine. He had also used biased methods to select and test his research participants and had used unapproved and medically unnecessary procedures on them. In 2010 *The Lancet* retracted the article, and the lead researcher's right to practice medicine was revoked (Burns, 2010).

Video: Vaccines Don't Cause Autism: Healthcare Triage #12 [https://www.youtube.com/watch?v=o65l1YAVaYc]



In the upcoming sections (3.2. 3.3, 3.4) we explore the ethics of scientific research in psychology. We begin with a general framework for thinking about the ethics of scientific research in psychology. Then we look at some specific ethical codes for biomedical and behavioral researchers —focusing on the Ethics Code of the American Psychological Association. Finally, we consider some practical tips for conducting ethical research in psychology.

Ethics is the branch of philosophy that is concerned with morality—what it means to behave morally and how people can achieve that goal. It can also refer to a set of principles and practices that provide moral guidance in a particular field. There is an ethics of business, medicine, teaching, and of course, scientific research. As the opening example illustrates, many kinds of ethical issues can arise in scientific research, especially when it involves human participants. For this reason, it is useful to begin with a general framework for thinking through these issues.

A Framework for Thinking About Research Ethics

Table 3.1 "A Framework for Thinking About Ethical Issues in Scientific Research" presents a framework for thinking through the ethical issues involved in psychological research. The rows of Table 3.1 "A Framework for Thinking About Ethical Issues in Scientific Research" represent four general moral principles that apply to scientific research: weighing risks against benefits, acting responsibly and with integrity, seeking justice, and respecting people's rights and dignity. (These principles are adapted from those

in the American Psychological Association [APA] Ethics Code.) The columns of Table 3.2 “A Framework for Thinking About Ethical Issues in Scientific Research” represent three groups of people that are affected by scientific research: the research participants, the scientific community, and society more generally. The idea is that a thorough consideration of the ethics of any research project must take into account how each of the four moral principles applies to each of the three groups of people.

Table 3.2 A Framework for Thinking About Ethical Issues in Scientific Research

Moral principle	Who is affected?		
	Research participants	Scientific community	Society
Weighing risks against benefits			
Acting responsibly and with integrity			
Seeking justice			
Respecting people’s rights and dignity			

Moral Principles

Let us look more closely at each of the moral principles and how they can be applied to each of the three groups.

Weighing Risks Against Benefits

Scientific research in psychology can be ethical only if its risks are outweighed by its benefits. Among the risks to research participants are that a treatment might fail to help or even be harmful, a procedure might result in physical or psychological harm, and their right to privacy might be violated. Among the potential benefits are receiving a helpful treatment, learning about psychology, experiencing the satisfaction of contributing to scientific knowledge, and receiving money or course credit for participating. Scientific research can have risks and benefits to the scientific community and to society too (Rosenthal, 1994). A risk to science is that if a research question is uninteresting or a study is poorly designed, then the time, money, and effort spent on that research could have been spent on more productive research. A risk to society is that research results could be misunderstood or misapplied with harmful consequences. The research that mistakenly linked the measles, mumps, and rubella (MMR) vaccine to autism resulted in both of these kinds of harm. Of course, the benefits of scientific research to science and society are that it advances scientific knowledge and can contribute to the welfare of society.

It is not necessarily easy to weigh the risks of research against its benefits because the risks and benefits may not be directly comparable. For example, it is common for the risks of a study to be primarily to the research participants but the benefits primarily for science or society. Consider, for example, Stanley Milgram’s original study on obedience to authority (Milgram, 1963). The participants were told that they were taking part in a study on the effects of punishment on learning and were instructed to give electric shocks to another participant each time that participant responded incorrectly on a learning task. With each incorrect response, the shock became stronger—eventually causing the other participant (who was in the next room) to protest, complain about his heart, scream in pain, and finally fall silent and stop responding. If the first participant hesitated or expressed concern, the researcher said that he must continue. In reality, the other participant was a **confederate** of the researcher—a helper who pretended to be a real participant—and the protests, complaints, and screams that the real participant heard were an audio recording that was activated when he flipped the switch to administer the “shocks.” The surprising result of this study was that most of the real participants continued to administer the shocks right through the confederate’s protests, complaints, and screams. Although this is considered one of the most important results in psychology—with implications for understanding events like the Holocaust or the mistreatment of prisoners by US soldiers at Abu Ghraib—it came at the cost of producing severe psychological stress in the research participants.

Was It Worth It?

Much of the debate over the ethics of Milgram’s obedience study concerns the question of whether the resulting scientific knowledge was worth the harm caused to the research participants. To get a better sense of the harm, consider Milgram’s (1963) own description of it.

In a large number of cases, the degree of tension reached extremes that are rarely seen in sociopsychological laboratory studies. Subjects were observed to sweat, tremble, stutter, bite their lips, groan, and dig their fingernails into their flesh.…Fourteen of the 40 subjects showed definite signs of nervous laughter and smiling. The laughter seemed entirely out of place, even bizarre. Full blown uncontrollable seizures [of laughter] were observed for three subjects. On one occasion we observed a seizure so violently convulsive that it was necessary to call a halt to the experiment (p. 375).

Milgram also noted that another observer reported that within 20 minutes one participant "was reduced to a twitching, stuttering wreck, who was rapidly approaching the point of nervous collapse" (p. 377)

To Milgram's credit, he went to great lengths to debrief his participants—including returning their mental states to normal—and to show that most of them thought the research was valuable and were glad to have participated.

Acting Responsibly and With Integrity

Researchers must act responsibly and with integrity. This means carrying out their research in a thorough and competent manner, meeting their professional obligations, and being truthful. Acting with integrity is important because it promotes trust, which is an essential element of all effective human relationships. Participants must be able to trust that researchers are being honest with them (e.g., about what the study involves), will keep their promises (e.g., to maintain confidentiality), and will carry out their research in ways that maximize benefits and minimize risk. An important issue here is the use of deception. Some research questions (such as Milgram's) are difficult or impossible to answer without deceiving research participants. Thus acting with integrity can conflict with doing research that advances scientific knowledge and benefits society. We will consider how psychologists generally deal with this conflict shortly.

The scientific community and society must also be able to trust that researchers have conducted their research thoroughly and competently and that they have reported on it honestly. Again, the example at the beginning of the chapter illustrates what can happen when this trust is violated. In this case, other researchers wasted resources on unnecessary follow-up research and people avoided the MMR vaccine, putting their children at increased risk of measles, mumps, and rubella.

Seeking Justice

Researchers must conduct their research in a just manner. They should treat their participants fairly, for example, by giving them adequate compensation for their participation and making sure that benefits and risks are distributed across all participants. For example, in a study of a new and potentially beneficial psychotherapy, some participants might receive the psychotherapy while others serve as a control group that receives no treatment. If the psychotherapy turns out to be effective, it would be fair to offer it to participants in the control group when the study ends.

At a broader societal level, members of some groups have historically faced more than their fair share of the risks of scientific research, including people who are institutionalized, are disabled, or belong to racial or ethnic minorities. A particularly tragic example is the Tuskegee syphilis study conducted by the US Public Health Service from 1932 to 1972 (Reverby, 2009). The participants in this study were poor African American men in the vicinity of Tuskegee, Alabama, who were told that they were being treated for "bad blood." Although they were given some free medical care, they were not treated for their syphilis. Instead, they were observed to see how the disease developed in untreated patients. Even after the use of penicillin became the standard treatment for syphilis in the 1940s, these men continued to be denied treatment without being given an opportunity to leave the study. The study was eventually discontinued only after details were made known to the general public by journalists and activists. It is now widely recognized that researchers need to consider issues of justice and fairness at the societal level.

"They Were Betrayed"

In 1997—65 years after the Tuskegee Syphilis Study began and 25 years after it ended—President Bill Clinton formally apologized on behalf of the US government to those who were affected. Here is an excerpt from the apology:

So today America does remember the hundreds of men used in research without their knowledge and consent. We remember them and their family members. Men who were poor and African American, without resources and with few alternatives, they believed they had found hope when they were offered free medical care by the United States Public Health Service. They were betrayed.

Read the full text of the apology at http://www.cdc.gov/tuskegee/clintonp.htm.

Respecting People's Rights and Dignity

Researchers must respect people's rights and dignity as human beings. One element of this is respecting their **autonomy**—their right to make their own choices and take their own actions free from coercion. Of fundamental importance here is the concept of **informed consent**. This means that researchers obtain and document people's agreement to participate in a study after having informed them of everything that might reasonably be expected to affect their decision. Consider the participants in the Tuskegee study. Although they agreed to participate in the study, they were not told that they had syphilis but would be denied treatment for it. Had they been told this basic fact about the study, it seems likely that they would not have agreed to participate. Likewise, had participants in Milgram's study been told that they might be "reduced to a twitching, stuttering wreck," it seems likely that many of them would not have agreed to participate. In neither of these studies did participants give true informed consent.

Another element of respecting people's rights and dignity is respecting their **privacy**—their right to decide what information about them is shared with others. This means that researchers must maintain **confidentiality**, which is essentially an agreement not to disclose participants' personal information without their consent or some appropriate legal authorization. Even more ideally participants can maintain **anonymity,** which is when their name and other personally identifiable information is not collected at all.

Unavoidable Ethical Conflict

It may already be clear that ethical conflict in psychological research is unavoidable. Because there is little, if any, psychological research that is completely risk-free, there will almost always be a conflict between risks and benefits. Research that is beneficial to one group (e.g., the scientific community) can be harmful to another (e.g., the research participants), creating especially difficult tradeoffs. We have also seen that being completely truthful with research participants can make it difficult or impossible to conduct scientifically valid studies on important questions.

Of course, many ethical conflicts are fairly easy to resolve. Nearly everyone would agree that deceiving research participants and then subjecting them to physical harm would not be justified by filling a small gap in the research literature. But many ethical conflicts are not easy to resolve, and competent and well-meaning researchers can disagree about how to resolve them. Consider, for example, an actual study on "personal space" conducted in a public men's room (Middlemist, Knowles, & Matter, 1976). The researchers secretly observed their participants to see whether it took them longer to begin urinating when there was another man (a confederate of the researchers) at a nearby urinal. While some critics found this to be an unjustified assault on human dignity (Koocher, 1977), the researchers had carefully considered the ethical conflicts, resolved them as best they could, and concluded that the benefits of the research outweighed the risks (Middlemist, Knowles, & Matter, 1977). For example, they had interviewed some preliminary participants and found that none of them was bothered by the fact that they had been observed.

The point here is that although it may not be possible to eliminate ethical conflict completely, it is possible to deal with it in responsible and constructive ways. In general, this means thoroughly and carefully thinking through the ethical issues that are raised, minimizing the risks, and weighing the risks against the benefits. It also means being able to explain one's ethical decisions to others, seeking feedback on them, and ultimately taking responsibility for them.

Key Takeaways

- A wide variety of ethical issues arise in psychological research. Thinking them through requires considering how each of four moral principles (weighing risks against benefits, acting responsibly and with integrity, seeking justice, and respecting people's rights and dignity) applies to each of three groups of people (research participants, science, and society).
- Ethical conflict in psychological research is unavoidable. Researchers must think through the ethical issues raised by their research, minimize the risks, weigh the risks against the benefits, be able to explain their ethical decisions, seek feedback about these decisions from others, and ultimately take responsibility for them.

Exercises

1. Practice: Imagine a study testing the effectiveness of a new drug for treating obsessive-compulsive disorder. Give a hypothetical example of an ethical issue from each cell of Table 3.1 "A Framework for Thinking About Ethical Issues in Scientific Research" that could arise in this research.
2. Discussion: It has been argued that researchers are not ethically responsible for the misinterpretation or misuse of their research by others. Do you agree? Why or why not?

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3.4: From Moral Principles to Ethics Codes

Paul C. Price, Rajiv S. Jhangiani, I-Chant A. Chiang, Dana C. Leighton, and Carrie Cuttler

Learning Objectives

- Describe the history of ethics codes for scientific research with human participants.
- Summarize the American Psychological Association Ethics Code—especially as it relates to informed consent, deception, debriefing, research with nonhuman animals, and scholarly integrity.

The general moral principles of weighing risks against benefits, acting with integrity, seeking justice, and respecting people's rights and dignity provide a useful starting point for thinking about the ethics of psychological research because essentially everyone agrees on them. As we have seen, however, even people who agree on these general principles can disagree about specific ethical issues that arise in the course of conducting research. This is why there also exist more detailed and enforceable ethics codes that provide guidance on important issues that arise frequently. In this section, we begin with a brief historical overview of such ethics codes and then look closely at the one that is most relevant to psychological research—that of the American Psychological Association (APA).

Historical Overview

One of the earliest ethics codes was the **Nuremberg Code**—a set of 10 principles written in 1947 in conjunction with the trials of Nazi physicians accused of shockingly cruel research on concentration camp prisoners during World War II. It provided a standard against which to compare the behavior of the men on trial—many of whom were eventually convicted and either imprisoned or sentenced to death. The Nuremberg Code was particularly clear about the importance of carefully weighing risks against benefits and the need for informed consent. The **Declaration of Helsinki** is a similar ethics code that was created by the World Medical Council in 1964. Among the standards that it added to the Nuremberg Code was that research with human participants should be based on a written **protocol**—a detailed description of the research—that is reviewed by an independent committee. The Declaration of Helsinki has been revised several times, most recently in 2004.

In the United States, concerns about the Tuskegee study and others led to the publication in 1978 of a set of federal guidelines called the **Belmont Report**. The Belmont Report explicitly recognized the principle of seeking **justice**, including the importance of conducting research in a way that distributes risks and benefits fairly across different groups at the societal level. It also recognized the importance of **respect for persons,** which translates to the need for informed consent. Finally, it recognized the principle of **beneficence,** which underscores the importance of maximizing the benefits of research while minimizing harms to participants and society. The Belmont Report became the basis of a set of laws—the **Federal Policy for the Protection of Human Subjects**—that apply to research conducted, supported, or regulated by the federal government. An extremely important part of these regulations is that universities, hospitals, and other institutions that receive support from the federal government must establish an **ethical review board (ERB)** or an **institutional review board (IRB)**—a committee that is responsible for reviewing research protocols for potential ethical problems. An IRB must consist of at least five people with varying backgrounds, including members of different professions, scientists and nonscientists, men and women, and at least one person not otherwise affiliated with the institution. The IRB helps to make sure that the risks of the proposed research are minimized, the benefits outweigh the risks, the research is carried out in a fair manner, and the informed consent procedure is adequate.

The federal regulations also distinguish research that poses three levels of risk. **Exempt research** includes research on the effectiveness of normal educational activities, the use of standard psychological measures and surveys of a nonsensitive nature that are administered in a way that maintains confidentiality, and research using existing data from public sources. It is called exempt because the regulations do not apply to it. **Minimal risk research** exposes participants to risks that are no greater than those encountered by healthy people in daily life or during routine physical or psychological examinations. Minimal risk research can receive an expedited review by one member of the IRB or by a separate committee under the authority of the IRB that can only approve minimal risk research. (Many departments of psychology have such separate committees.) Finally, **at-risk research** poses greater than minimal risk and must be reviewed by the full board of IRB members.

Ethics Codes

The link that follows the list—from the Office of Human Subjects Research at the National Institutes of Health—allows you to read the ethics codes discussed in this section in their entirety. They are all highly recommended and, with the exception of the Federal Policy, short and easy to read.

- The Nuremberg Code
- The Declaration of Helsinki
- The Belmont Report
- Federal Policy for the Protection of Human Subjects

http://ohsr.od.nih.gov/guidelines/index.html

APA Ethics Code

The APA's *Ethical Principles of Psychologists and Code of Conduct* (also known as the **APA Ethics Code**) was first published in 1953 and has been revised several times since then, most recently in 2010. It includes about 150 specific ethical standards that psychologists and their students are expected to follow. Much of the APA Ethics Code concerns the clinical practice of psychology—advertising one's services, setting and collecting fees, having personal relationships with clients, and so on. For our purposes, the most relevant part is *Standard 8: Research and Publication*. Although *Standard 8* is reproduced here in its entirety, we should consider some of its most important aspects—informed consent, deception, debriefing, the use of nonhuman animal subjects, and scholarly integrity—in more detail.

APA Ethics Code

Standard 8: Research and Publication

8.01 Institutional Approval

When institutional approval is required, psychologists provide accurate information about their research proposals and obtain approval prior to conducting the research. They conduct the research in accordance with the approved research protocol.

8.02 Informed Consent to Research

3. When obtaining informed consent as required in Standard 3.10, Informed Consent, psychologists inform participants about (1) the purpose of the research, expected duration, and procedures; (2) their right to decline to participate and to withdraw from the research once participation has begun; (3) the foreseeable consequences of declining or withdrawing; (4) reasonably foreseeable factors that may be expected to influence their willingness to participate such as potential risks, discomfort, or adverse effects; (5) any prospective research benefits; (6) limits of confidentiality; (7) incentives for participation; and (8) whom to contact for questions about the research and research participants' rights. They provide opportunity for the prospective participants to ask questions and receive answers. (See also Standards 8.03, Informed Consent for Recording Voices and Images in Research; 8.05, Dispensing With Informed Consent for Research; and 8.07, Deception in Research.)
4. Psychologists conducting intervention research involving the use of experimental treatments clarify to participants at the outset of the research (1) the experimental nature of the treatment; (2) the services that will or will not be available to the control group(s) if appropriate; (3) the means by which assignment to treatment and control groups will be made; (4) available treatment alternatives if an individual does not wish to participate in the research or wishes to withdraw once a study has begun; and (5) compensation for or monetary costs of participating including, if appropriate, whether reimbursement from the participant or a third-party payor will be sought. (See also Standard 8.02a, Informed Consent to Research.)

8.03 Informed Consent for Recording Voices and Images in Research

Psychologists obtain informed consent from research participants prior to recording their voices or images for data collection unless (1) the research consists solely of naturalistic observations in public places, and it is not anticipated that the recording will be used in a manner that could cause personal identification or harm, or (2) the research design includes deception, and consent for the use of the recording is obtained during debriefing. (See also Standard 8.07, Deception in Research.)

8.04 Client/Patient, Student, and Subordinate Research Participants

1. When psychologists conduct research with clients/patients, students, or subordinates as participants, psychologists take steps to protect the prospective participants from adverse consequences of declining or withdrawing from participation.
2. When research participation is a course requirement or an opportunity for extra credit, the prospective participant is given the choice of equitable alternative activities.

8.05 Dispensing With Informed Consent for Research

Psychologists may dispense with informed consent only (1) where research would not reasonably be assumed to create distress or harm and involves (a) the study of normal educational practices, curricula, or classroom management methods conducted in educational settings; (b) only anonymous questionnaires, naturalistic observations, or archival research for which disclosure of responses would not place participants at risk of criminal or civil liability or damage their financial standing, employability, or reputation, and confidentiality is protected; or (c) the study of factors related to job or organization effectiveness conducted in organizational settings for which there is no risk to participants' employability, and confidentiality is protected or (2) where otherwise permitted by law or federal or institutional regulations.

8.06 Offering Inducements for Research Participation

1. Psychologists make reasonable efforts to avoid offering excessive or inappropriate financial or other inducements for research participation when such inducements are likely to coerce participation.
2. When offering professional services as an inducement for research participation, psychologists clarify the nature of the services, as well as the risks, obligations, and limitations. (See also Standard 6.05, Barter With Clients/Patients.)

8.07 Deception in Research

1. Psychologists do not conduct a study involving deception unless they have determined that the use of deceptive techniques is justified by the study's significant prospective scientific, educational, or applied value and that effective nondeceptive alternative procedures are not feasible.
2. Psychologists do not deceive prospective participants about research that is reasonably expected to cause physical pain or severe emotional distress.
3. Psychologists explain any deception that is an integral feature of the design and conduct of an experiment to participants as early as is feasible, preferably at the conclusion of their participation, but no later than at the conclusion of the data collection, and permit participants to withdraw their data. (See also Standard 8.08, Debriefing.)

8.08 Debriefing

1. Psychologists provide a prompt opportunity for participants to obtain appropriate information about the nature, results, and conclusions of the research, and they take reasonable steps to correct any misconceptions that participants may have of which the psychologists are aware.
2. If scientific or humane values justify delaying or withholding this information, psychologists take reasonable measures to reduce the risk of harm.
3. When psychologists become aware that research procedures have harmed a participant, they take reasonable steps to minimize the harm.

8.09 Humane Care and Use of Animals in Research

1. Psychologists acquire, care for, use, and dispose of animals in compliance with current federal, state, and local laws and regulations, and with professional standards.
2. Psychologists trained in research methods and experienced in the care of laboratory animals supervise all procedures involving animals and are responsible for ensuring appropriate consideration of their comfort, health, and humane treatment.
3. Psychologists ensure that all individuals under their supervision who are using animals have received instruction in research methods and in the care, maintenance, and handling of the species being used, to the extent appropriate to their role. (See also Standard 2.05, Delegation of Work to Others.)
4. Psychologists make reasonable efforts to minimize the discomfort, infection, illness, and pain of animal subjects.
5. Psychologists use a procedure subjecting animals to pain, stress, or privation only when an alternative procedure is unavailable and the goal is justified by its prospective scientific, educational, or applied value.

6. Psychologists perform surgical procedures under appropriate anesthesia and follow techniques to avoid infection and minimize pain during and after surgery.
7. When it is appropriate that an animal's life be terminated, psychologists proceed rapidly, with an effort to minimize pain and in accordance with accepted procedures.

8.10 Reporting Research Results

5. Psychologists do not fabricate data. (See also Standard 5.01a, Avoidance of False or Deceptive Statements.)
6. If psychologists discover significant errors in their published data, they take reasonable steps to correct such errors in a correction, retraction, erratum, or other appropriate publication means.

8.11 Plagiarism

Psychologists do not present portions of another's work or data as their own, even if the other work or data source is cited occasionally.

8.12 Publication Credit

8. Psychologists take responsibility and credit, including authorship credit, only for work they have actually performed or to which they have substantially contributed. (See also Standard 8.12b, Publication Credit.)
9. Principal authorship and other publication credits accurately reflect the relative scientific or professional contributions of the individuals involved, regardless of their relative status. Mere possession of an institutional position, such as department chair, does not justify authorship credit. Minor contributions to the research or to the writing for publications are acknowledged appropriately, such as in footnotes or in an introductory statement.
10. Except under exceptional circumstances, a student is listed as principal author on any multiple-authored article that is substantially based on the student's doctoral dissertation. Faculty advisors discuss publication credit with students as early as feasible and throughout the research and publication process as appropriate. (See also Standard 8.12b, Publication Credit.)

8.13 Duplicate Publication of Data

Psychologists do not publish, as original data, data that have been previously published. This does not preclude republishing data when they are accompanied by proper acknowledgment.

8.14 Sharing Research Data for Verification

1. After research results are published, psychologists do not withhold the data on which their conclusions are based from other competent professionals who seek to verify the substantive claims through reanalysis and who intend to use such data only for that purpose, provided that the confidentiality of the participants can be protected and unless legal rights concerning proprietary data preclude their release. This does not preclude psychologists from requiring that such individuals or groups be responsible for costs associated with the provision of such information.
2. Psychologists who request data from other psychologists to verify the substantive claims through reanalysis may use shared data only for the declared purpose. Requesting psychologists obtain prior written agreement for all other uses of the data.

8.15 Reviewers

Psychologists who review material submitted for presentation, publication, grant, or research proposal review respect the confidentiality of and the proprietary rights in such information of those who submitted it.

Source: You can read the full APA Ethics Code at http://www.apa.org/ethics/code/index.aspx.

Informed Consent

Standards 8.02 to 8.05 are about informed consent. Again, informed consent means obtaining and documenting people's agreement to participate in a study, having informed them of everything that might reasonably be expected to affect their decision. This includes details of the procedure, the risks and benefits of the research, the fact that they have the right to decline to participate or to withdraw from the study, the consequences of doing so, and any legal limits to confidentiality. For example, some states require researchers who learn of child abuse or other crimes to report this information to authorities.

Although the process of obtaining informed consent often involves having participants read and sign a **consent form**, it is important to understand that this is not all it is. Although having participants read and sign a consent form might be enough when

they are competent adults with the necessary ability and motivation, many participants do not actually read consent forms or read them but do not understand them. For example, participants often mistake consent forms for legal documents and mistakenly believe that by signing them they give up their right to sue the researcher (Mann, 1994). Even with competent adults, therefore, it is good practice to tell participants about the risks and benefits, demonstrate the procedure, ask them if they have questions, and remind them of their right to withdraw at any time—in addition to having them read and sign a consent form.

Note also that there are situations in which informed consent is not necessary. These include situations in which the research is not expected to cause any harm and the procedure is straightforward or the study is conducted in the context of people's ordinary activities. For example, if you wanted to sit outside a public building and observe whether people hold the door open for people behind them, you would not need to obtain their informed consent. Similarly, if a college instructor wanted to compare two legitimate teaching methods across two sections of his research methods course, he would not need to obtain informed consent from his students.

Deception

Deception of participants in psychological research can take a variety of forms: misinforming participants about the purpose of a study, using confederates, using phony equipment like Milgram's shock generator, and presenting participants with false feedback about their performance (e.g., telling them they did poorly on a test when they actually did well). Deception also includes not informing participants of the full design or true purpose of the research even if they are not actively misinformed (Sieber, Iannuzzo, & Rodriguez, 1995). For example, a study on incidental learning—learning without conscious effort—might involve having participants read through a list of words in preparation for a "memory test" later. Although participants are likely to assume that the memory test will require them to recall the words, it might instead require them to recall the contents of the room or the appearance of the research assistant.

Some researchers have argued that deception of research participants is rarely if ever ethically justified. Among their arguments are that it prevents participants from giving truly informed consent, fails to respect their dignity as human beings, has the potential to upset them, makes them distrustful and therefore less honest in their responding, and damages the reputation of researchers in the field (Baumrind, 1985).

Note, however, that the APA Ethics Code takes a more moderate approach—allowing deception when the benefits of the study outweigh the risks, participants cannot reasonably be expected to be harmed, the research question cannot be answered without the use of deception, and participants are informed about the deception as soon as possible. This approach acknowledges that not all forms of deception are equally bad. Compare, for example, Milgram's study in which he deceived his participants in several significant ways that resulted in their experiencing severe psychological stress with an incidental learning study in which a "memory test" turns out to be slightly different from what participants were expecting. It also acknowledges that some scientifically and socially important research questions can be difficult or impossible to answer without deceiving participants. Knowing that a study concerns the extent to which they obey authority, act aggressively toward a peer, or help a stranger is likely to change the way people behave so that the results no longer generalize to the real world.

Debriefing

Standard 8.08 is about **debriefing**. This is the process of informing research participants as soon as possible of the purpose of the study, revealing any deception, and correcting any other misconceptions they might have as a result of participating. Debriefing also involves minimizing harm that might have occurred. For example, an experiment on the effects of being in a sad mood on memory might involve inducing a sad mood in participants by having them think sad thoughts, watch a sad video, and/or listen to sad music. Debriefing would be the time to return participants' moods to normal by having them think happy thoughts, watch a happy video, or listen to happy music.

Nonhuman Animal Subjects

Standard 8.09 is about the humane treatment and care of nonhuman animal subjects. Although most contemporary research in psychology does not involve nonhuman animal subjects, a significant minority of it does—especially in the study of learning and conditioning, behavioral neuroscience, and the development of drug and surgical therapies for psychological disorders.

The use of nonhuman animal subjects in psychological research is similar to the use of deception in that there are those who argue that it is rarely, if ever, ethically acceptable (Bowd & Shapiro, 1993). Clearly, nonhuman animals are incapable of giving informed

consent. Yet they can be subjected to numerous procedures that are likely to cause them suffering. They can be confined, deprived of food and water, subjected to pain, operated on, and ultimately euthanized. (Of course, they can also be observed benignly in natural or zoo-like settings.) Others point out that psychological research on nonhuman animals has resulted in many important benefits to humans, including the development of behavioral therapies for many disorders, more effective pain control methods, and antipsychotic drugs (Miller, 1985). It has also resulted in benefits to nonhuman animals, including alternatives to shooting and poisoning as means of controlling them.

As with deception, the APA acknowledges that the benefits of research on nonhuman animals can outweigh the costs, in which case it is ethically acceptable. However, researchers must use alternative methods when they can. When they cannot, they must acquire and care for their subjects humanely and minimize the harm to them. For more information on the APA's position on nonhuman animal subjects, see the website of the APA's Committee on Animal Research and Ethics (http://www.apa.org/science/leadership/care/index.aspx).

Scholarly Integrity

Standards 8.10 to 8.15 are about scholarly integrity. These include the obvious points that researchers must not fabricate data or plagiarize. Plagiarism means using others' words or ideas without proper acknowledgment. Proper acknowledgment generally means indicating direct quotations with quotation marks *and* providing a citation to the source of any quotation or idea used.

The remaining standards make some less obvious but equally important points. Researchers should not publish the same data a second time as though it were new, they should share their data with other researchers, and as peer reviewers they should keep the unpublished research they review confidential. Note that the authors' names on published research—and the order in which those names appear—should reflect the importance of each person's contribution to the research. It would be unethical, for example, to include as an author someone who had made only minor contributions to the research (e.g., analyzing some of the data) or for a faculty member to make himself or herself the first author on research that was largely conducted by a student.

Key Takeaways

- There are several written ethics codes for research with human participants that provide specific guidance on the ethical issues that arise most frequently. These codes include the Nuremberg Code, the Declaration of Helsinki, the Belmont Report, and the Federal Policy for the Protection of Human Subjects.
- The APA Ethics Code is the most important ethics code for researchers in psychology. It includes many standards that are relevant mainly to clinical practice, but *Standard 8* concerns informed consent, deception, debriefing, the use of nonhuman animal subjects, and scholarly integrity in research.
- Research conducted at universities, hospitals, and other institutions that receive support from the federal government must be reviewed by an institutional review board (IRB)—a committee at the institution that reviews research protocols to make sure they conform to ethical standards.
- Informed consent is the process of obtaining and documenting people's agreement to participate in a study, having informed them of everything that might reasonably be expected to affect their decision. Although it often involves having them read and sign a consent form, it is not equivalent to reading and signing a consent form.
- Although some researchers argue that deception of research participants is never ethically justified, the APA Ethics Code allows for its use when the benefits of using it outweigh the risks, participants cannot reasonably be expected to be harmed, there is no way to conduct the study without deception, and participants are informed of the deception as soon as possible.

Exercises

1. Practice: Read the Nuremberg Code, the Belmont Report, and *Standard 8*of the APA Ethics Code. List five specific similarities and five specific differences among them.
2. Discussion: In a study on the effects of disgust on moral judgment, participants were asked to judge the morality of disgusting acts, including people eating a dead pet and passionate kissing between a brother and sister (Haidt, Koller, & Dias, 1993). If you were on the IRB that reviewed this protocol, what concerns would you have with it? Refer to the appropriate sections of the APA Ethics Code.

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3.5: Putting Ethics into Practice

Paul C. Price, Rajiv S. Jhangiani, I-Chant A. Chiang, Dana C. Leighton, and Carrie Cuttler

Learning Objectives

- Describe several strategies for identifying and minimizing risks and deception in psychological research.
- Create thorough informed consent and debriefing procedures, including a consent form.

In this section, we look at some practical advice for conducting ethical research in psychology. Again, it is important to remember that ethical issues arise well before you begin to collect data and continue to arise through publication and beyond.

Know and Accept Your Ethical Responsibilities

As the American Psychological Association (APA) Ethics Code notes in its introduction, “Lack of awareness or misunderstanding of an ethical standard is not itself a defense to a charge of unethical conduct.” This is why the very first thing that you must do as a new researcher is to know and accept your ethical responsibilities. At a minimum, this means reading and understanding the relevant sections of the APA Ethics Code, distinguishing minimal risk from at-risk research, and knowing the specific policies and procedures of your institution—including how to prepare and submit a research protocol for institutional review board (IRB) review. If you are conducting research as a course requirement, there may be specific course standards, policies, and procedures. If any standard, policy, or procedure is unclear—or you are unsure what to do about an ethical issue that arises—you must seek clarification. You can do this by reviewing the relevant ethics codes, reading about how similar issues have been resolved by others, or consulting with more experienced researchers, your IRB, or your course instructor. Ultimately, you as the researcher must take responsibility for the ethics of the research you conduct.

Identify and Minimize Risks

As you design your study, you must identify and minimize risks to participants. Start by listing all the risks, including risks of physical and psychological harm and violations of confidentiality. Remember that it is easy for researchers to see risks as less serious than participants do or even to overlook them completely. For example, one student researcher wanted to test people’s sensitivity to violent images by showing them gruesome photographs of crime and accident scenes. Because she was an emergency medical technician, however, she greatly underestimated how disturbing these images were to most people. Remember too that some risks might apply only to some participants. For example, while most people would have no problem completing a survey about their fear of various crimes, those who have been a victim of one of those crimes might become upset. This is why you should seek input from a variety of people, including your research collaborators, more experienced researchers, and even from nonresearchers who might be better able to take the perspective of a participant.

Once you have identified the risks, you can often reduce or eliminate many of them. One way is to modify the research design. For example, you might be able to shorten or simplify the procedure to prevent boredom and frustration. You might be able to replace upsetting or offensive stimulus materials (e.g., graphic accident scene photos) with less upsetting or offensive ones (e.g., milder photos of the sort people are likely to see in the newspaper). A good example of modifying a research design is a 2009 replication of Milgram’s study conducted by Jerry Burger. Instead of allowing his participants to continue administering shocks up to the 450-V maximum, the researcher always stopped the procedure when they were about to administer the 150-V shock (Burger, 2009). This made sense because in Milgram’s study (a) participants’ severe negative reactions occurred after this point and (b) most participants who administered the 150-V shock continued all the way to the 450-V maximum. Thus the researcher was able to compare his results directly with Milgram’s at every point up to the 150-V shock and also was able to estimate how many of his participants would have continued to the maximum—but without subjecting them to the severe stress that Milgram did. (The results, by the way, were that these contemporary participants were just as obedient as Milgram’s were.)

A second way to minimize risks is to use a **pre-screening** procedure to identify and eliminate participants who are at high risk. You can do this in part through the informed consent process. For example, you can warn participants that a survey includes questions about their fear of crime and remind them that they are free to withdraw if they think this might upset them. Prescreening can also involve collecting data to identify and eliminate participants. For example, Burger used an extensive pre-screening procedure

involving multiple questionnaires and an interview with a clinical psychologist to identify and eliminate participants with physical or psychological problems that put them at high risk.

A third way to minimize risks is to take active steps to maintain confidentiality. You should keep signed consent forms separately from any data that you collect and in such a way that no individual's name can be linked to his or her data. In addition, beyond people's sex and age, you should only collect personal information that you actually need to answer your research question. If people's sexual orientation or ethnicity is not clearly relevant to your research question, for example, then do not ask them about it. Be aware also that certain data collection procedures can lead to unintentional violations of confidentiality. When participants respond to an oral survey in a shopping mall or complete a questionnaire in a classroom setting, it is possible that their responses will be overheard or seen by others. If the responses are personal, it is better to administer the survey or questionnaire individually in private or to use other techniques to prevent the unintentional sharing of personal information.

Identify and Minimize Deception

Remember that deception can take a variety of forms, not all of which involve actively misleading participants. It is also deceptive to allow participants to make incorrect assumptions (e.g., about what will be on a "memory test") or simply withhold information about the full design or purpose of the study. It is best to identify and minimize *all* forms of deception.

Remember that according to the APA Ethics Code, deception is ethically acceptable only if there is no way to answer your research question without it. Therefore, if your research design includes any form of active deception, you should consider whether it is truly necessary. Imagine, for example, that you want to know whether the age of college professors affects students' expectations about their teaching ability. You could do this by telling participants that you will show them photos of college professors and ask them to rate each one's teaching ability. But if the photos are not really of college professors but of your own family members and friends, then this would be deception. This deception could easily be eliminated, however, by telling participants instead to *imagine* that the photos are of college professors and to rate them *as if* they were.

In general, it is considered acceptable to wait until debriefing before you reveal your research question as long as you describe the procedure, risks, and benefits during the informed consent process. For example, you would not have to tell participants that you wanted to know whether the age of college professors affects people's expectations about them until the study was over. Not only is this information unlikely to affect people's decision about whether or not to participate in the study, but it has the potential to invalidate the results. Participants who know that age is the independent variable might rate the older and younger "professors" differently because they think you want them to. Alternatively, they might be careful to rate them the same so that they do not appear prejudiced. But even this extremely mild form of deception can be minimized by informing participants—orally, in writing, or both—that although you have accurately described the procedure, risks, and benefits, you will wait to reveal the research question until afterward. In essence, participants give their consent to be deceived or to have information withheld from them until later.

Weigh the Risks Against the Benefits

Once the risks of the research have been identified and minimized, you need to weigh them against the benefits. This requires identifying all the benefits. Remember to consider benefits to the research participants, to science, and to society. If you are a student researcher, remember that one of the benefits is the knowledge you will gain about how to conduct scientific research in psychology—knowledge you can then use to complete your studies and succeed in graduate school or in your career.

If the research poses minimal risk—no more than in people's daily lives or routine physical or psychological examinations—then even a small benefit to participants, science, or society is generally considered enough to justify it. If it poses more than minimal risk, then there should be more benefits. If the research has the potential to upset some participants, for example, then it becomes more important that the study is well designed and can answer a scientifically interesting research question or have clear practical implications. It would be unethical to subject people to pain, fear, or embarrassment for no better reason than to satisfy one's personal curiosity. In general, psychological research that has the potential to cause harm that is more than minor or lasts for more than a short time is rarely considered justified by its benefits.

Create Informed Consent and Debriefing Procedures

Once you have settled on a research design, you need to create your informed consent and debriefing procedures. Start by deciding whether informed consent is necessary according to APA Standard 8.05. If informed consent is necessary, there are several things you should do. First, when you recruit participants—whether it is through word of mouth, posted advertisements, or a participant pool—provide them with as much information about the study as you can. This will allow those who might find the study objectionable to avoid it. Second, prepare a script or set of "talking points" to help you explain the study to your participants in simple everyday language. This should include a description of the procedure, the risks and benefits, and their right to withdraw at any time. Third, create an informed consent form that covers all the points in Standard 8.02a that participants can read and sign after you have described the study to them. Your university, department, or course instructor may have a sample consent form that you can adapt for your own study. If not, an Internet search will turn up several samples. Remember that if appropriate, both the oral and written parts of the informed consent process should include the fact that you are keeping some information about the design or purpose of the study from them but that you will reveal it during debriefing.

Debriefing is similar to informed consent in that you cannot necessarily expect participants to read and understand written debriefing forms. So again it is best to write a script or set of talking points with the goal of being able to explain the study in simple, everyday language. During the debriefing, you should reveal the research question and full design of the study. For example, if participants are tested under only one condition, then you should explain what happened in the other conditions. If you deceived your participants, you should reveal this as soon as possible, apologize for the deception, explain why it was necessary, and correct any misconceptions that participants might have as a result. Debriefing is also a good time to provide additional benefits to research participants by giving them relevant practical information or referrals to other sources of help. For example, in a study of attitudes toward domestic abuse, you could provide pamphlets about domestic abuse and referral information to the university counseling center for those who might want it.

Remember to schedule plenty of time for the informed consent and debriefing processes. They cannot be effective if you have to rush through them.

Get Approval

The next step is to get institutional approval for your research based on the specific policies and procedures at your institution or for your course. This will generally require writing a protocol that describes the purpose of the study, the research design and procedure, the risks and benefits, the steps taken to minimize risks, and the informed consent and debriefing procedures. Do not think of the institutional approval process as merely an obstacle to overcome but as an opportunity to think through the ethics of your research and to consult with others who are likely to have more experience or different perspectives than you. If the IRB has questions or concerns about your research, address them promptly and in good faith. This might even mean making further modifications to your research design and procedure before resubmitting your protocol.

Follow Through

Your concern with ethics should not end when your study receives institutional approval. It now becomes important to stick to the protocol you submitted or to seek additional approval for anything other than a minor change. During the research, you should monitor your participants for unanticipated reactions and seek feedback from them during debriefing. One criticism of Milgram's study is that although he did not know ahead of time that his participants would have such severe negative reactions, he certainly knew after he had tested the first several participants and should have made adjustments at that point (Baumrind, 1985). Be alert also for potential violations of confidentiality. Keep the consent forms and the data safe and separate from each other and make sure that no one, intentionally or unintentionally, has access to any participant's personal information.

Finally, you must maintain your integrity through the publication process and beyond. Address publication credit—who will be authors on the research and the order of authors—with your collaborators early and avoid plagiarism in your writing. Remember that your scientific goal is to learn about the way the world actually is and that your scientific duty is to report on your results honestly and accurately. So do not be tempted to fabricate data or alter your results in any way. Besides, unexpected results are often as interesting, or more so, than expected ones.

Key Takeaways

- It is your responsibility as a researcher to know and accept your ethical responsibilities.
- You can take several concrete steps to minimize risks and deception in your research. These include making changes to your research design, prescreening to identify and eliminate high-risk participants, and providing participants with as much information as possible during informed consent and debriefing.
- Your ethical responsibilities continue beyond IRB approval. You need to monitor participants' reactions, be alert for potential violations of confidentiality, and maintain scholarly integrity through the publication process.

Exercises

1. Discussion: How could you conduct a study on the extent to which people obey authority in a way that minimizes risks and deception as much as possible? (Note: Such a study would not have to look at all like Milgram's.)
2. Practice: Find a study in a professional journal and create a consent form for that study. Be sure to include all the information in Standard 8.02.

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3.6: Psychologists Use Descriptive, Correlational, and Experimental Research Designs to Understand Behaviour

Charles Stangor and Jennifer Walinga

Learning Objectives

- Differentiate the goals of descriptive, correlational, and experimental research designs and explain the advantages and disadvantages of each.
- Explain the goals of descriptive research and the statistical techniques used to interpret it.
- Summarize the uses of correlational research and describe why correlational research cannot be used to infer causality.
- Review the procedures of experimental research and explain how it can be used to draw causal inferences.

Psychologists agree that if their ideas and theories about human behaviour are to be taken seriously, they must be backed up by data. However, the research of different psychologists is designed with different goals in mind, and the different goals require different approaches. These varying approaches, summarized in Table 3.3, are known as *research designs*. A **research design** is *the specific method a researcher uses to collect, analyze, and interpret data*. Psychologists use three major types of research designs in their research, and each provides an essential avenue for scientific investigation. **Descriptive research** is *research designed to provide a snapshot of the current state of affairs*. **Correlational research** is *research designed to discover relationships among variables and to allow the prediction of future events from present knowledge*. **Experimental research** is *research in which initial equivalence among research participants in more than one group is created, followed by a manipulation of a given experience for these groups and a measurement of the influence of the manipulation*. Each of the three research designs varies according to its strengths and limitations, and it is important to understand how each differs.

Table 3.3 Characteristics of the Three Research Designs

Research design	Goal	Advantages	Disadvantages
Descriptive	To create a snapshot of the current state of affairs	Provides a relatively complete picture of what is occurring at a given time. Allows the development of questions for further study.	Does not assess relationships among variables. May be unethical if participants do not know they are being observed.
Correlational	To assess the relationships between and among two or more variables	Allows testing of expected relationships between and among variables and the making of predictions. Can assess these relationships in everyday life events.	Cannot be used to draw inferences about the causal relationships between and among the variables.
Experimental	To assess the causal impact of one or more experimental manipulations on a dependent variable	Allows drawing of conclusions about the causal relationships among variables.	Cannot experimentally manipulate many important variables. May be expensive and time consuming.

Source: Stangor, 2011.

Descriptive Research: Assessing the Current State of Affairs

Descriptive research is designed to create a snapshot of the current thoughts, feelings, or behaviour of individuals. This section reviews three types of **descriptive research**: *case studies*, *surveys*, and *naturalistic observation* (Figure 3.3).

Sometimes the data in a descriptive research project are based on only a small set of individuals, often only one person or a single small group. These research designs are known as **case studies** — *descriptive records of one or more individual's experiences and behaviour*. Sometimes case studies involve ordinary individuals, as when developmental psychologist Jean Piaget used his

observation of his own children to develop his stage theory of cognitive development. More frequently, case studies are conducted on individuals who have unusual or abnormal experiences or characteristics or who find themselves in particularly difficult or stressful situations. The assumption is that by carefully studying individuals who are socially marginal, who are experiencing unusual situations, or who are going through a difficult phase in their lives, we can learn something about human nature.

Sigmund Freud was a master of using the psychological difficulties of individuals to draw conclusions about basic psychological processes. Freud wrote case studies of some of his most interesting patients and used these careful examinations to develop his important theories of personality. One classic example is Freud's description of "Little Hans," a child whose fear of horses the psychoanalyst interpreted in terms of repressed sexual impulses and the Oedipus complex (Freud, 1909/1964).



Figure 3.3 Descriptive Research. Political polls reported in newspapers and on the Internet are descriptive research designs that provide snapshots of the likely voting behaviour of a population.

Another well-known case study is Phineas Gage, a man whose thoughts and emotions were extensively studied by cognitive psychologists after a railroad spike was blasted through his skull in an accident. Although there are questions about the interpretation of this case study (Kotowicz, 2007), it did provide early evidence that the brain's frontal lobe is involved in emotion and morality (Damasio et al., 2005). An interesting example of a case study in clinical psychology is described by Rokeach (1964), who investigated in detail the beliefs of and interactions among three patients with schizophrenia, all of whom were convinced they were Jesus Christ.

In other cases the data from descriptive research projects come in the form of a **survey** — *a measure administered through either an interview or a written questionnaire to get a picture of the beliefs or behaviours of a sample of people of interest. The people chosen to participate in the research* (known as the **sample)** are selected to be representative of *all the people that the researcher wishes to know about* (the population). In election polls, for instance, a sample is taken from the population of all "likely voters" in the upcoming elections.

The results of surveys may sometimes be rather mundane, such as "Nine out of 10 doctors prefer Tymenocin" or "The median income in the city of Hamilton is $46,712." Yet other times (particularly in discussions of social behaviour), the results can be shocking: "More than 40,000 people are killed by gunfire in the United States every year" or "More than 60% of women between the ages of 50 and 60 suffer from depression." Descriptive research is frequently used by psychologists to get an *estimate of the prevalence* (or **incidence**) of psychological disorders.

A final type of descriptive research — known as **naturalistic observation** — is *research based on the observation of everyday events*. For instance, a developmental psychologist who watches children on a playground and describes what they say to each other while they play is conducting descriptive research, as is a biopsychologist who observes animals in their natural habitats. One example of observational research involves a systematic procedure known as the *strange situation*, used to get a picture of how adults and young children interact. The data that are collected in the strange situation are systematically coded in a coding sheet such as that shown in Table 3.4.

This table represents a sample coding sheet from an episode of the "strange situation," in which an infant (usually about one year old) is observed playing in a room with two adults — the child's mother and a stranger. Each of the four coding categories is scored

by the coder from 1 (the baby makes no effort to engage in the behaviour) to 7 (the baby makes a significant effort to engage in the behaviour). More information about the meaning of the coding can be found in Ainsworth, Blehar, Waters, and Wall (1978).

Coding categories explained:

- Proximity: The baby moves toward, grasps, or climbs on the adult.
- Maintaining contact: The baby resists being put down by the adult by crying or trying to climb back up.
- Resistance: The baby pushes, hits, or squirms to be put down from the adult's arms.
- Avoidance: The baby turns away or moves away from the adult.

Coder name: *Olive*

Table 3.4 Sample Coding Form Used to Assess Child's and Mother's Behaviour in the Strange Situation

Episode	Coding categories			
	Proximity	Contact	Resistance	Avoidance
Mother and baby play alone	1	1	1	1
Mother puts baby down	4	1	1	1
Stranger enters room	1	2	3	1
Mother leaves room; stranger plays with baby	1	3	1	1
Mother re-enters, greets and may comfort baby, then leaves again	4	2	1	2
Stranger tries to play with baby	1	3	1	1
Mother re-enters and picks up baby	6	6	1	2

Source: Stangor, 2011.

The results of descriptive research projects are analyzed using **descriptive statistics** — *numbers that summarize the distribution of scores on a measured variable*. Most variables have **distributions** similar to that shown in Figure 3.4 where most of the scores are located near the centre of the distribution, and the distribution is symmetrical and bell-shaped. *A data distribution that is shaped like a bell* is known as a **normal distribution**.

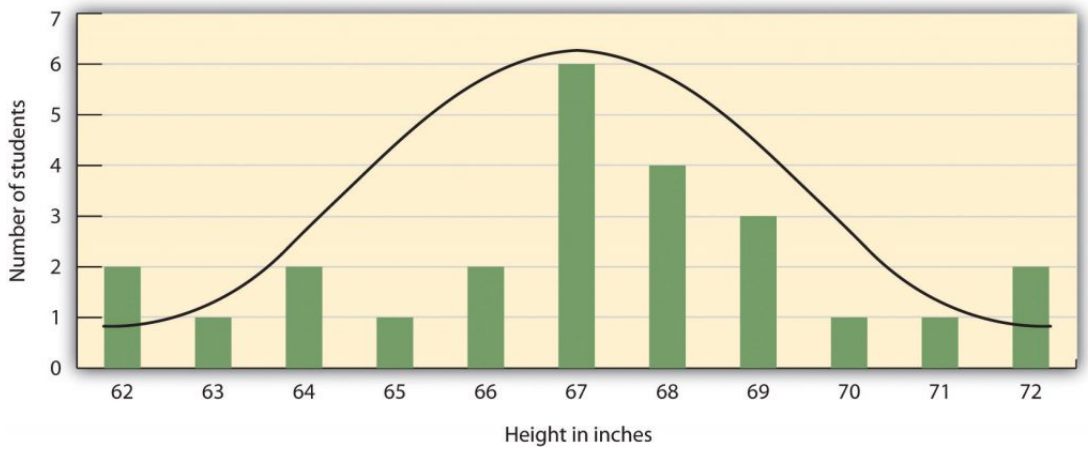


Figure 3.4 Height Distribution. The distribution of the heights of the students in a class will form a normal distribution. In this sample the mean (M) = 67.12 inches and the standard deviation (s) = 2.74.

A distribution can be described in terms of its **central tendency** — that is, *the point in the distribution around which the data are centred* — and its dispersion, or spread. The arithmetic average, or **arithmetic mean**, symbolized by the letter *M*, is *the most commonly used measure of central tendency*. It is computed by calculating the sum of all the scores of the variable and dividing this sum by the number of participants in the distribution (denoted by the letter *N*). In the data presented in Figure 3.4 the mean height of the students is 67.12 inches (170.5 cm). The sample mean is usually indicated by the letter *M*.

In some cases, however, the data distribution is not symmetrical. This occurs when there are one or more *extreme scores* (known as **outliers**) at one end of the distribution. Consider, for instance, the variable of family income (see Figure 3.6), which includes an outlier (a value of $3,800,000). In this case the mean is not a good measure of central tendency. Although it appears from Figure 3.5 that the central tendency of the family income variable should be around $70,000, the mean family income is actually $223,960. The single very extreme income has a disproportionate impact on the mean, resulting in a value that does not well represent the central tendency.

The *median* is used as an alternative measure of central tendency when distributions are not symmetrical. The **median** is *the score in the center of the distribution, meaning that 50% of the scores are greater than the median and 50% of the scores are less than the median*. In our case, the median household income ($73,000) is a much better indication of central tendency than is the mean household income ($223,960).

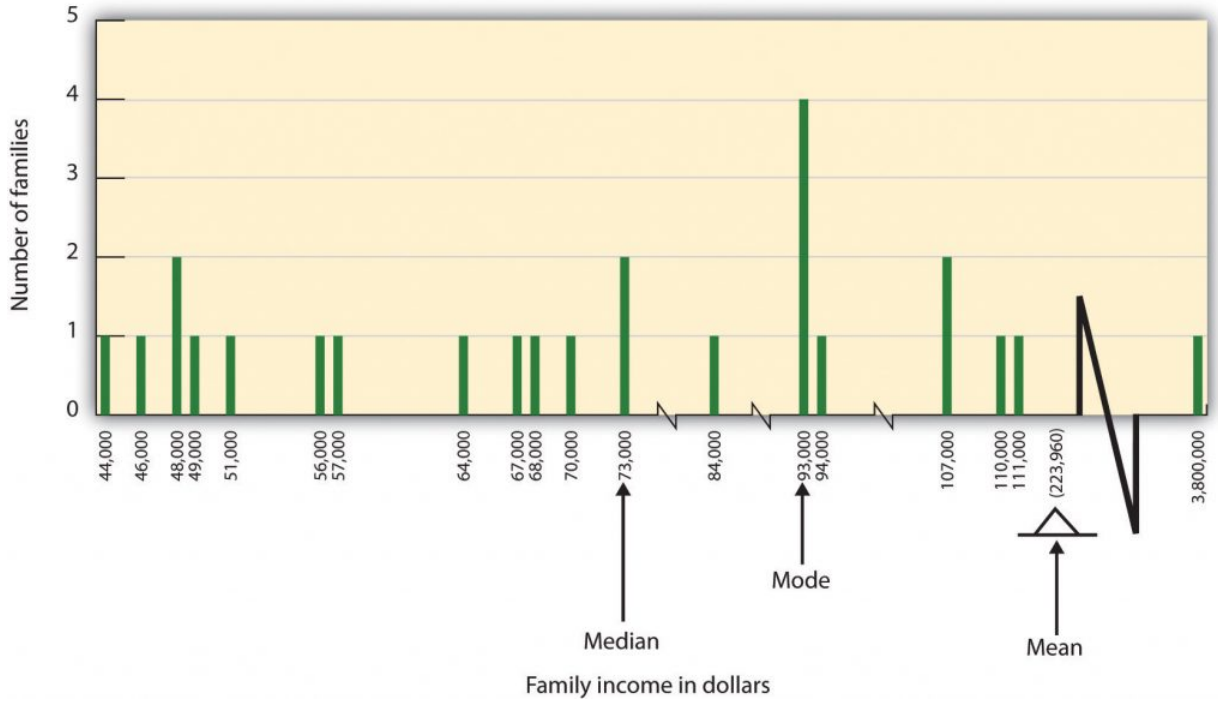


Figure 3.5 Family Income Distribution. The distribution of family incomes is likely to be nonsymmetrical because some incomes can be very large in comparison to most incomes. In this case the median or the mode is a better indicator of central tendency than is the mean. [Long Description]

A final measure of central tendency, known as the **mode**, represents *the value that occurs most frequently in the distribution*. You can see from Figure 3.5 that the mode for the family income variable is $93,000 (it occurs four times).

In addition to summarizing the central tendency of a distribution, descriptive statistics convey information about how the scores of the variable are spread around the central tendency. **Dispersion** refers to *the extent to which the scores are all tightly clustered around the central tendency*, as seen in Figure 3.6.

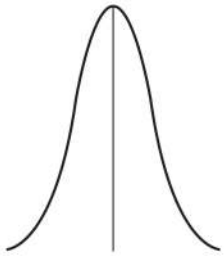


Figure 3.6

Or they may be more spread out away from it, as seen in Figure 3.7.



Figure 3.7

One simple measure of dispersion is to find the *largest* (the **maximum**) and the *smallest* (the **minimum**) observed values of the variable and to compute the **range** of the variable as the maximum observed score minus the minimum observed score. You can check that the range of the height variable in Figure 3.4 is 72 – 62 = 10. The **standard deviation**, symbolized as *s*, is *the most commonly used measure of dispersion*. Distributions with a larger standard deviation have more spread. The standard deviation of the height variable is s = 2.74, and the standard deviation of the family income variable is s = $745,337.

An advantage of descriptive research is that it attempts to capture the complexity of everyday behaviour. Case studies provide detailed information about a single person or a small group of people, surveys capture the thoughts or reported behaviours of a large population of people, and naturalistic observation objectively records the behaviour of people or animals as it occurs naturally. Thus descriptive research is used to provide a relatively complete understanding of what is currently happening.

Despite these advantages, descriptive research has a distinct disadvantage in that, although it allows us to get an idea of what is currently happening, it is usually limited to static pictures. Although descriptions of particular experiences may be interesting, they are not always transferable to other individuals in other situations, nor do they tell us exactly why specific behaviours or events occurred. For instance, descriptions of individuals who have suffered a stressful event, such as a war or an earthquake, can be used to understand the individuals' reactions to the event but cannot tell us anything about the long-term effects of the stress. And because there is no comparison group that did not experience the stressful situation, we cannot know what these individuals would be like if they hadn't had the stressful experience.

Correlational Research: Seeking Relationships among Variables

In contrast to descriptive research, which is designed primarily to provide static pictures, **correlational research** *involves the measurement of two or more relevant variables and an assessment of the relationship between or among those variables.* For instance, the variables of height and weight are systematically related (correlated) because taller people generally weigh more than shorter people. In the same way, study time and memory errors are also related, because the more time a person is given to study a list of words, the fewer errors he or she will make. When there are two variables in the research design, one of them is called the *predictor variable* and the other the *outcome variable*. The research design can be visualized as shown in Figure 3.8, where the curved arrow represents the expected correlation between these two variables.



Figure 3.8 Predictor and Outcome Variables.

One way of organizing the data from a correlational study with two variables is to graph the values of each of the measured variables using a *scatter plot*. As you can see in Figure 3.9 a **scatter plot** is *a visual image of the relationship between two variables*. A point is plotted for each individual at the intersection of his or her scores for the two variables. *When the association between the variables on the scatter plot can be easily approximated with a straight line*, as in parts (a) and (b) of Figure 3.9 the variables are said to have a **linear relationship**.

When the straight line indicates that individuals who have above-average values for one variable also tend to have above-average values for the other variable, as in part (a), the relationship is said to be **positive linear**. Examples of positive linear relationships include those between height and weight, between education and income, and between age and mathematical abilities in children. In each case, people who score higher on one of the variables also tend to score higher on the other variable. **Negative linear relationships**, in contrast, as shown in part (b), occur when above-average values for one variable tend to be associated with below-average values for the other variable. Examples of negative linear relationships include those between the age of a child and the number of diapers the child uses, and between practice on and errors made on a learning task. In these cases, people who score higher on one of the variables tend to score lower on the other variable.

Relationships between variables that cannot be described with a straight line are known as **nonlinear relationships**. Part (c) of Figure 3.9 shows a common pattern in which the distribution of the points is essentially random. In this case there is **no relationship** at all between the two variables, and they are said to be **independent**. Parts (d) and (e) of Figure 3.9 show patterns of association in which, although there is an association, the points are not well described by a single straight line. For instance, part (d) shows the type of relationship that frequently occurs between anxiety and performance. Increases in anxiety from low to moderate levels are associated with performance increases, whereas increases in anxiety from moderate to high levels are associated with decreases in performance. *Relationships that change in direction and thus are not described by a single straight line* are called **curvilinear relationships**.

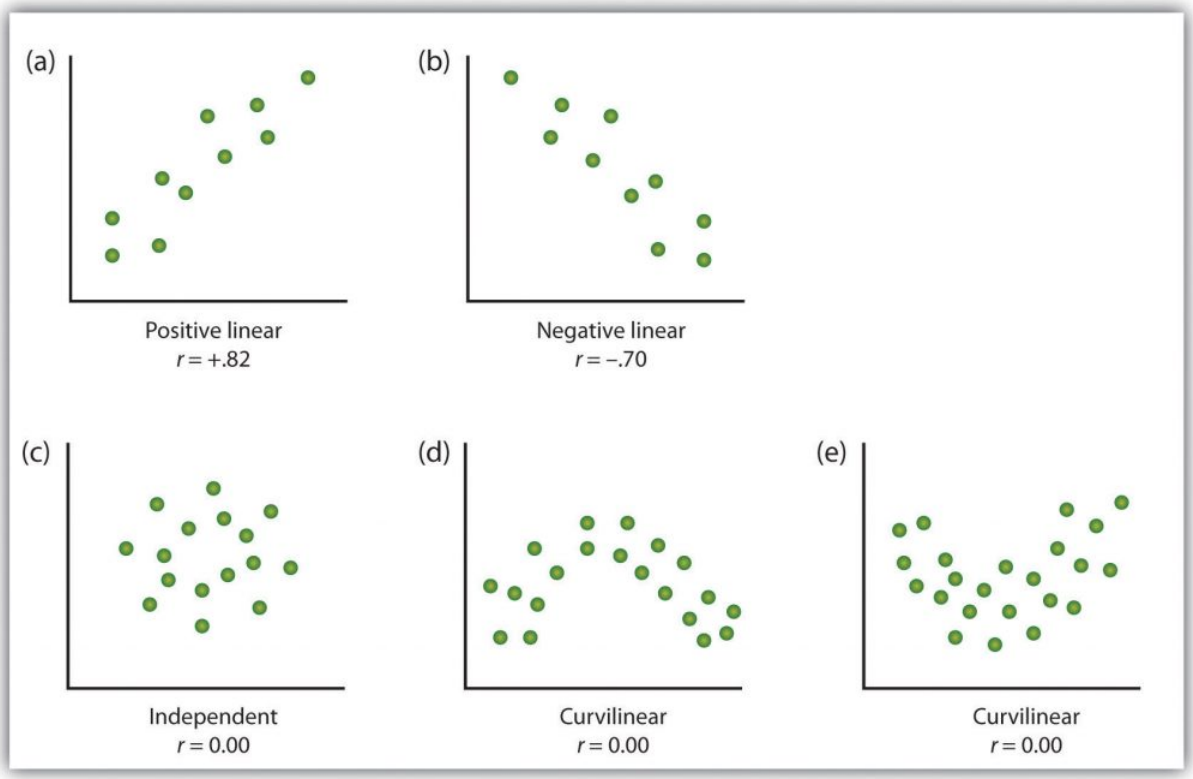


Figure 3.9 Examples of Scatter Plots. Some examples of relationships between two variables as shown in scatter plots. Note that the Pearson correlation coefficient (r) between variables that have curvilinear relationships will likely be close to zero. [Long Description] Source: Adapted from Stangor (2011).

The most common statistical measure of the strength of linear relationships among variables is the **Pearson correlation coefficient**, which is symbolized by the letter *r*. The value of the correlation coefficient ranges from *r* = –1.00 to *r* = +1.00. The direction of the linear relationship is indicated by the sign of the correlation coefficient. Positive values of *r* (such as *r* = .54 or *r* = .67) indicate that the relationship is positive linear (i.e., the pattern of the dots on the scatter plot runs from the lower left to the upper right), whereas negative values of *r* (such as *r* = –.30 or *r* = –.72) indicate negative linear relationships (i.e., the dots run from the upper left to the lower right). The strength of the linear relationship is indexed by the distance of the correlation coefficient from zero (its absolute value). For instance, *r* = –.54 is a stronger relationship than *r* = .30, and *r* = .72 is a stronger relationship than *r* = –.57. Because the Pearson correlation coefficient only measures linear relationships, variables that have curvilinear relationships are not well described by *r*, and the observed correlation will be close to zero.

It is also possible to study relationships among more than two measures at the same time. A research design in which more than one predictor variable is used to predict a single outcome variable is analyzed through *multiple regression* (Aiken & West, 1991). **Multiple regression** is *a statistical technique, based on correlation coefficients among variables, that allows predicting a single outcome variable from more than one predictor variable*. For instance, Figure 3.10 shows a multiple regression analysis in which three predictor variables (Salary, job satisfaction, and years employed) are used to predict a single outcome (job performance). The use of multiple regression analysis shows an important advantage of correlational research designs — they can be used to make predictions about a person's likely score on an outcome variable (e.g., job performance) based on knowledge of other variables.

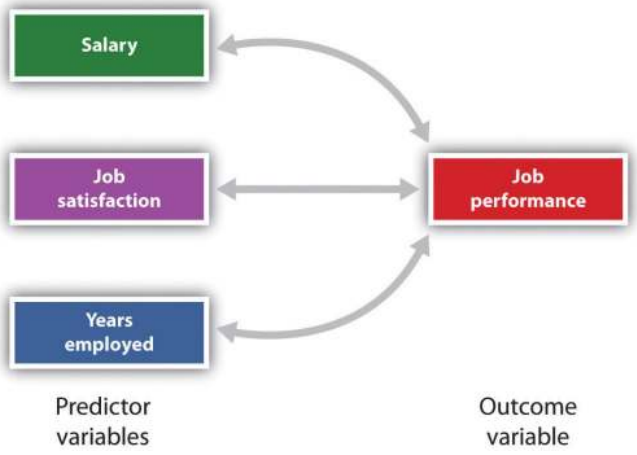


Figure 3.10 Prediction of Job Performance from Three Predictor Variables. Multiple regression allows scientists to predict the scores on a single outcome variable using more than one predictor variable.

An important limitation of correlational research designs is that they cannot be used to draw conclusions about the causal relationships among the measured variables. Consider, for instance, a researcher who has hypothesized that viewing violent behaviour will cause increased aggressive play in children. He has collected, from a sample of Grade 4 children, a measure of how many violent television shows each child views during the week, as well as a measure of how aggressively each child plays on the school playground. From his collected data, the researcher discovers a positive correlation between the two measured variables.



Figure 3.11

Although this positive correlation appears to support the researcher's hypothesis, it cannot be taken to indicate that viewing violent television causes aggressive behaviour. Although the researcher is tempted to assume that viewing violent television causes aggressive play, there are other possibilities. One alternative possibility is that the causal direction is exactly opposite from what has been hypothesized. Perhaps children who have behaved aggressively at school develop residual excitement that leads them to want to watch violent television shows at home (Figure 3.12):



Figure 3.12

Although this possibility may seem less likely, there is no way to rule out the possibility of such reverse causation on the basis of this observed correlation. It is also possible that both causal directions are operating and that the two variables cause each other (Figure 3.13).



Figure 3.13

Still another possible explanation for the observed correlation is that it has been produced by the presence of a *common-causal variable* (also known as a *third variable*). A **common-causal variable** is *a variable that is not part of the research hypothesis but that causes both the predictor and the outcome variable and thus produces the observed correlation between them*. In our example, a potential common-causal variable is the discipline style of the children's parents. Parents who use a harsh and punitive discipline style may produce children who like to watch violent television and who also behave aggressively in comparison to children whose parents use less harsh discipline (Figure 3.14)

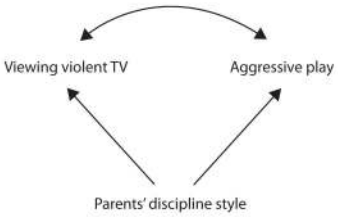


Figure 3.14

In this case, television viewing and aggressive play would be positively correlated (as indicated by the curved arrow between them), even though neither one caused the other but they were both caused by the discipline style of the parents (the straight arrows). When the predictor and outcome variables are both caused by a common-causal variable, the observed relationship between them is said to be *spurious*. A **spurious relationship** is *a relationship between two variables in which a common-causal variable produces and "explains away" the relationship*. If effects of the common-causal variable were taken away, or controlled for, the relationship between the predictor and outcome variables would disappear. In the example, the relationship between aggression and television viewing might be spurious because by controlling for the effect of the parents' disciplining style, the relationship between television viewing and aggressive behaviour might go away.

Common-causal variables in correlational research designs can be thought of as mystery variables because, as they have not been measured, their presence and identity are usually unknown to the researcher. Since it is not possible to measure every variable that could cause both the predictor and outcome variables, the existence of an unknown common-causal variable is always a possibility. For this reason, we are left with the basic limitation of correlational research: correlation does not demonstrate causation. It is important that when you read about correlational research projects, you keep in mind the possibility of spurious relationships, and be sure to interpret the findings appropriately. Although correlational research is sometimes reported as demonstrating causality without any mention being made of the possibility of reverse causation or common-causal variables, informed consumers of research, like you, are aware of these interpretational problems.

In sum, correlational research designs have both strengths and limitations. One strength is that they can be used when experimental research is not possible because the predictor variables cannot be manipulated. Correlational designs also have the advantage of allowing the researcher to study behaviour as it occurs in everyday life. And we can also use correlational designs to make predictions — for instance, to predict from the scores on their battery of tests the success of job trainees during a training session.

But we cannot use such correlational information to determine whether the training caused better job performance. For that, researchers rely on experiments.

Experimental Research: Understanding the Causes of Behaviour

The goal of experimental research design is to provide more definitive conclusions about the causal relationships among the variables in the research hypothesis than is available from correlational designs. In an experimental research design, the variables of interest are called the *independent variable* (or *variables*) and the *dependent variable*. The **independent variable** in an experiment is *the causing variable that is created (manipulated) by the experimenter*. The **dependent variable** in an experiment is *a measured variable that is expected to be influenced by the experimental manipulation*. The research hypothesis suggests that the manipulated independent variable or variables will cause changes in the measured dependent variables. We can diagram the research hypothesis by using an arrow that points in one direction. This demonstrates the expected direction of causality (Figure 3.15):



Figure 3.15

Research Focus: Video Games and Aggression

Consider an experiment conducted by Anderson and Dill (2000). The study was designed to test the hypothesis that viewing violent video games would increase aggressive behaviour. In this research, male and female undergraduates from Iowa State University were given a chance to play with either a violent video game (Wolfenstein 3D) or a nonviolent video game (Myst). During the experimental session, the participants played their assigned video games for 15 minutes. Then, after the play, each participant played a competitive game with an opponent in which the participant could deliver blasts of white noise through the earphones of the opponent. The operational definition of the dependent variable (aggressive behaviour) was the level and duration of noise delivered to the opponent. The design of the experiment is shown in Figure 3.16

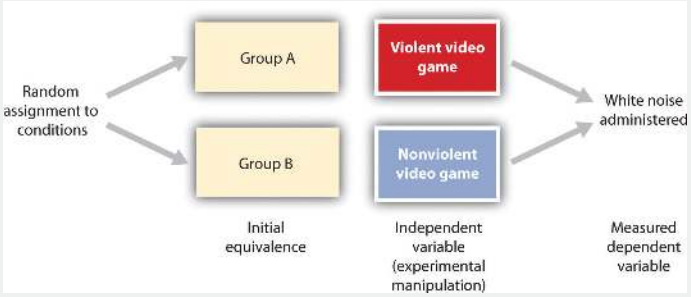


Figure 3.16 An Experimental Research Design.

Two advantages of the experimental research design are (a) the assurance that the independent variable (also known as the *experimental manipulation*) occurs prior to the measured dependent variable, and (b) the creation of initial equivalence between the conditions of the experiment (in this case by using random assignment to conditions).

Experimental designs have two very nice features. For one, they guarantee that the independent variable occurs prior to the measurement of the dependent variable. This eliminates the possibility of reverse causation. Second, the influence of common-causal variables is controlled, and thus eliminated, by creating *initial equivalence* among the participants in each of the experimental conditions before the manipulation occurs.

The most common method of creating equivalence among the experimental conditions is through **random assignment to conditions,** *a procedure in which the condition that each participant is assigned to is determined through a random process, such as drawing numbers out of an envelope or using a random number table*. Anderson and Dill first randomly assigned about 100 participants to each of their two groups (Group A and Group B). Because they used random assignment to conditions, they could be confident that, before the experimental manipulation occurred, the students in Group A were, on average, equivalent

to the students in Group B on every possible variable, including variables that are likely to be related to aggression, such as parental discipline style, peer relationships, hormone levels, diet — and in fact everything else.

Then, after they had created initial equivalence, Anderson and Dill created the experimental manipulation — they had the participants in Group A play the violent game and the participants in Group B play the nonviolent game. Then they compared the dependent variable (the white noise blasts) between the two groups, finding that the students who had viewed the violent video game gave significantly longer noise blasts than did the students who had played the nonviolent game.

Anderson and Dill had from the outset created initial equivalence between the groups. This initial equivalence allowed them to observe differences in the white noise levels between the two groups after the experimental manipulation, leading to the conclusion that it was the independent variable (and not some other variable) that caused these differences. The idea is that the only thing that was different between the students in the two groups was the video game they had played.

Despite the advantage of determining causation, experiments do have limitations. One is that they are often conducted in laboratory situations rather than in the everyday lives of people. Therefore, we do not know whether results that we find in a laboratory setting will necessarily hold up in everyday life. Second, and more important, is that some of the most interesting and key social variables cannot be experimentally manipulated. If we want to study the influence of the size of a mob on the destructiveness of its behaviour, or to compare the personality characteristics of people who join suicide cults with those of people who do not join such cults, these relationships must be assessed using correlational designs, because it is simply not possible to experimentally manipulate these variables.

Key Takeaways

- Descriptive, correlational, and experimental research designs are used to collect and analyze data.
- Descriptive designs include case studies, surveys, and naturalistic observation. The goal of these designs is to get a picture of the current thoughts, feelings, or behaviours in a given group of people. Descriptive research is summarized using descriptive statistics.
- Correlational research designs measure two or more relevant variables and assess a relationship between or among them. The variables may be presented on a scatter plot to visually show the relationships. The Pearson Correlation Coefficient (r) is a measure of the strength of linear relationship between two variables.
- Common-causal variables may cause both the predictor and outcome variable in a correlational design, producing a spurious relationship. The possibility of common-causal variables makes it impossible to draw causal conclusions from correlational research designs.
- Experimental research involves the manipulation of an independent variable and the measurement of a dependent variable. Random assignment to conditions is normally used to create initial equivalence between the groups, allowing researchers to draw causal conclusions.

Exercises and Critical Thinking

1. There is a negative correlation between the row that a student sits in in a large class (when the rows are numbered from front to back) and his or her final grade in the class. Do you think this represents a causal relationship or a spurious relationship, and why?
2. Think of two variables (other than those mentioned in this book) that are likely to be correlated, but in which the correlation is probably spurious. What is the likely common-causal variable that is producing the relationship?
3. Imagine a researcher wants to test the hypothesis that participating in psychotherapy will cause a decrease in reported anxiety. Describe the type of research design the investigator might use to draw this conclusion. What would be the independent and dependent variables in the research?

Image Attributions

Figure 3.3: "Reading newspaper" by Alaskan Dude (http://commons.wikimedia.org/wiki/Fi..._newspaper.jpg) is licensed under CC BY 2.0

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Long Descriptions

Figure 3.5 long description: There are 25 families. 24 families have an income between $44,000 and $111,000 and one family has an income of $3,800,000. The mean income is $223,960 while the median income is $73,000.

Figure 3.9 long description: Types of scatter plots.

1. Positive linear, r=positive .82. The plots on the graph form a rough line that runs from lower left to upper right.
2. Negative linear, r=negative .70. The plots on the graph form a rough line that runs from upper left to lower right.
3. Independent, r=0.00. The plots on the graph are spread out around the centre.
4. Curvilinear, r=0.00. The plots of the graph form a rough line that goes up and then down like a hill.
5. Curvilinear, r=0.00. The plots on the graph for a rough line that goes down and then up like a ditch.

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3.7: You Can Be an Informed Consumer of Psychological Research

Charles Stangor and Jennifer Walinga

Learning Objectives

- Outline the four potential threats to the validity of research and discuss how they may make it difficult to accurately interpret research findings.
- Describe how confounding may reduce the internal validity of an experiment.
- Explain how generalization, replication, and meta-analyses are used to assess the external validity of research findings.

Good research is *valid* research. When research is **valid**, *the conclusions drawn by the researcher are legitimate*. For instance, if a researcher concludes that participating in psychotherapy reduces anxiety, or that taller people are smarter than shorter people, the research is valid only if the therapy really works or if taller people really are smarter. Unfortunately, there are many threats to the validity of research, and these threats may sometimes lead to unwarranted conclusions. Often, and despite researchers' best intentions, some of the research reported on websites as well as in newspapers, magazines, and even scientific journals is invalid. Validity is not an all-or-nothing proposition, which means that some research is more valid than other research. Only by understanding the potential threats to validity will you be able to make knowledgeable decisions about the conclusions that can or cannot be drawn from a research project. There are four major types of threats to the validity of research, and informed consumers of research are aware of each type.

Threats to the Validity of Research

1. *Threats to construct validity.* Although it is claimed that the measured variables measure the conceptual variables of interest, they actually may not.
2. *Threats to statistical conclusion validity.* Conclusions regarding the research may be incorrect because no statistical tests were made or because the statistical tests were incorrectly interpreted.
3. *Threats to internal validity.* Although it is claimed that the independent variable caused the dependent variable, the dependent variable actually may have been caused by a confounding variable.
4. *Threats to external validity.* Although it is claimed that the results are more general, the observed effects may actually only be found under limited conditions or for specific groups of people. (Stangor, 2011)

One threat to valid research occurs when there is a threat to *construct validity*. **Construct validity** refers to *the extent to which the variables used in the research adequately assess the conceptual variables they were designed to measure*. One requirement for construct validity is that the measure be *reliable*, where **reliability** refers to *the consistency of a measured variable*. A bathroom scale is usually reliable, because if we step on and off it a couple of times, the scale will consistently measure the same weight every time. Other measures, including some psychological tests, may be less reliable, and thus less useful.

Normally, we can assume that the researchers have done their best to assure the construct validity of their measures, but it is not inappropriate for you, as an informed consumer of research, to question this. It is always important to remember that the ability to learn about the relationship between the conceptual variables in a research hypothesis is dependent on the operational definitions of the measured variables. If the measures do not really measure the conceptual variables that they are designed to assess (e.g., if a supposed IQ test does not really measure intelligence), then they cannot be used to draw inferences about the relationship between the conceptual variables (Nunnally, 1978).

The statistical methods that scientists use to test their research hypotheses are based on probability estimates. You will see statements in research reports indicating that the results were *statistically significant* or *not statistically significant*. These statements will be accompanied by statistical tests, often including statements such as $p < 0.05$ or about confidence intervals. These statements describe the *statistical significance* of the data that have been collected. **Statistical significance** refers to *the confidence with which a scientist can conclude that data are not due to chance or random error*. When a researcher concludes that a result is statistically significant, he or she has determined that the observed data was very unlikely to have been caused by chance factors alone. Hence, there is likely a real relationship between or among the variables in the research design. Otherwise, the researcher concludes that the results were not statistically significant.

Statistical conclusion validity refers to *the extent to which we can be certain that the researcher has drawn accurate conclusions about the statistical significance of the research*. Research will be invalid if the conclusions made about the research hypothesis are incorrect because statistical inferences about the collected data are in error. These errors can occur either because the scientist inappropriately infers that the data do support the research hypothesis when in fact they are due to chance, or when the researcher mistakenly fails to find support for the research hypothesis. Normally, we can assume that the researchers have done their best to ensure the statistical conclusion validity of a research design, but we must always keep in mind that inferences about data are probabilistic and never certain — this is why research never *proves* a theory.

Internal validity refers to *the extent to which we can trust the conclusions that have been drawn about the causal relationship between the independent and dependent variables* (Campbell & Stanley, 1963). Internal validity applies primarily to experimental research designs, in which the researcher hopes to conclude that the independent variable has caused the dependent variable. Internal validity is maximized when the research is free from the presence of **confounding variables** — *variables other than the independent variable on which the participants in one experimental condition differ systematically from those in other conditions*.

Consider an experiment in which a researcher tested the hypothesis that drinking alcohol makes members of the opposite sex look more attractive. Participants older than 21 years of age were randomly assigned to drink either orange juice mixed with vodka or orange juice alone. To eliminate the need for deception, the participants were told whether or not their drinks contained vodka. After enough time had passed for the alcohol to take effect, the participants were asked to rate the attractiveness of pictures of members of the opposite sex. The results of the experiment showed that, as predicted, the participants who drank the vodka rated the photos as significantly more attractive.

If you think about this experiment for a minute, it may occur to you that although the researcher wanted to draw the conclusion that the alcohol caused the differences in perceived attractiveness, the expectation of having consumed alcohol is confounded with the presence of alcohol. That is, the people who drank alcohol also knew they drank alcohol, and those who did not drink alcohol knew they did not. It is possible that simply knowing that they were drinking alcohol, rather than the effect of the alcohol itself, may have caused the differences (see Figure 3.17, "An Example of Confounding"). One solution to the problem of potential *expectancy effects* is to tell both groups that they are drinking orange juice and vodka but really give alcohol to only half of the participants (it is possible to do this because vodka has very little smell or taste). If differences in perceived attractiveness are found, the experimenter could then confidently attribute them to the alcohol rather than to the expectancy about having consumed alcohol.

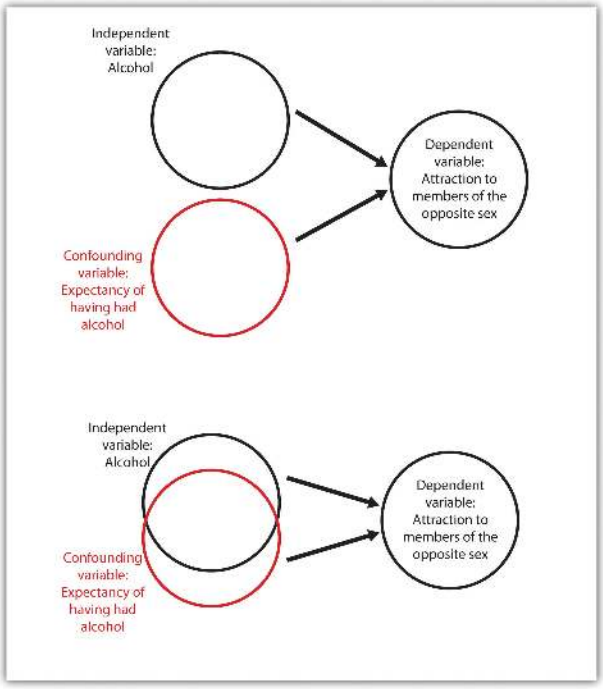


Figure 3.17 An Example of Confounding. Confounding occurs when a variable that is not part of the research hypothesis is "mixed up," or confounded, with the variable in the research hypothesis. In the bottom panel, alcohol consumed and alcohol expectancy are

confounded, but in the top panel they are separate (independent). Confounding makes it impossible to be sure that the independent variable (rather than the confounding variable) caused the dependent variable.

Another threat to internal validity can occur when the experimenter knows the research hypothesis and also knows which experimental condition the participants are in. The outcome is the potential for **experimenter bias**, *a situation in which the experimenter subtly treats the research participants in the various experimental conditions differently, resulting in an invalid confirmation of the research hypothesis*. In one study demonstrating experimenter bias, Rosenthal and Fode (1963) sent 12 students to test a research hypothesis concerning maze learning in rats. Although it was not initially revealed to the students, they were actually the participants in an experiment. Six of the students were randomly told that the rats they would be testing had been bred to be highly intelligent, whereas the other six students were led to believe that the rats had been bred to be unintelligent. In reality there were no differences among the rats given to the two groups of students. When the students returned with their data, a startling result emerged. The rats run by students who expected them to be intelligent showed significantly better maze learning than the rats run by students who expected them to be unintelligent. Somehow the students' expectations influenced their data. They evidently did something different when they tested the rats, perhaps subtly changing how they timed the maze running or how they treated the rats. And this experimenter bias probably occurred entirely out of their awareness.

To avoid experimenter bias, researchers frequently run experiments in which the researchers are **blind to condition**. This means that *although the experimenters know the research hypotheses, they do not know which conditions the participants are assigned to*. Experimenter bias cannot occur if the researcher is blind to condition. In a **double-blind experiment**, *both the researcher and the research participants are blind to condition*. For instance, in a double-blind trial of a drug, the researcher does not know whether the drug being given is the real drug or the ineffective placebo, and the patients also do not know which they are getting. Double-blind experiments eliminate the potential for experimenter effects and at the same time eliminate participant expectancy effects.

While internal validity refers to conclusions drawn about events that occurred within the experiment, **external validity** refers to *the extent to which the results of a research design can be generalized beyond the specific way the original experiment was conducted*. **Generalization** refers to *the extent to which relationships among conceptual variables can be demonstrated in a wide variety of people and a wide variety of manipulated or measured variables*.

Psychologists who use university students as participants in their research may be concerned about generalization, wondering if their research will generalize to people who are not college students. And researchers who study the behaviours of employees in one company may wonder whether the same findings would translate to other companies. Whenever there is reason to suspect that a result found for one sample of participants would not hold up for another sample, then research may be conducted with these other populations to test for generalization.

Recently, many psychologists have been interested in testing hypotheses about the extent to which a result will replicate across people from different cultures (Heine, 2010). For instance, a researcher might test whether the effects on aggression of viewing violent video games are the same for Japanese children as they are for Canadian children by showing violent and nonviolent films to a sample of both Japanese and Canadian schoolchildren. If the results are the same in both cultures, then we say that the results have generalized, *but if they are different*, then we have learned a **limiting condition** of the effect (see Table 3.5, "A Cross-Cultural Replication").

Table 3.5 A Cross-Cultural Replication.

Canada	Japan	Gaming behaviour
More aggressive behaviour observed	???	Violent Games
Less aggressive behaviour observed	???	Nonviolent Games
Source: Adapted by J. Walinga.		

In a cross-cultural replication, external validity is observed if the same effects that have been found in one culture are replicated in another culture. If they are not replicated in the new culture, then a limiting condition of the original results is found.

Unless the researcher has a specific reason to believe that generalization will not hold, it is appropriate to assume that a result found in one population (even if that population is college or university students) will generalize to other populations. Because the

investigator can never demonstrate that the research results generalize to all populations, it is not expected that the researcher will attempt to do so. Rather, the burden of proof rests on those who claim that a result will not generalize.

Because any single test of a research hypothesis will always be limited in terms of what it can show, important advances in science are never the result of a single research project. Advances occur through the accumulation of knowledge that comes from many different tests of the same theory or research hypothesis. These tests are conducted by different researchers using different research designs, participants, and operationalizations of the independent and dependent variables. *The process of repeating previous research, which forms the basis of all scientific inquiry*, is known as **replication**.

Scientists often use a procedure known as *meta-analysis* to summarize replications of research findings. A **meta-analysis** is *a statistical technique that uses the results of existing studies to integrate and draw conclusions about those studies*. Because meta-analyses provide so much information, they are very popular and useful ways of summarizing research literature.

A meta-analysis provides a relatively objective method of reviewing research findings because it (a) specifies inclusion criteria that indicate exactly which studies will or will not be included in the analysis, (b) systematically searches for all studies that meet the inclusion criteria, and (c) provides an objective measure of the strength of observed relationships. Frequently, the researchers also include — if they can find them — studies that have not been published in journals.

Psychology in Everyday Life: Critically Evaluating the Validity of Websites

The validity of research reports published in scientific journals is likely to be high because the hypotheses, methods, results, and conclusions of the research have been rigorously evaluated by other scientists, through peer review, before the research was published. For this reason, you will want to use peer-reviewed journal articles as your major source of information about psychological research.

Although research articles are the gold standard for validity, you may also need and desire to get at least some information from other sources. The Internet is a vast source of information from which you can learn about almost anything, including psychology. Search engines — such as Google or Yahoo! — bring hundreds or thousands of hits on a topic, and online encyclopedias, such as Wikipedia, provide articles about relevant topics.

Although you will naturally use the web to help you find information about fields such as psychology, you must also realize that it is important to carefully evaluate the validity of the information you get from the web. You must try to distinguish information that is based on empirical research from information that is based on opinion, and between valid and invalid data. The following material may be helpful to you in learning to make these distinctions.

The techniques for evaluating the validity of websites are similar to those that are applied to evaluating any other source of information. Ask first about the source of the information. Is the domain a ".com" or ".ca" (business), ".gov" (government), or ".org" (nonprofit) entity? This information can help you determine the author's (or organization's) purpose in publishing the website. Try to determine where the information is coming from. Is the data being summarized from objective sources, such as journal articles or academic or government agencies? Does it seem that the author is interpreting the information as objectively as possible, or is the data being interpreted to support a particular point of view? Consider what groups, individuals, and political or commercial interests stand to gain from the site. Is the website potentially part of an advocacy group whose web pages reflect the particular positions of the group? Material from any group's site may be useful, but try to be aware of the group's purposes and potential biases.

Also, ask whether or not the authors themselves appear to be a trustworthy source of information. Do they hold positions in an academic institution? Do they have peer-reviewed publications in scientific journals? Many useful web pages appear as part of organizational sites and reflect the work of that organization. You can be more certain of the validity of the information if it is sponsored by a professional organization, such as the Canadian Psychological Association or the Canadian Mental Health Association.

Try to check on the accuracy of the material and discern whether the sources of information seem current. Is the information cited so that you can read it in its original form? Reputable websites will probably link to other reputable sources, such as journal articles and scholarly books. Try to check the accuracy of the information by reading at least some of these sources yourself.

> It is fair to say that all authors, researchers, and organizations have at least some bias and that the information from any site can be invalid. But good material attempts to be fair by acknowledging other possible positions, interpretations, or conclusions. A critical examination of the nature of the websites you browse for information will help you determine if the information is valid and will give you more confidence in the information you take from it.

Key Takeaways

- Research is said to be valid when the conclusions drawn by the researcher are legitimate. Because all research has the potential to be invalid, no research ever "proves" a theory or research hypothesis.
- Construct validity, statistical conclusion validity, internal validity, and external validity are all types of validity that people who read and interpret research need to be aware of.
- Construct validity refers to the assurance that the measured variables adequately measure the conceptual variables.
- Statistical conclusion validity refers to the assurance that inferences about statistical significance are appropriate.
- Internal validity refers to the assurance that the independent variable has caused the dependent variable. Internal validity is greater when confounding variables are reduced or eliminated.
- External validity is greater when effects can be replicated across different manipulations, measures, and populations. Scientists use meta-analyses to better understand the external validity of research.

Exercises and Critical Thinking

1. The Pepsi-Cola Company, now PepsiCo Inc., conducted the "Pepsi Challenge" by randomly assigning individuals to taste either a Pepsi or a Coke. The researchers labelled the glasses with only an "M" (for Pepsi) or a "Q" (for Coke) and asked the participants to rate how much they liked the beverage. The research showed that subjects overwhelmingly preferred glass "M" over glass "Q," and the researchers concluded that Pepsi was preferred to Coke. Can you tell what confounding variable is present in this research design? How would you redesign the research to eliminate the confound?
2. Locate a research report of a meta-analysis. Determine the criteria that were used to select the studies and report on the findings of the research.

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3.8: The Replication Crisis in Psychology

Edward Diener and Robert Biswas-Diener

In science, replication is the process of repeating research to determine the extent to which findings generalize across time and across situations. Recently, the science of psychology has come under criticism because a number of research findings do not replicate. In this module we discuss reasons for non-replication, the impact this phenomenon has on the field, and suggest solutions to the problem.

Learning Objectives

- Define “replication”
- Explain the difference between exact and conceptual replication
- List 4 explanations for non-replication
- Name 3 potential solutions to the replication crisis

The Disturbing Problem



Figure 3.18: If you saw a pirate you might not believe it; but if you saw another one you would feel more confident in your observation. In science, this is the process of replication.

If you were driving down the road and you saw a pirate standing at an intersection you might not believe your eyes. But if you continued driving and saw a second, and then a third, you might become more confident in your observations. The more pirates you saw the less likely the first sighting would be a false positive (you were driving fast and the person was just wearing an unusual hat and billowy shirt) and the more likely it would be the result of a logical reason (there is a pirate themed conference in town). This somewhat absurd example is a real-life illustration of replication: the repeated findings of the same results.

The replication of findings is one of the defining hallmarks of science. Scientists must be able to replicate the results of studies or their findings do not become part of scientific knowledge. Replication protects against false positives (seeing a result that is not really there) and also increases confidence that the result actually exists. If you collect satisfaction data among homeless people living in Kolkata, India, for example, it might seem strange that they would report fairly high satisfaction with their food (which is exactly what we found in Biswas-Diener & Diener, 2001). If you find the exact same result, but at a *different* time, and with a *different* sample of homeless people living in Kolkata, however, you can feel more confident that this result is true (as we did in Biswas-Diener & Diener, 2006).

In modern times, the science of psychology is facing a crisis. It turns out that many studies in psychology—including many highly cited studies—do not replicate. In an era where news is instantaneous, the failure to replicate research raises important questions about the scientific process in general and psychology specifically. People have the right to know if they can trust research evidence. For our part, psychologists also have a vested interest in ensuring that our methods and findings are as trustworthy as possible.

Psychology is not alone in coming up short on replication. There have been notable failures to replicate findings in other scientific fields as well. For instance, in 1989 scientists reported that they had produced “cold fusion,” achieving nuclear fusion at room temperatures. This could have been an enormous breakthrough in the advancement of clean energy. However, other scientists were

unable to replicate the findings. Thus, the potentially important results did not become part of the scientific canon, and a new energy source did not materialize. In medical science as well, a number of findings have been found not to replicate—which is of vital concern to all of society. The non-reproducibility of medical findings suggests that some treatments for illness could be ineffective. One example of non-replication has emerged in the study of genetics and diseases: when replications were attempted to determine whether certain gene-disease findings held up, only about 4% of the findings consistently did so.

The non-reproducibility of findings is disturbing because it suggests the possibility that the original research was done sloppily. Even worse is the suspicion that the research may have been falsified. In science, faking results is *the biggest* of sins, the unforgivable sin, and for this reason the field of psychology has been thrown into an uproar. However, as we will discuss, there are a number of explanations for non-replication, and not all are bad.

What is Replication?

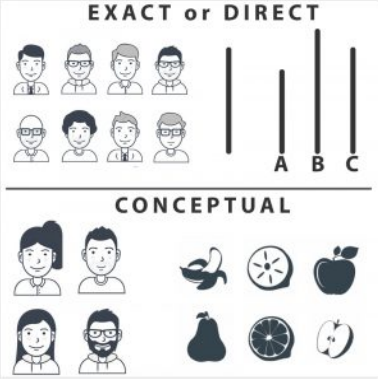


Figure 3.19: Example of direct replication and conceptual replication of Asch's conformity experiment.

There are different types of replication. First, there is a type called "**exact replication**" (also called "**direct replication**"). In this form, a scientist attempts to exactly recreate the scientific methods used in conditions of an earlier study to determine whether the results come out the same. If, for instance, you wanted to exactly replicate Asch's (1956) classic findings on conformity, you would follow the original methodology: you would use only male participants, you would use groups of 8, and you would present the same stimuli (lines of differing lengths) in the same order. The second type of replication is called "**conceptual replication**." This occurs when—instead of an exact replication, which reproduces the methods of the earlier study as closely as possible—a scientist tries to confirm the previous findings using a different set of specific methods that test the same idea. The same hypothesis is tested, but using a different set of methods and measures. A conceptual replication of Asch's research might involve both male and female **confederates** purposefully misidentifying types of fruit to investigate conformity—rather than only males misidentifying line lengths.

Both exact and conceptual replications are important because they each tell us something new. Exact replications tell us whether the original findings are true, at least under the exact conditions tested. Conceptual replications help confirm whether the theoretical idea behind the findings is true, and under what conditions these findings will occur. In other words, conceptual replication offers insights into how generalizable the findings are.

Enormity of the Current Crisis

Journal	% Findings Replicated
Journal of Personality and Social Psychology: Social	23
Journal of Experimental Psychology: Learning, Memory, and Cognition	48
Psychological Science, social articles	29
Psychological Science, cognitive articles	53
Overall	36

Table 3.6: The Reproducibility of Psychological Science

Recently, there has been growing concern as psychological research fails to replicate. To give you an idea of the extent of non-replicability of psychology findings, Table 3.6 shows data reported in 2015 by the Open Science Collaboration project, led by University of Virginia psychologist Brian Nosek (Open Science Collaboration, 2015). Because these findings were reported in the prestigious journal, *Science*, they received widespread attention from the media. Here are the percentages of research that replicated —selected from several highly prestigious journals:

Clearly, there is a very large problem when only about 1/3 of the psychological studies in premier journals replicate! It appears that this problem is particularly pronounced for social psychology but even the 53% replication level of cognitive psychology is cause for concern.

The situation in psychology has grown so worrisome that the Nobel Prize-winning psychologist Daniel Kahneman called on social psychologists to clean up their act (Kahneman, 2012). The Nobel laureate spoke bluntly of doubts about the integrity of psychology research, calling the current situation in the field a "mess." His missive was pointed primarily at researchers who study social "priming," but in light of the non-replication results that have since come out, it might be more aptly directed at the behavioral sciences in general.

Examples of Non-replications in Psychology

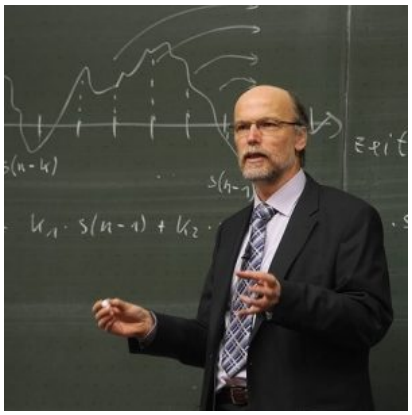


Figure 3.20: In one study, researchers enhanced test performance by priming participants with stereotypes of intelligence. But subsequent studies have not been able to replicate those results.

A large number of scientists have attempted to replicate studies on what might be called "metaphorical priming," and more often than not these replications have failed. **Priming** is the process by which a recent reference (often a subtle, subconscious cue) can increase the accessibility of a trait. For example, if your instructor says, "Please put aside your books, take out a clean sheet of paper, and write your name at the top," you might find your pulse quickening. Over time, you have learned that this cue means you are about to be given a pop quiz. This phrase primes all the features associated with pop quizzes: they are anxiety-provoking, they are tricky, your performance matters.

One example of a priming study that, at least in some cases, does not replicate, is the priming of the idea of intelligence. In theory, it might be possible to prime people to actually become more intelligent (or perform better on tests, at least). For instance, in one study, priming students with the idea of a stereotypical professor versus soccer hooligans led participants in the "professor" condition to earn higher scores on a trivia game (Dijksterhuis & van Knippenberg, 1998). Unfortunately, in several follow-up instances this finding has not replicated (Shanks et al, 2013). This is unfortunate for all of us because it would be a very easy way to raise our test scores and general intelligence. If only it were true.

Another example of a finding that seems not to replicate consistently is the use of spatial distance cues to prime people's feelings of emotional closeness to their families (Williams & Bargh, 2008). In this type of study, participants are asked to plot points on graph paper, either close together or far apart. The participants are then asked to rate how close they are to their family members. Although the original researchers found that people who plotted close-together points on graph paper reported being closer to their

relatives, studies reported on PsychFileDrawer—an internet repository of replication attempts—suggest that the findings frequently do not replicate. Again, this is unfortunate because it would be a handy way to help people feel closer to their families.

As one can see from the examples, some of the studies that fail to replicate report extremely interesting findings—even counterintuitive findings that appear to offer new insights into the human mind. Critics claim that psychologists have become too enamored with such newsworthy, surprising "discoveries" that receive a lot of media attention. Which raises the question of timing: might the current crisis of non-replication be related to the modern, media-hungry context in which psychological research (indeed, all research) is conducted? Put another way: is the non-replication crisis new?

Nobody has tried to systematically replicate studies from the past, so we do not know if published studies are becoming less replicable over time. In 1990, however, Amir and Sharon were able to successfully replicate most of the main effects of six studies from another culture, though they did fail to replicate many of the interactions. This particular shortcoming in their overall replication may suggest that published studies are becoming less replicable over time, but we cannot be certain. What we can be sure of is that there is a significant problem with replication in psychology, and it's a trend the field needs to correct. Without replicable findings, nobody will be able to believe in scientific psychology.

Reasons for Non-replication

When findings do not replicate, the original scientists sometimes become indignant and defensive, offering reasons or excuses for non-replication of their findings—including, at times, attacking those attempting the replication. They sometimes claim that the scientists attempting the replication are unskilled or unsophisticated, or do not have sufficient experience to replicate the findings. This, of course, might be true, and it is one possible reason for non-replication.

One reason for defensive responses is the unspoken implication that the original results might have been falsified. Faked results are only one reason studies may not replicate, but it is the most disturbing reason. We hope faking is rare, but in the past decade a number of shocking cases have turned up. Perhaps the most well-known come from social psychology. Diederik Stapel, a renowned social psychologist in the Netherlands, admitted to faking the results of a number of studies. Marc Hauser, a popular professor at Harvard, apparently faked results on morality and cognition. Karen Ruggiero at the University of Texas was also found to have **falsified** a number of her results (proving that bad behavior doesn't have a gender bias). Each of these psychologists—and there are quite a few more examples—was believed to have faked data. Subsequently, they all were disgraced and lost their jobs.

Another reason for non-replication is that, in studies with small **sample sizes**, statistically-significant results may often be the result of chance. For example, if you ask five people if they believe that aliens from other planets visit Earth and regularly abduct humans, you may get three people who agree with this notion—simply by chance. Their answers may, in fact, not be at all representative of the larger population. On the other hand, if you survey one thousand people, there is a higher probability that their belief in alien abductions reflects the actual attitudes of society. Now consider this scenario in the context of replication: if you try to replicate the first study—the one in which you interviewed only five people—there is only a small chance that you will randomly draw five new people with exactly the same (or similar) attitudes. It's far more likely that you will be able to replicate the findings using another large sample, because it is simply more likely that the findings are accurate.

Another reason for non-replication is that, while the findings in an original study may be true, they may only be true for some people in some circumstances and not necessarily universal or enduring. Imagine that a survey in the 1950s found a strong majority of respondents to have trust in government officials. Now imagine the same survey administered today, with vastly different results. This example of non-replication does not invalidate the original results. Rather, it suggests that attitudes have shifted over time.

A final reason for non-replication relates to the quality of the replication rather than the quality of the original study. Non-replication might be the product of scientist-error, with the newer investigation not following the original procedures closely enough. Similarly, the attempted replication study might, itself, have too small a sample size or insufficient statistical power to find significant results.

In Defense of Replication Attempts

Failures in replication are not all bad and, in fact, some non-replication should be expected in science. Original studies are conducted when an answer to a question is uncertain. That is to say, scientists are venturing into new territory. In such cases we should expect some answers to be uncovered that will not pan out in the long run. Furthermore, we hope that scientists take on

challenging new topics that come with some amount of risk. After all, if scientists were only to publish safe results that were easy to replicate, we might have very boring studies that do not advance our knowledge very quickly. But, with such risks, some non-replication of results is to be expected.

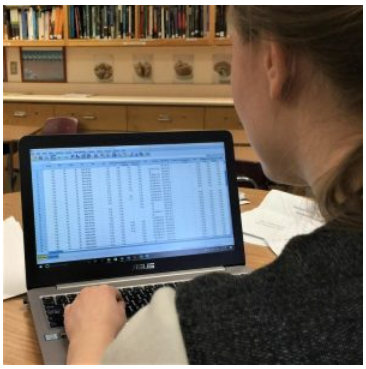


Figure 3.21: Researchers use specialized statistical software to store, analyze, and share data. Saving data over time and sharing data with others can be useful in conducting replications.

A recent example of risk-taking can be seen in the research of social psychologist Daryl Bem. In 2011, Bem published an article claiming he had found in a number of studies that future events could influence the past. His proposition turns the nature of time, which is assumed by virtually everyone except science fiction writers to run in one direction, on its head. Needless to say, attacks on Bem's article came fast and furious, including attacks on his statistics and methodology (Ritchie, Wiseman & French, 2012). There were attempts at replication and most of them failed, but not all. A year after Bem's article came out, the prestigious journal where it was published, *Journal of Personality and Social Psychology*, published another paper in which a scientist failed to replicate Bem's findings in a number of studies very similar to the originals (Galak, Lebeouf, Nelson & Simmons, 2012).

Some people viewed the publication of Bem's (2011) original study as a failure in the system of science. They argued that the paper should not have been published. But the editor and reviewers of the article had moved forward with publication because, although they might have thought the findings provocative and unlikely, they did not see obvious flaws in the methodology. We see the publication of the Bem paper, and the ensuing debate, as a strength of science. We are willing to consider unusual ideas if there is evidence to support them: we are open-minded. At the same time, we are critical and believe in replication. Scientists should be willing to consider unusual or risky hypotheses but ultimately allow good evidence to have the final say, not people's opinions.

Solutions to the Problem

Dissemination of Replication Attempts

- Psychfiledrawer.org: Archives attempted replications of specific studies and whether replication was achieved.
- Center for Open Science: Psychologist Brian Nosek, a champion of replication in psychology, has created the Open Science Framework, where replications can be reported.
- Association of Psychological Science: Has registered replications of studies, with the overall results published in *Perspectives on Psychological Science.*
- Plos One: Public Library of Science—publishes a broad range of articles, including failed replications, and there are occasional summaries of replication attempts in specific areas.
- The Replication Index: Created in 2014 by Ulrich Schimmack, the so-called "R Index" is a statistical tool for estimating the replicability of studies, of journals, and even of specific researchers. Schimmack describes it as a "doping test".

The fact that replications, including failed replication attempts, now have outlets where they can be communicated to other researchers is a very encouraging development, and should strengthen the science considerably. One problem for many decades has been the near-impossibility of publishing replication attempts, regardless of whether they've been positive or negative.



Figure 3.22: 6 Principles of Open Science – adapted from openscienceASAP.

The reward structure in academia has served to discourage replication. Many psychologists—especially those who work full time at universities—are often rewarded at work—with promotions, pay raises, tenure, and prestige—through their research. Replications of one's own earlier work, or the work of others, is typically discouraged because it does not represent original thinking. Instead, academics are rewarded for high numbers of publications, and flashy studies are often given prominence in media reports of published studies.

Psychological scientists need to carefully pursue programmatic research. Findings from a single study are rarely adequate, and should be followed up by additional studies using varying methodologies. Thinking about research this way—as if it were a program rather than a single study—can help. We would recommend that laboratories conduct careful sets of interlocking studies, where important findings are followed up using various methods. It is not sufficient to find some surprising outcome, report it, and then move on. When findings are important enough to be published, they are often important enough to prompt further, more conclusive research. In this way scientists will discover whether their findings are replicable, and how broadly generalizable they are. If the findings do not always replicate, but do sometimes, we will learn the conditions in which the pattern does or doesn't hold. This is an important part of science—to discover how generalizable the findings are.

When researchers criticize others for being unable to replicate the original findings, saying that the conditions in the follow-up study were changed, this is important to pay attention to as well. Not all criticism is knee-jerk defensiveness or resentment. The replication crisis has stirred heated emotions among research psychologists and the public, but it is time for us to calm down and return to a more scientific attitude and system of programmatic research.

Textbooks and Journals

Some psychologists blame the trend toward non-replication on specific journal policies, such as the policy of *Psychological Science* to publish short single studies. When single studies are published we do not know whether even the authors themselves can replicate their findings. The journal *Psychological Science* has come under perhaps the harshest criticism. Others blame the rash of nonreplicable studies on a tendency of some fields for surprising and counterintuitive findings that grab the public interest. The irony here is that such counterintuitive findings are in fact less likely to be true precisely because they are so strange—so they should perhaps warrant *more* scrutiny and further analysis.

The criticism of journals extends to textbooks as well. In our opinion, psychology textbooks should stress true science, based on findings that have been demonstrated to be replicable. There are a number of inaccuracies that persist across common psychology textbooks, including small mistakes in common coverage of the most famous studies, such as the Stanford Prison Experiment (Griggs & Whitehead, 2014) and the Milgram studies (Griggs & Whitehead, 2015). To some extent, the inclusion of non-replicated studies in textbooks is the product of market forces. Textbook publishers are under pressure to release new editions of their books, often far more frequently than advances in psychological science truly justify. As a result, there is pressure to include "sexier" topics such as controversial studies.

Ultimately, people also need to learn to be intelligent consumers of science. Instead of getting overly-excited by findings from a single study, it's wise to wait for replications. When a corpus of studies is built on a phenomenon, we can begin to trust the findings. Journalists must be educated about this too, and learn not to readily broadcast and promote findings from single flashy studies. If the results of a study seem too good to be true, maybe they are. Everyone needs to take a more skeptical view of scientific findings, until they have been replicated.

Outside Resources

Article: New Yorker article on the "replication crisis"http://www.newyorker.com/tech/elements/the-crisis-in-social-psychology-that-isnt

Web: Collaborative Replications and Education Project – This is a replication project where students are encouraged to conduct replications as part of their courses.https://osf.io/wfc6u/

Web: Commentary on what makes for a convincing replication.http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2283856

Web: Open Science Framework – The Open Science Framework is an open source software project that facilitates open collaboration in science research.https://osf.io/

Web: Psych File Drawer – A website created to address "the file drawer problem". PsychFileDrawer.org allows users to upload results of serious replication attempts in all research areas of psychology.http://psychfiledrawer.org/

Discussion Questions

1. Why do scientists see replication by other laboratories as being so crucial to advances in science?
2. Do the failures of replication shake your faith in what you have learned about psychology? Why or why not?
3. Can you think of any psychological findings that you think might not replicate?
4. What findings are so important that you think they should be replicated?
5. Why do you think quite a few studies do not replicate?
6. How frequently do you think faking results occurs? Why? How might we prevent that?

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3.9: Summary, Key Terms, and Self-Test

Charles Stangor, Jennifer Walinga, Jorden A. Cummings, and Lee Sanders

Summary

Psychologists study the behaviour of both humans and animals in order to understand and improve the quality of human lives.

Psychological research may be either basic or applied in orientation. Basic research and applied research inform each other, and advances in science occur more rapidly when both types of research are conducted.

The results of psychological research are reported primarily in research reports in scientific journals. These research reports have been evaluated, critiqued, and improved by other scientists through the process of peer review.

The methods used by scientists have developed over many years and provide a common framework through which information can be collected, organized, and shared.

The scientific method is the set of assumptions, rules, and procedures that scientists use to conduct research. In addition to requiring that science be empirical, the scientific method demands that the procedures used be objective, or free from personal bias.

Scientific findings are organized by theories, which are used to summarize and make new predictions, but theories are usually framed too broadly to be tested in a single experiment. Therefore, scientists normally use the research hypothesis as a basis for their research.

Good theories are falsifiable. This means that the relationships between the variables that are predicted by the theory can be shown through research to be incorrect.

Scientists use operational definitions to turn the ideas of interest — conceptual variables — into measured variables.

It is important for psychological research using humans and animals to be ethical. Our ethics codes are developed from the moral principles of weighing risks against benefits, acting responsibly and with integrity, seeking justice, and respecting people's rights and dignity.

Researchers must follow specific ethics codes, providing rules for how to conduct studies. Some historical events that impacted our ethics codes today are the Nuremberg trials, the Declaration of Helsinki, and the Belmont Report.

Decisions about whether psychological research using human and animals is ethical are made using established ethical codes developed by scientific organizations and on the basis of judgments made by the local Ethical Review Board. Informed consent, deception, and debriefing are all considered when deciding if research will be approved.

Psychological studies start with a research design that vary according to its strengths and limitations, and it is important to understand how each differs.

Descriptive research is designed to provide a snapshot of the current state of affairs. Descriptive research allows the development of questions for further study but does not assess relationships among variables. The results of descriptive research projects are analyzed using descriptive statistics.

Correlational research assesses the relationships between and among two or more variables. It allows making predictions but cannot be used to draw inferences about the causal relationships between and among the variables. Linear relationships between variables are normally analyzed using the Pearson correlation coefficient.

The goal of experimental research is to assess the causal impact of one or more experimental manipulations on a dependent variable. Because experimental research creates initial equivalence among the participants in the different experimental conditions, it allows drawing conclusions about the causal relationships among variables. Experimental designs are not always possible because many important variables cannot be experimentally manipulated.

Because all research has the potential for invalidity, research never "proves" a theory or hypothesis.

Threats to construct validity involve potential inaccuracies in the measurement of the conceptual variables.

Threats to statistical conclusion validity involve potential inaccuracies in the statistical testing of the relationships among variables.

Threats to internal validity involve potential inaccuracies in assumptions about the causal role of the independent variable on the dependent variable.

Threats to external validity involve potential inaccuracy regarding the generality of observed findings.

Informed consumers of research are aware of the strengths of research but are also aware of its potential limitations.

The replication of findings is an important hallmark of science. Replication projects in psychology have had mixed results, with many studies not being replicated. There are multiple reasons why study results might not be replicable.

Key Terms

- Anonymity
- APA Ethical Code
- Applied Research
- Arithmetic Mean (*M*)
- At-Risk Research
- Autonomy
- Basic Research
- Belmont Report
- Beneficence
- Blind to Condition
- Case Studies
- Central Tendency
- Common-Causal Variable
- Conceptual Replication
- Conceptual Variables
- Confederate
- Confidentiality
- Confounding Variables
- Consent Form
- Construct Validity
- Correlational Research
- Cost-Benefit Analysis
- Curvilinear Relationship
- Debriefing
- Deception
- Declaration of Helsinki
- Dependent Variable
- Descriptive Research
- Descriptive Statistics
- Dispersion
- Distribution
- Double-Blind Experiment
- Ethical Review Board (ERB) (also known as Institutional Review Board, IRB)
- Ethics
- Empirical
- Exact (or Direct) Replication
- Exempt Research
- Experimenter Bias
- Experimental Research
- External Validity
- Falsified Data (or faked data)
- Federal Policy for the Protection of Human Subjects
- Generalization
- Incidence
- Independent Variable
- Informed Consent
- Internal Validity
- Laws
- Linear Relationship
- Limiting Condition
- Maximum Observed Score
- Measured Variables
- Median
- Meta-Analysis
- Minimum Observed Score
- Minimal Risk Research
- Mode
- Multiple Regression
- Naturalistic Observations
- Negative Linear Relationship
- No Relationship
- Nonlinear Relationship
- Normal Distribution
- Nuremberg Code
- Objective
- Operational Definition
- Outliers
- Pearson Correlation Coefficient (*r*)
- Positive Linear Relationship
- Pre-Screening
- Priming
- Privacy
- Protocol
- Random Assignment to Conditions
- Range
- Reliability
- Replicate
- Replication
- Research Design
- Research Hypothesis
- Respect for Persons
- Sample
- Sample Size
- Scatter Plot
- Scientific Method
- Single-Blind Experiment
- Spurious Relationship
- Stage Theory of Cognitive Development
- Standard Deviation
- Statistical Conclusion Validity
- Statistical Significance
- Surveys
- Theory
- Traits of Good Theories: General; Parsimonious; Falsifiable
- Valid

- Justice
- Variables

Self-Test

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CHAPTER OVERVIEW

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4.1: Introduction

Lee Sanders

As discussed in Chapter 2, the biological perspective in psychology emphasizes bodily events and changes associated with behaviour. Biological psychology applies the principles of biology to the study of mental processes and behaviour. Psychologists in this framework study human behaviours that are both different and alike. We will begin this chapter with a discussion if the *nature versus nurture* debate. In this debate, psychological scientists seek to determine the origins of behavioural traits as being either biological or due to environment. Both sides of the debate contribute to the question, 'why do we behave the way we do?"

Genetic and evolutionary approaches are biological perspective that inform this question. Genetic influence on behavior is a relatively recent discovery. **Behavioural genetics** is an interdisciplinary field concerned with how genes and the environment influence individual behaviour and traits including brain function. The focus of this field is on the genetic bases of individual *difference* in how we think and act.

Heredity and environment are constantly interacting to influence our psychological and physical traits. **Epigenetics** is the study of heritable changes in gene expression that does not involve changes to the underlying DNA sequence. Epigenetic research seeks to understand the influence of genes on our behaviour and mental processes, and how the environment affects our genes, and influences their expression through biological mechanisms that switch them on and off.

Behavioural genomics is the of study of DNA, inherited traits, and the ways in which specific genes are related to behaviour. This framework involves a shift in focus away from the influence of specific individual genes on behaviour to the entire **genome** which is *an organism's complete set of genes in each cell with the exceptions of sperm and egg cells.* Researchers are interested in the interaction of multiple genes and numerous environmental factors that influence human behaviour. Methods using twin and adoption studies are engaged calculate **heritability**, which is *a measure of variability of behavioural traits among individuals that can be accounted for by genetic factors.* Variability in IQ scores, for example, can be denoted by a **heritability coefficient,** which is a *statistic expressed as a number between zero and one that represents the degree to which genetic differences between individuals contribute to individual differences in a behaviour or trait found in a population.*

While behavioural genetics and genomics perspectives focus on the roles of genes, heredity, and environment in explaining individual differences in behaviour, researchers in evolutionary psychology concentrate on the evolutionary mechanisms that might explain the *commonalities* that aid in our survival and reproductive success, including human cognition, development, emotion, and social practices. Evolutionary psychology is a field of psychology that emphasizes the evolutionary mechanisms at work in the similarities of human behaviour including cognition, emotion, development, and social practice. An evolutionary approach aims to interpret and explain modern human behaviour in terms of how our brains and behaviours have been shaped by the physical and social environment encountered by our ancestors, and the forces that acted upon them.

The theories of Charles Darwin have a profound influence on evolutionary psychology. **Natural selection** is a theory developed through his observations of the *fitness* of a species' characteristics to its environment. Natural selection refers to the ability for a species to adapt to its environment, find food and water, and mate in order to stay alive long enough to reproduce and pass on genetic traits favorable to that setting. Evolution through natural selection requires a trait to be *heritable***,** and individuals within the breeding population must have a reproductive advantage for having the trait. Evolutionary useful behaviors have had a beneficial function in the cognitive development of our species. The brain, for example, has a set of cognitive adaptations for solving problems related to survival and reproductive fitness. Individuals with advantageous traits are more likely to survive and reproduce offspring with similar genes.

While natural selection suggests that some traits and adaptations make an individual more likely to survive, certain traits evolve to help some individuals increase their chances of mating and passing on their genes. Darwin proposed a second theory to explain the fate of genes. *Sexual selection theory* suggests that certain traits evolve to help some individuals increase their chances of mating and passing on their genes. Members of the same sex will compete for access to the other sex in a process called *intrasexual selection*. *Intersexual selection* refers to the influence of physical factors signalling reproductive health and fitness, and cultural factors that indicate social security.

Sexual strategies theory is a comprehensive evolutionary theory of human mating that defines the menu of mating strategies humans pursue (e.g., short-term casual sex, long-term committed mating), the adaptive problems women and men face when

pursuing these strategies, and the evolved solutions to these mating problems. **Sexual overperception bias**, for example, is a mating theory that suggests that males often misread sexual interest from women to prevent the costs of missing out on an opportunity for reproduction. Evolutionary research on attraction also highlights the importance of facial symmetry to mate selection and reproduction.

Sociobiology contends that evolution has given us a genetic tendency to act in ways that maximize our chances of passing on our genes onto the next generations. Psychological traits are thought to be 'selected' to aid individuals in propagating their genes. Hunter-gatherer theory illustrates sex differences and suggests that our labour was divided based on sex and sex role socialization as a means of survival (Buss & Barnes, 1986; Silverman & Eals, 1992). For example, this theory suggests that males hunted, and females gathered because of physical and behavioural skills that are reproductively fit to this environment, an also, that some competencies selected for during the process of human evolution are still present today. This can be a very controversial area of theory and research as you will see in the highlight 'How We Talk (or Do Not Talk) about Intelligence' in Chapter 9.

Biopsychosocial theory takes a complex approach to understanding human behaviour. Aspects of biology (genes), psychological components (thoughts, personality, mood), and social conditions (family support, stress, culture) are all considered in analyses of why we do what we do from this perspective.

Research in the evolutionary perspective also applies the principles of biology to the study of human behaviour. Evolutionary psychologists start from the position that cognitive structures are designed by natural selection to serve survival and reproduction (Hagen 2004). From this perspective, hearing, smell, vision, pain, and motor control are examined as functions of the nervous system that have been involved in survival and reproduction for thousands of generations and years.

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4.2: The Nature-Nurture Question

Eric Turkheimer

People have a deep intuition about what has been called the “nature–nurture question.” Some aspects of our behavior feel as though they originate in our genetic makeup, while others feel like the result of our upbringing or our own hard work. The scientific field of behavior genetics attempts to study these differences empirically, either by examining similarities among family members with different degrees of genetic relatedness, or, more recently, by studying differences in the DNA of people with different behavioral traits. The scientific methods that have been developed are ingenious, but often inconclusive. Many of the difficulties encountered in the empirical science of behavior genetics turn out to be conceptual, and our intuitions about nature and nurture get more complicated the harder we think about them. In the end, it is an oversimplification to ask how “genetic” some particular behavior is. Genes and environments always combine to produce behavior, and the real science is in the discovery of how they combine for a given behavior.

Learning Objectives

- Understand what the nature–nurture debate is and why the problem fascinates us.
- Understand why nature–nurture questions are difficult to study empirically.
- Know the major research designs that can be used to study nature–nurture questions.
- Appreciate the complexities of nature–nurture and why questions that seem simple turn out not to have simple answers.

Introduction

There are three related problems at the intersection of philosophy and science that are fundamental to our understanding of our relationship to the natural world: the mind–body problem, the free will problem, and the nature–nurture problem. These great questions have a lot in common. Everyone, even those without much knowledge of science or philosophy, has opinions about the answers to these questions that come simply from observing the world we live in. Our feelings about our relationship with the physical and biological world often seem incomplete. We are in control of our actions in some ways, but at the mercy of our bodies in others; it feels obvious that our consciousness is some kind of creation of our physical brains, at the same time we sense that our awareness must go beyond just the physical. This incomplete knowledge of our relationship with nature leaves us fascinated and a little obsessed, like a cat that climbs into a paper bag and then out again, over and over, mystified every time by a relationship between inner and outer that it can see but can’t quite understand.

It may seem obvious that we are born with certain characteristics while others are acquired, and yet of the three great questions about humans’ relationship with the natural world, only nature–nurture gets referred to as a “debate.” In the history of psychology, no other question has caused so much controversy and offense: We are so concerned with nature–nurture because our very sense of moral character seems to depend on it. While we may admire the athletic skills of a great basketball player, we think of his height as simply a gift, a payoff in the “genetic lottery.” For the same reason, no one blames a short person for his height or someone’s congenital disability on poor decisions: To state the obvious, it’s “not their fault.” But we do praise the concert violinist (and perhaps her parents and teachers as well) for her dedication, just as we condemn cheaters, slackers, and bullies for their bad behavior.

The problem is, most human characteristics aren’t usually as clear-cut as height or instrument-mastery, affirming our nature–nurture expectations strongly one way or the other. In fact, even the great violinist might have some inborn qualities—perfect pitch, or long, nimble fingers—that support and reward her hard work. And the basketball player might have eaten a diet while growing up that promoted his genetic tendency for being tall. When we think about our own qualities, they seem under our control in some respects, yet beyond our control in others. And often the traits that don’t seem to have an obvious cause are the ones that concern us the most and are far more personally significant. What about how much we drink or worry? What about our honesty, or religiosity, or sexual orientation? They all come from that uncertain zone, neither fixed by nature nor totally under our own control.



Figure 4.1: Researchers have learned a great deal about the nature-nurture dynamic by working with animals. But of course many of the techniques used to study animals cannot be applied to people. Separating these two influences in human subjects is a greater research challenge.

One major problem with answering nature-nurture questions about people is, how do you set up an experiment? In nonhuman animals, there are relatively straightforward experiments for tackling nature–nurture questions. Say, for example, you are interested in aggressiveness in dogs. You want to test for the more important determinant of aggression: being born to aggressive dogs or being raised by them. You could mate two aggressive dogs—angry Chihuahuas—together, and mate two nonaggressive dogs—happy beagles—together, then switch half the puppies from each litter between the different sets of parents to raise. You would then have puppies born to aggressive parents (the Chihuahuas) but being raised by nonaggressive parents (the Beagles), and vice versa, in litters that mirror each other in puppy distribution. The big questions are: Would the Chihuahua parents raise aggressive beagle puppies? Would the beagle parents raise *non*aggressive Chihuahua puppies? Would the puppies' *nature* win out, regardless of who raised them? Or… would the result be a combination of nature *and* nurture? Much of the most significant nature–nurture research has been done in this way (Scott & Fuller, 1998), and animal breeders have been doing it successfully for thousands of years. In fact, it is fairly easy to breed animals for behavioral traits.

With people, however, we can't assign babies to parents at random, or select parents with certain behavioral characteristics to mate, merely in the interest of science (though history does include horrific examples of such practices, in misguided attempts at "eugenics," the shaping of human characteristics through intentional breeding). In typical human families, children's biological parents raise them, so it is very difficult to know whether children act like their parents due to genetic (nature) or environmental (nurture) reasons. Nevertheless, despite our restrictions on setting up human-based experiments, we do see real-world examples of nature-nurture at work in the human sphere—though they only provide partial answers to our many questions.

The science of how genes and environments work together to influence behavior is called **behavioral genetics**. The easiest opportunity we have to observe this is the **adoption study**. When children are put up for adoption, the parents who give birth to them are no longer the parents who raise them. This setup isn't quite the same as the experiments with dogs (children aren't assigned to random adoptive parents in order to suit the particular interests of a scientist) but adoption still tells us some interesting things, or at least confirms some basic expectations. For instance, if the biological child of tall parents were adopted into a family of short people, do you suppose the child's growth would be affected? What about the biological child of a Spanish-speaking family adopted at birth into an English-speaking family? What language would you expect the child to speak? And what might these outcomes tell you about the difference between height and language in terms of nature-nurture?



Figure 4.2: Studies focused on twins have led to important insights about the biological origins of many personality characteristics.

Another option for observing nature-nurture in humans involves **twin studies**. There are two types of twins: monozygotic (MZ) and dizygotic (DZ). Monozygotic twins, also called “identical” twins, result from a single zygote (fertilized egg) and have the same DNA. They are essentially clones. Dizygotic twins, also known as “fraternal” twins, develop from two zygotes and share 50% of their DNA. Fraternal twins are ordinary siblings who happen to have been born at the same time. To analyze nature–nurture using twins, we compare the similarity of MZ and DZ pairs. Sticking with the features of height and spoken language, let’s take a look at how nature and nurture apply: Identical twins, unsurprisingly, are almost perfectly similar for height. The heights of fraternal twins, however, are like any other sibling pairs: more similar to each other than to people from other families, but hardly identical. This contrast between twin types gives us a clue about the role genetics plays in determining height. Now consider spoken language. If one identical twin speaks Spanish at home, the co-twin with whom she is raised almost certainly does too. But the same would be true for a pair of fraternal twins raised together. In terms of spoken language, fraternal twins are just as similar as identical twins, so it appears that the genetic match of identical twins doesn’t make much difference.

Twin and adoption studies are two instances of a much broader class of methods for observing nature-nurture called **quantitative genetics**, the scientific discipline in which similarities among individuals are analyzed based on how biologically related they are. We can do these studies with siblings and half-siblings, cousins, twins who have been separated at birth and raised separately (Bouchard, Lykken, McGue, & Segal, 1990; such twins are very rare and play a smaller role than is commonly believed in the science of nature–nurture), or with entire extended families (see Plomin, DeFries, Knopik, & Neiderhiser, 2012, for a complete introduction to research methods relevant to nature–nurture).

For better or for worse, contentions about nature–nurture have intensified because quantitative genetics produces a number called a **heritability coefficient**, varying from 0 to 1, that is meant to provide a single measure of genetics’ influence of a trait. In a general way, a heritability coefficient measures how strongly differences among individuals are related to differences among their genes. But beware: Heritability coefficients, although simple to compute, are deceptively difficult to interpret. Nevertheless, numbers that provide simple answers to complicated questions tend to have a strong influence on the human imagination, and a great deal of time has been spent discussing whether the heritability of intelligence or personality or depression is equal to one number or another.

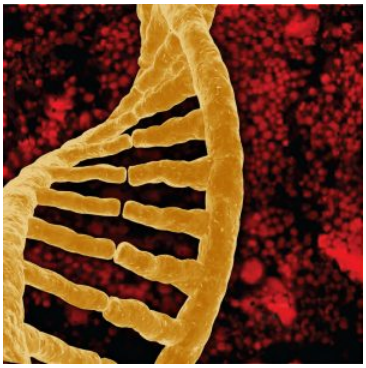


Figure 4.3: Quantitative genetics uses statistical methods to study the effects that both heredity and environment have on test subjects. These methods have provided us with the heritability coefficient which measures how strongly differences among

individuals for a trait are related to differences among their genes.

One reason nature–nurture continues to fascinate us so much is that we live in an era of great scientific discovery in genetics, comparable to the times of Copernicus, Galileo, and Newton, with regard to astronomy and physics. Every day, it seems, new discoveries are made, new possibilities proposed. When Francis Galton first started thinking about nature–nurture in the late-19th century he was very influenced by his cousin, Charles Darwin, but genetics *per se* was unknown. Mendel's famous work with peas, conducted at about the same time, went undiscovered for 20 years; quantitative genetics was developed in the 1920s; DNA was discovered by Watson and Crick in the 1950s; the human genome was completely sequenced at the turn of the 21st century; and we are now on the verge of being able to obtain the specific DNA sequence of anyone at a relatively low cost. No one knows what this new genetic knowledge will mean for the study of nature–nurture, but as we will see in the next section, answers to nature–nurture questions have turned out to be far more difficult and mysterious than anyone imagined.

What Have We Learned About Nature–Nurture?

It would be satisfying to be able to say that nature–nurture studies have given us conclusive and complete evidence about where traits come from, with some traits clearly resulting from genetics and others almost entirely from environmental factors, such as childrearing practices and personal will; but that is not the case. Instead, *everything* has turned out to have some footing in genetics. The more genetically-related people are, the more similar they are—for *everything*: height, weight, intelligence, personality, mental illness, etc. Sure, it seems like common sense that some traits have a genetic bias. For example, adopted children resemble their biological parents even if they have never met them, and identical twins are more similar to each other than are fraternal twins. And while certain psychological traits, such as personality or mental illness (e.g., schizophrenia), seem reasonably influenced by genetics, it turns out that the same is true for political attitudes, how much television people watch (Plomin, Corley, DeFries, & Fulker, 1990), and whether or not they get divorced (McGue & Lykken, 1992).



Figure 4.4: Research over the last half century has revealed how central genetics are to behavior. The more genetically related people are the more similar they are not just physically but also in terms of personality and behavior.

It may seem surprising, but genetic influence on behavior is a relatively recent discovery. In the middle of the 20th century, psychology was dominated by the doctrine of behaviorism, which held that behavior could only be explained in terms of environmental factors. Psychiatry concentrated on psychoanalysis, which probed for roots of behavior in individuals' early life-histories. The truth is, neither behaviorism nor psychoanalysis is incompatible with genetic influences on behavior, and neither Freud nor Skinner was naive about the importance of organic processes in behavior. Nevertheless, in their day it was widely thought that children's personalities were shaped entirely by imitating their parents' behavior, and that schizophrenia was caused by certain kinds of "pathological mothering." Whatever the outcome of our broader discussion of nature–nurture, the basic fact that the best predictors of an adopted child's personality or mental health are found in the biological parents he or she has never met, rather than in the adoptive parents who raised him or her, presents a significant challenge to purely environmental explanations of personality or psychopathology. The message is clear: You can't leave genes out of the equation. But keep in mind, no behavioral traits are completely inherited, so you can't leave the environment out altogether, either.

Trying to untangle the various ways nature-nurture influences human behavior can be messy, and often common-sense notions can get in the way of good science. One very significant contribution of behavioral genetics that has changed psychology for good can be very helpful to keep in mind: When your subjects are biologically-related, no matter how clearly a situation may seem to point

to environmental influence, it is never safe to interpret a behavior as wholly the result of nurture without further evidence. For example, when presented with data showing that children whose mothers read to them often are likely to have better reading scores in third grade, it is tempting to conclude that reading to your kids out loud is important to success in school; this may well be true, but the study as described is inconclusive, because there are genetic *as well as*environmental pathways between the parenting practices of mothers and the abilities of their children. This is a case where "correlation does not imply causation," as they say. To establish that reading aloud causes success, a scientist can either study the problem in adoptive families (in which the genetic pathway is absent) or by finding a way to randomly assign children to oral reading conditions.

The outcomes of nature–nurture studies have fallen short of our expectations (of establishing clear-cut bases for traits) in many ways. The most disappointing outcome has been the inability to organize traits from *more*– to *less*-genetic. As noted earlier, everything has turned out to be at least *somewhat* heritable (passed down), yet nothing has turned out to be *absolutely* heritable, and there hasn't been much consistency as to which traits are *more* heritable and which are *less* heritable once other considerations (such as how accurately the trait can be measured) are taken into account (Turkheimer, 2000). The problem is conceptual: The heritability coefficient, and, in fact, the whole quantitative structure that underlies it, does not match up with our nature–nurture intuitions. We want to know how "important" the roles of genes and environment are to the development of a trait, but in focusing on "important" maybe we're emphasizing the wrong thing. First of all, genes and environment are both crucial to *every* trait; without genes the environment would have nothing to work on, and too, genes cannot develop in a vacuum. Even more important, because nature–nurture questions look at the differences among people, the cause of a given trait depends not only on the trait itself, but also on the differences in that trait between members of the group being studied.

The classic example of the heritability coefficient defying intuition is the trait of having two arms. No one would argue against the development of arms being a biological, genetic process. But fraternal twins are just as similar for "two-armedness" as identical twins, resulting in a heritability coefficient of zero for the trait of having two arms. Normally, according to the heritability model, this result (coefficient of zero) would suggest all nurture, no nature, but we know that's not the case. The reason this result is not a tip-off that arm development is less genetic than we imagine is because people *do not vary* in the genes related to arm development —which essentially upends the heritability formula. In fact, in this instance, the opposite is likely true: the extent that people differ in arm number is likely the result of accidents and, therefore, environmental. For reasons like these, we always have to be very careful when asking nature–nurture questions, especially when we try to express the answer in terms of a single number. The heritability of a trait is not simply a property of that trait, but a property of the trait in a particular context of relevant genes and environmental factors.

Another issue with the heritability coefficient is that it divides traits' determinants into two portions—genes and environment— which are then calculated together for the total variability. This is a little like asking how much of the experience of a symphony comes from the horns and how much from the strings; the ways instruments or genes integrate is more complex than that. It turns out to be the case that, for many traits, genetic differences affect behavior under some environmental circumstances but not others —a phenomenon called gene-environment interaction, or G x E. In one well-known example, Caspi et al. (2002) showed that among maltreated children, those who carried a particular allele of the MAOA gene showed a predisposition to violence and antisocial behavior, while those with other alleles did not. Whereas, in children who had not been maltreated, the gene had no effect. Making matters even more complicated are very recent studies of what is known as epigenetics (see module, "Epigenetics" http://noba.to/37p5cb8v), a process in which the DNA itself is modified by environmental events, and those genetic changes transmitted to children.



Figure 4.5: The answer to the nature –nurture question has not turned out to be as straightforward as we would like. The many questions we can ask about the relationships among genes, environments, and human traits may have many different answers, and the answer to one tells us little about the answers to the others.

Some common questions about nature–nurture are, how susceptible is a trait to change, how malleable is it, and do we "have a choice" about it? These questions are much more complex than they may seem at first glance. For example, phenylketonuria is an inborn error of metabolism caused by a single gene; it prevents the body from metabolizing phenylalanine. Untreated, it causes mental retardation and death. But it can be treated effectively by a straightforward environmental intervention: avoiding foods containing phenylalanine. Height seems like a trait firmly rooted in our nature and unchangeable, but the average height of many populations in Asia and Europe has increased significantly in the past 100 years, due to changes in diet and the alleviation of poverty. Even the most modern genetics has not provided definitive answers to nature–nurture questions. When it was first becoming possible to measure the DNA sequences of individual people, it was widely thought that we would quickly progress to finding the specific genes that account for behavioral characteristics, but that hasn't happened. There are a few rare genes that have been found to have significant (almost always negative) effects, such as the single gene that causes Huntington's disease, or the Apolipoprotein gene that causes early onset dementia in a small percentage of Alzheimer's cases. Aside from these rare genes of great effect, however, the genetic impact on behavior is broken up over many genes, each with very small effects. For most behavioral traits, the effects are so small and distributed across so many genes that we have not been able to catalog them in a meaningful way. In fact, the same is true of environmental effects. We know that extreme environmental hardship causes catastrophic effects for many behavioral outcomes, but fortunately extreme environmental hardship is very rare. Within the normal range of environmental events, those responsible for differences (e.g., why some children in a suburban third-grade classroom perform better than others) are much more difficult to grasp.

The difficulties with finding clear-cut solutions to nature–nurture problems bring us back to the other great questions about our relationship with the natural world: the mind-body problem and free will. Investigations into what we mean when we say we are aware of something reveal that consciousness is not simply the product of a particular area of the brain, nor does choice turn out to be an orderly activity that we can apply to some behaviors but not others. So it is with nature and nurture: What at first may seem to be a straightforward matter, able to be indexed with a single number, becomes more and more complicated the closer we look. The many questions we can ask about the intersection among genes, environments, and human traits—how sensitive are traits to environmental change, and how common are those influential environments; are parents or culture more relevant; how sensitive are traits to differences in genes, and how much do the relevant genes vary in a particular population; does the trait involve a single gene or a great many genes; is the trait more easily described in genetic or more-complex behavioral terms?—may have different answers, and the answer to one tells us little about the answers to the others.

It is tempting to predict that the more we understand the wide-ranging effects of genetic differences on all human characteristics—especially behavioral ones—our cultural, ethical, legal, and personal ways of thinking about ourselves will have to undergo profound changes in response. Perhaps criminal proceedings will consider genetic background. Parents, presented with the genetic sequence of their children, will be faced with difficult decisions about reproduction. These hopes or fears are often exaggerated. In some ways, our thinking may need to change—for example, when we consider the meaning behind the fundamental American principle that all men are created equal. Human beings differ, and like all evolved organisms they differ genetically. The Declaration of Independence predates Darwin and Mendel, but it is hard to imagine that Jefferson—whose genius encompassed botany as well as moral philosophy—would have been alarmed to learn about the genetic diversity of organisms. One of the most important things modern genetics has taught us is that almost all human behavior is too complex to be nailed down, even from the most complete genetic information, unless we're looking at identical twins. The science of nature and nurture has demonstrated that genetic differences among people are vital to human moral equality, freedom, and self-determination, not opposed to them. As Mordecai Kaplan said about the role of the past in Jewish theology, genetics gets a vote, not a veto, in the determination of human behavior. We should indulge our fascination with nature–nurture while resisting the temptation to oversimplify it.

Outside Resources

Web: Institute for Behavioral Genetics http://www.colorado.edu/ibg/

Discussion Questions

1. Is your personality more like one of your parents than the other? If you have a sibling, is his or her personality like yours? In your family, how did these similarities and differences develop? What do you think caused them?
2. Can you think of a human characteristic for which genetic differences would play almost no role? Defend your choice.
3. Do you think the time will come when we will be able to predict almost everything about someone by examining their DNA on the day they are born?
4. Identical twins are more similar than fraternal twins for the trait of aggressiveness, as well as for criminal behavior. Do these facts have implications for the courtroom? If it can be shown that a violent criminal had violent parents, should it make a difference in culpability or sentencing?

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4.3: Evolutionary Theories in Psychology

David M. Buss

Evolution or change over time occurs through the processes of natural and sexual selection. In response to problems in our environment, we adapt both physically and psychologically to ensure our survival and reproduction. Sexual selection theory describes how evolution has shaped us to provide a mating advantage rather than just a survival advantage and occurs through two distinct pathways: intrasexual competition and intersexual selection. **Gene selection theory**, the modern explanation behind evolutionary biology, occurs through the desire for gene replication. Evolutionary psychology connects evolutionary principles with modern psychology and focuses primarily on psychological adaptations: changes in the way we think in order to improve our survival. Two major evolutionary psychological theories are described: Sexual strategies theory describes the psychology of human mating strategies and the ways in which women and men differ in those strategies. Error management theory describes the evolution of biases in the way we think about everything.

Learning Objectives

- Learn what “evolution” means.
- Define the primary mechanisms by which evolution takes place.
- Identify the two major classes of adaptations.
- Define sexual selection and its two primary processes.
- Define gene selection theory.
- Understand psychological adaptations.
- Identify the core premises of sexual strategies theory.
- Identify the core premises of error management theory, and provide two empirical examples of adaptive cognitive biases.

Introduction



Figure 4.6: It may seem like just a casual date, but don’t doubt that the forces of evolution are hard at work below the surface.

If you have ever been on a first date, you’re probably familiar with the anxiety of trying to figure out what clothes to wear or what perfume or cologne to put on. In fact, you may even consider flossing your teeth for the first time all year. When considering why you put in all this work, you probably recognize that you’re doing it to impress the other person. But how did you learn these particular behaviors? Where did you get the idea that a first date should be at a nice restaurant or someplace unique? It is possible that we have been taught these behaviors by observing others. It is also possible, however, that these behaviors—the fancy clothes, the expensive restaurant—are biologically programmed into us. That is, just as peacocks display their feathers to show how attractive they are, or some lizards do push-ups to show how strong they are, when we style our hair or bring a gift to a date, we’re trying to communicate to the other person: “Hey, I’m a good mate! Choose me! Choose me!”

However, we all know that our ancestors hundreds of thousands of years ago weren’t driving sports cars or wearing designer clothes to attract mates. So how could someone ever say that such behaviors are “biologically programmed” into us? Well, even though our ancestors might not have been doing these specific actions, these behaviors are the result of the same driving force: the powerful influence of **evolution**. Yes, evolution—certain traits and behaviors developing over time because they are advantageous

to our survival. In the case of dating, doing something like offering a gift might represent more than a nice gesture. Just as chimpanzees will give food to mates to show they can provide for them, when you offer gifts to your dates, you are communicating that you have the money or "resources" to help take care of them. And even though the person receiving the gift may not realize it, the same evolutionary forces are influencing his or her behavior as well. The receiver of the gift evaluates not only the gift but also the gift-giver's clothes, physical appearance, and many other qualities, to determine whether the individual is a suitable mate. But because these evolutionary processes are hardwired into us, it is easy to overlook their influence.

To broaden your understanding of evolutionary processes, this module will present some of the most important elements of evolution as they impact psychology. Evolutionary theory helps us piece together the story of how we humans have prospered. It also helps to explain why we behave as we do on a daily basis in our modern world: why we bring gifts on dates, why we get jealous, why we crave our favorite foods, why we protect our children, and so on. Evolution may seem like a historical concept that applies only to our ancient ancestors but, in truth, it is still very much a part of our modern daily lives.

Basics of Evolutionary Theory

Evolution simply means change over time. Many think of evolution as the development of traits and behaviors that allow us to survive this "dog-eat-dog" world, like strong leg muscles to run fast, or fists to punch and defend ourselves. However, physical survival is only important if it eventually contributes to successful reproduction. That is, even if you live to be a 100-year-old, if you fail to mate and produce children, your genes will die with your body. Thus, *reproductive* success, not *survival* success, is the engine of evolution by **natural selection**. Every mating success by one person means the loss of a mating opportunity for another. Yet every living human being is an evolutionary success story. Each of us is descended from a long and unbroken line of ancestors who triumphed over others in the struggle to survive (at least long enough to mate) and reproduce. However, in order for our genes to endure over time—to survive harsh climates, to defeat predators—we have inherited adaptive, psychological processes designed to ensure success.

At the broadest level, we can think of organisms, including humans, as having two large classes of **adaptations**—or traits and behaviors that evolved over time to increase our reproductive success. The first class of adaptations are called survival adaptations: mechanisms that helped our ancestors handle the "hostile forces of nature." For example, in order to survive very hot temperatures, we developed sweat glands to cool ourselves. In order to survive very cold temperatures, we developed shivering mechanisms (the speedy contraction and expansion of muscles to produce warmth). Other examples of survival adaptations include developing a craving for fats and sugars, encouraging us to seek out particular foods rich in fats and sugars that keep us going longer during food shortages. Some threats, such as snakes, spiders, darkness, heights, and strangers, often produce fear in us, which encourages us to avoid them and thereby stay safe. These are also examples of survival adaptations. However, all of these adaptations are for physical *survival*, whereas the second class of adaptations are for *reproduction*, and help us compete for mates. These adaptations are described in an evolutionary theory proposed by Charles Darwin, called **sexual selection** theory.

Sexual Selection Theory

Darwin noticed that there were many traits and behaviors of organisms that could not be explained by "survival selection." For example, the brilliant plumage of peacocks should actually lower their rates of survival. That is, the peacocks' feathers act like a neon sign to predators, advertising "Easy, delicious dinner here!" But if these bright feathers only lower peacocks' chances at survival, why do they have them? The same can be asked of similar characteristics of other animals, such as the large antlers of male stags or the wattles of roosters, which also seem to be unfavorable to survival. Again, if these traits only make the animals less likely to survive, why did they develop in the first place? And how have these animals continued to survive with these traits over thousands and thousands of years? Darwin's answer to this conundrum was the theory of sexual selection: the evolution of characteristics, not because of survival advantage, but because of *mating* advantage.



Figure 4.7: Modern sports like boxing can be seen as modified/stylized versions of the evolutionary behavior of intrasexual competition.

Sexual selection occurs through two processes. The first, intrasexual competition, occurs when members of one sex compete against each other, and the winner gets to mate with a member of the opposite sex. Male stags, for example, battle with their antlers, and the winner (often the stronger one with larger antlers) gains mating access to the female. That is, even though large antlers make it harder for the stags to run through the forest and evade predators (which lowers their survival success), they provide the stags with a better chance of attracting a mate (which increases their reproductive success). Similarly, human males sometimes also compete against each other in physical contests: boxing, wrestling, karate, or group-on-group sports, such as football. Even though engaging in these activities poses a "threat" to their survival success, as with the stag, the victors are often more attractive to potential mates, increasing their reproductive success. Thus, whatever qualities lead to success in **intrasexual competition** are then passed on with greater frequency due to their association with greater mating success.

The second process of sexual selection is preferential mate choice, also called **intersexual selection**. In this process, if members of one sex are attracted to certain qualities in mates—such as brilliant plumage, signs of good health, or even intelligence—those desired qualities get passed on in greater numbers, simply because their possessors mate more often. For example, the colorful plumage of peacocks exists due to a long evolutionary history of peahens' (the term for female peacocks) attraction to males with brilliantly colored feathers.

In all sexually-reproducing species, adaptations in both sexes (males and females) exist due to survival selection and sexual selection. However, unlike other animals where one sex has dominant control over mate choice, humans have "mutual mate choice." That is, both women and men typically have a say in choosing their mates. And both mates value qualities such as kindness, intelligence, and dependability that are beneficial to long-term relationships—qualities that make good partners and good parents.

Gene Selection Theory

In modern evolutionary theory, all evolutionary processes boil down to an organism's genes. Genes are the basic "units of heredity," or the information that is passed along in DNA that tells the cells and molecules how to "build" the organism and how that organism should behave. Genes that are better able to encourage the organism to reproduce, and thus replicate themselves in the organism's offspring, have an advantage over competing genes that are less able. For example, take female sloths: In order to attract a mate, they will scream as loudly as they can, to let potential mates know where they are in the thick jungle. Now, consider two types of genes in female sloths: one gene that allows them to scream extremely loudly, and another that only allows them to scream moderately loudly. In this case, the sloth with the gene that allows her to shout louder will attract more mates—increasing reproductive success—which ensures that her genes are more readily passed on than those of the quieter sloth.

Essentially, genes can boost their own replicative success in two basic ways. First, they can influence the odds for survival and reproduction of the organism they are in (individual reproductive success or fitness—as in the example with the sloths). Second, genes can also influence the organism to help other organisms who also likely contain those genes—known as "genetic relatives"—to survive and reproduce (which is called inclusive fitness). For example, why do human parents tend to help their own kids with the financial burdens of a college education and not the kids next door? Well, having a college education increases one's attractiveness to other mates, which increases one's likelihood for reproducing and passing on genes. And because parents' genes

are in their own children (and not the neighborhood children), funding their children's educations increases the likelihood that the parents' genes will be passed on.

Understanding gene replication is the key to understanding modern evolutionary theory. It also fits well with many evolutionary psychological theories. However, for the time being, we'll ignore genes and focus primarily on actual adaptations that evolved because they helped our ancestors survive and/or reproduce.

Evolutionary Psychology

Evolutionary psychology aims the lens of modern evolutionary theory on the workings of the human mind. It focuses primarily on **psychological adaptations**: mechanisms of the mind that have evolved to solve specific problems of survival or reproduction. These kinds of adaptations are in contrast to **physiological adaptations**, which are adaptations that occur in the body as a consequence of one's environment. One example of a physiological adaptation is how our skin makes calluses. First, there is an "input," such as repeated friction to the skin on the bottom of our feet from walking. Second, there is a "procedure," in which the skin grows new skin cells at the afflicted area. Third, an actual callus forms as an "output" to protect the underlying tissue—the final outcome of the physiological adaptation (i.e., tougher skin to protect repeatedly scraped areas). On the other hand, a *psychological* adaptation is a development or change of a mechanism in the mind. For example, take sexual jealousy. First, there is an "input," such as a romantic partner flirting with a rival. Second, there is a "procedure," in which the person evaluates the threat the rival poses to the romantic relationship. Third, there is a behavioral output, which might range from vigilance (e.g., snooping through a partner's email) to violence (e.g., threatening the rival).

Evolutionary psychology is fundamentally an *interactionist* framework, or a theory that takes into account multiple factors when determining the outcome. For example, jealousy, like a callus, doesn't simply pop up out of nowhere. There is an "interaction" between the environmental trigger (e.g., the flirting; the repeated rubbing of the skin) and the initial response (e.g., evaluation of the flirter's threat; the forming of new skin cells) to produce the outcome.

In evolutionary psychology, culture also has a major effect on psychological adaptations. For example, status within one's group is important in all cultures for achieving reproductive success, because higher status makes someone more attractive to mates. In individualistic cultures, such as the United States, status is heavily determined by individual accomplishments. But in more collectivist cultures, such as Japan, status is more heavily determined by contributions to the group and by that group's success. For example, consider a group project. If you were to put in most of the effort on a successful group project, the culture in the United States reinforces the psychological adaptation to try to claim that success for yourself (because individual achievements are rewarded with higher status). However, the culture in Japan reinforces the psychological adaptation to attribute that success to the whole group (because collective achievements are rewarded with higher status). Another example of cultural input is the importance of virginity as a desirable quality for a mate. Cultural norms that advise against premarital sex persuade people to ignore their own basic interests because they know that virginity will make them more attractive marriage partners. Evolutionary psychology, in short, does not predict rigid robotic-like "instincts." That is, there isn't one rule that works all the time. Rather, evolutionary psychology studies flexible, environmentally-connected and culturally-influenced adaptations that vary according to the situation.

Psychological adaptations are hypothesized to be wide-ranging, and include food preferences, habitat preferences, mate preferences, and specialized fears. These psychological adaptations also include many traits that improve people's ability to live in groups, such as the desire to cooperate and make friends, or the inclination to spot and avoid frauds, punish rivals, establish status hierarchies, nurture children, and help genetic relatives. Research programs in evolutionary psychology develop and empirically test predictions about the nature of psychological adaptations. Below, we highlight a few evolutionary psychological theories and their associated research approaches.

Sexual Strategies Theory

Sexual strategies theory is based on sexual selection theory. It proposes that humans have evolved a list of different mating strategies, both short-term and long-term, that vary depending on culture, social context, parental influence, and personal mate value (desirability in the "mating market").

In its initial formulation, sexual strategies theory focused on the differences between men and women in mating preferences and strategies (Buss & Schmitt, 1993). It started by looking at the minimum parental investment needed to produce a child. For women,

even the minimum investment is significant: after becoming pregnant, they have to carry that child for nine months inside of them. For men, on the other hand, the minimum investment to produce the same child is considerably smaller—simply the act of sex.



Figure 4.8: Because women bear responsibility for pregnancy, they may use different sexual selection strategies than men do.

These differences in parental investment have an enormous impact on sexual strategies. For a woman, the risks associated with making a poor mating choice is high. She might get pregnant by a man who will not help to support her and her children, or who might have poor-quality genes. And because the stakes are higher for a woman, *wise* mating decisions for her are much more valuable. For men, on the other hand, the need to focus on making wise mating decisions isn't as important. That is, unlike women, men 1) don't biologically have the child growing inside of them for nine months, and 2) do not have as high a cultural expectation to raise the child. This logic leads to a powerful set of predictions: In short-term mating, women will likely be choosier than men (because the costs of getting pregnant are so high), while men, on average, will likely engage in more casual sexual activities (because this cost is greatly lessened). Due to this, men will sometimes deceive women about their long-term intentions for the benefit of short-term sex, and men are more likely than women to lower their mating standards for short-term mating situations.

An extensive body of empirical evidence supports these and related predictions (Buss & Schmitt, 2011). Men express a desire for a larger number of sex partners than women do. They let less time elapse before seeking sex. They are more willing to consent to sex with strangers and are less likely to require emotional involvement with their sex partners. They have more frequent sexual fantasies and fantasize about a larger variety of sex partners. They are more likely to regret missed sexual opportunities. And they lower their standards in short-term mating, showing a willingness to mate with a larger variety of women as long as the costs and risks are low.

However, in situations where both the man and woman are interested in long-term mating, both sexes tend to invest substantially in the relationship and in their children. In these cases, the theory predicts that both sexes will be extremely choosy when pursuing a long-term mating strategy. Much empirical research supports this prediction, as well. In fact, the qualities women and men generally look for when choosing long-term mates are very similar: both want mates who are intelligent, kind, understanding, healthy, dependable, honest, loyal, loving, and adaptable.

Nonetheless, women and men do differ in their preferences for a few key qualities in long-term mating, because of somewhat distinct adaptive problems. Modern women have inherited the evolutionary trait to desire mates who possess resources, have qualities linked with acquiring resources (e.g., ambition, wealth, industriousness), and are willing to share those resources with them. On the other hand, men more strongly desire youth and health in women, as both are cues to fertility. These male and female differences are universal in humans. They were first documented in 37 different cultures, from Australia to Zambia (Buss, 1989), and have been replicated by dozens of researchers in dozens of additional cultures (for summaries, see Buss, 2012).

As we know, though, just because we have these mating preferences (e.g., men with resources; fertile women), people don't always get what they want. There are countless other factors which influence who people ultimately select as their mate. For example, the sex ratio (the percentage of men to women in the mating pool), cultural practices (such as arranged marriages, which inhibit individuals' freedom to act on their preferred mating strategies), the strategies of others (e.g., if everyone else is pursuing short-term sex, it's more difficult to pursue a long-term mating strategy), and many others all influence who we select as our mates.

Sexual strategies theory—anchored in sexual selection theory— predicts specific similarities and differences in men and women's mating preferences and strategies. Whether we seek short-term or long-term relationships, many personality, social, cultural, and

ecological factors will all influence who our partners will be.

Error Management Theory



Figure 4.9: If you were walking in the woods and heard a sound in the bushes you might be startled and act on the worst case scenario—such as the threat of a wild animal—by moving in the opposite direction. This is evolutionary psychology at work, keeping you safe so you can survive and reproduce.

Error management theory (EMT) deals with the evolution of how we think, make decisions, and evaluate uncertain situations—that is, situations where there's no clear answer how we should behave. (Haselton & Buss, 2000; Haselton, Nettle, & Andrews, 2005). Consider, for example, walking through the woods at dusk. You hear a rustle in the leaves on the path in front of you. It could be a snake. Or, it could just be the wind blowing the leaves. Because you can't really tell why the leaves rustled, it's an uncertain situation. The important question then is, what are the costs of errors in judgment? That is, if you conclude that it's a dangerous snake so you avoid the leaves, the costs are minimal (i.e., you simply make a short detour around them). However, if you assume the leaves are safe and simply walk over them—when in fact it *is* a dangerous snake—the decision could cost you your life.

Now, think about our evolutionary history and how generation after generation was confronted with similar decisions, where one option had low cost but great reward (walking around the leaves and not getting bitten) and the other had a low reward but high cost (walking through the leaves and getting bitten). These kinds of choices are called "cost asymmetries." If during our evolutionary history we encountered decisions like these generation after generation, over time an adaptive bias would be created: we would make sure to err in favor of the least costly (in this case, least dangerous) option (e.g., walking around the leaves). To put it another way, EMT predicts that whenever uncertain situations present us with a safer versus more dangerous decision, we will psychologically adapt to prefer choices that minimize the cost of errors.

EMT is a general evolutionary psychological theory that can be applied to many different domains of our lives, but a specific example of it is the *visual descent illusion*. To illustrate: Have you ever thought it would be no problem to jump off of a ledge, but as soon as you stood up there, it suddenly looked much higher than you thought? The visual descent illusion (Jackson & Cormack, 2008) states that people will overestimate the distance when looking down from a height (compared to looking up) so that people will be especially wary of falling from great heights—which would result in injury or death. Another example of EMT is the *auditory looming bias*: Have you ever noticed how an ambulance seems closer when it's coming toward you, but suddenly seems far away once it's immediately passed? With the auditory looming bias, people overestimate how close objects are when the sound is moving toward them compared to when it is moving away from them. From our evolutionary history, humans learned, "It's better to be safe than sorry." Therefore, if we think that a threat is closer to us when it's moving toward us (because it seems louder), we will be quicker to act and escape. In this regard, there may be times we ran away when we didn't need to (a false alarm), but wasting that time is a less costly mistake than not acting in the first place when a real threat does exist.

EMT has also been used to predict adaptive biases in the domain of mating. Consider something as simple as a smile. In one case, a smile from a potential mate could be a sign of sexual or romantic interest. On the other hand, it may just signal friendliness. Because of the costs to men of missing out on chances for reproduction, EMT predicts that men have a *sexual overperception bias*: they often misread sexual interest from a woman, when really it's just a friendly smile or touch. In the mating domain, the sexual overperception bias is one of the best-documented phenomena. It's been shown in studies in which men and women rated the

sexual interest between people in photographs and videotaped interactions. As well, it's been shown in the laboratory with participants engaging in actual "speed dating," where the men interpret sexual interest from the women more often than the women actually intended it (Perilloux, Easton, & Buss, 2012). In short, EMT predicts that men, more than women, will over-infer sexual interest based on minimal cues, and empirical research confirms this adaptive mating bias.

Conclusion

Sexual strategies theory and error management theory are two evolutionary psychological theories that have received much empirical support from dozens of independent researchers. But, there are many other evolutionary psychological theories, such as social exchange theory for example, that also make predictions about our modern day behavior and preferences, too. The merits of each evolutionary psychological theory, however, must be evaluated separately and treated like any scientific theory. That is, we should only trust their predictions and claims to the extent they are supported by scientific studies. However, even if the theory is scientifically grounded, just because a psychological adaptation was advantageous in our history, it doesn't mean it's still useful today. For example, even though women may have preferred men with resources in generations ago, our modern society has advanced such that these preferences are no longer apt or necessary. Nonetheless, it's important to consider how our evolutionary history has shaped our automatic or "instinctual" desires and reflexes of today, so that we can better shape them for the future ahead.

Outside Resources

FAQs http://www.anth.ucsb.edu/projects/human/evpsychfaq.html

Web: Articles and books on evolutionary psychology http://homepage.psy.utexas.edu/homepage/Group/BussLAB/

Web: Main international scientific organization for the study of evolution and human behavior, HBES http://www.hbes.com/

Discussion Questions

1. How does change take place over time in the living world?
2. Which two potential psychological adaptations to problems of survival are not discussed in this module?
3. What are the psychological and behavioral implications of the fact that women bear heavier costs to produce a child than men do?
4. Can you formulate a hypothesis about an error management bias in the domain of social interaction?

Image Attributions

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4.4: Epigenetics in Psychology

Ian Weaver

Early life experiences exert a profound and long-lasting influence on physical and mental health throughout life. The efforts to identify the primary causes of this have significantly benefited from studies of the epigenome—a dynamic layer of information associated with DNA that differs between individuals and can be altered through various experiences and environments. The epigenome has been heralded as a key "missing piece" of the etiological puzzle for understanding how development of psychological disorders may be influenced by the surrounding environment, in concordance with the genome. Understanding the mechanisms involved in the initiation, maintenance, and heritability of epigenetic states is thus an important aspect of research in current biology, particularly in the study of learning and memory, emotion, and social behavior in humans. Moreover, epigenetics in psychology provides a framework for understanding how the expression of genes is influenced by experiences and the environment to produce individual differences in behavior, cognition, personality, and mental health. In this module, we survey recent developments revealing epigenetic aspects of mental health and review some of the challenges of epigenetic approaches in psychology to help explain how nurture shapes nature.

Learning Objectives

- Explain what the term epigenetics means and the molecular machinery involved.
- Name and discuss important neural and developmental pathways that are regulated by epigenetic factors, and provide examples of epigenetic effects on personality traits and cognitive behavior.
- Understand how misregulation of epigenetic mechanisms can lead to disease states, and be able to discuss examples.
- Recognize how epigenetic machinery can be targets for therapeutic agents, and discuss examples.

Introduction



Figure 4.10: DNA stands for Deoxyribonucleic Acid, and although each person's DNA is unique to that individual, it is 99.9% similar to every other human on the planet.

Early childhood is not only a period of physical growth; it is also a time of mental development related to changes in the anatomy, physiology, and chemistry of the nervous system that influence mental health throughout life. Cognitive abilities associated with learning and memory, reasoning, problem solving, and developing relationships continue to emerge during childhood. Brain development is more rapid during this critical or sensitive period than at any other, with more than 700 neural connections created each second. Herein, complex **gene**–environment interactions (or genotype–environment interactions, G×E) serve to increase the number of possible contacts between neurons, as they hone their adult synaptic properties and excitability. Many weak connections form to different neuronal targets; subsequently, they undergo remodeling in which most connections vanish and a few stable connections remain. These structural changes (or plasticity) may be crucial for the development of mature neural networks that support emotional, cognitive, and social behavior. The generation of different morphology, physiology, and behavioral outcomes from a single genome in response to changes in the environment forms the basis for "phenotypic plasticity," which is fundamental to the way organisms cope with environmental variation, navigate the present world, and solve future problems.

The challenge for psychology has been to integrate findings from genetics and environmental (social, biological, chemical) factors, including the quality of infant–mother attachments, into the study of personality and our understanding of the emergence of mental illness. These studies have demonstrated that common DNA sequence variation and rare mutations account for only a small fraction (1%–2%) of the total risk for inheritance of personality traits and mental disorders (Dick, Riley, & Kendler, 2010; Gershon, Alliey-Rodriguez, & Liu, 2011). Additionally, studies that have attempted to examine the mechanisms and conditions under which DNA sequence variation influences brain development and function have been confounded by complex cause-and-effect relationships (Petronis, 2010). The large unaccounted heritability of personality traits and mental health suggests that additional molecular and cellular mechanisms are involved.

Epigenetics has the potential to provide answers to these important questions and refers to the transmission of **phenotype** in terms of gene expression in the absence of changes in DNA sequence—hence the name epi- (Greek: επί- over, above) genetics (Waddington, 1942; Wolffe & Matzke, 1999). The advent of high-throughput techniques such as sequencing-based approaches to study the distributions of regulators of gene expression throughout the genome led to the collective description of the "epigenome." In contrast to the genome sequence, which is static and the same in almost all cells, the **epigenome** is highly dynamic, differing among cell types, tissues, and brain regions (Gregg et al., 2010). Recent studies have provided insights into epigenetic regulation of developmental pathways in response to a range of external environmental factors (Dolinoy, Weidman, & Jirtle, 2007). These environmental factors during early childhood and adolescence can cause changes in expression of genes conferring risk of mental health and chronic physical conditions. Thus, the examination of genetic–epigenetic–environment interactions from a developmental perspective may determine the nature of gene misregulation in psychological disorders.

This module will provide an overview of the main components of the epigenome and review themes in recent epigenetic research that have relevance for psychology, to form the biological basis for the interplay between environmental signals and the genome in the regulation of individual differences in physiology, emotion, cognition, and behavior.

Molecular control of gene expression: the dynamic epigenome



Figure 4.11: Identical twins are the perfect example of epigenetics. Although they share exactly the same DNA, their unique experiences in life will cause some genes (and not others) to express themselves. This is why, over time, identical twins come to look and behave differently.

Almost all the cells in our body are genetically identical, yet our body generates many different cell types, organized into different tissues and organs, and expresses different proteins. Within each type of mammalian cell, about 2 meters of genomic DNA is divided into nuclear chromosomes. Yet the nucleus of a human cell, which contains the chromosomes, is only about 2 μm in diameter. To achieve this 1,000,000-fold compaction, DNA is wrapped around a group of 8 proteins called histones. This combination of DNA and histone proteins forms a special structure called a "nucleosome," the basic unit of chromatin, which represents a structural solution for maintaining and accessing the tightly compacted genome. These factors alter the likelihood that a gene will be expressed or silenced. Cellular functions such as gene expression, DNA replication, and the generation of specific cell types are therefore influenced by distinct patterns of chromatin structure, involving covalent modification of both histones (Kadonaga, 1998) and DNA (Razin, 1998).

Importantly, epigenetic variation also emerges across the lifespan. For example, although **identical twins** share a common **genotype** and are genetically identical and epigenetically similar when they are young, as they age they become more

dissimilar in their epigenetic patterns and often display behavioral, personality, or even physical differences, and have different risk levels for serious illness. Thus, understanding the structure of the nucleosome is key to understanding the precise and stable control of gene expression and regulation, providing a molecular interface between genes and environmentally induced changes in cellular activity.

The primary epigenetic mark: DNA modification

DNA methylation is the best-understood epigenetic modification influencing gene expression. DNA is composed of four types of naturally occurring nitrogenous bases: adenine (A), thymine (T), guanine (G), and cytosine (C). In mammalian genomes, **DNA methylation** occurs primarily at cytosine residues in the context of cytosines that are followed by guanines (CpG dinucleotides), to form 5-methylcytosine in a cell-specific pattern (Goll & Bestor, 2005; Law & Jacobsen, 2010; Suzuki & Bird, 2008). The enzymes that perform DNA methylation are called **DNA methyltransferases (DNMTs)**, which catalyze the transfer of a methyl group to the cytosine (Adams, McKay, Craig, & Burdon, 1979). These enzymes are all expressed in the central nervous system and are dynamically regulated during development (Feng, Chang, Li, & Fan, 2005; Goto et al., 1994). The effect of DNA methylation on gene function varies depending on the period of development during which the methylation occurs and location of the methylated cytosine. Methylation of DNA in gene regulatory regions (promoter and enhancer regions) usually results in gene silencing and reduced gene expression (Ooi, O'Donnell, & Bestor, 2009; Suzuki & Bird, 2008; Sutter and Doerfler, 1980; Vardimon et al., 1982). This is a powerful regulatory mechanism that ensures that genes are expressed only when needed. Thus DNA methylation may broadly impact human brain development, and age-related misregulation of DNA methylation is associated with the molecular pathogenesis of neurodevelopmental disorders.

Histone modification and the histone code

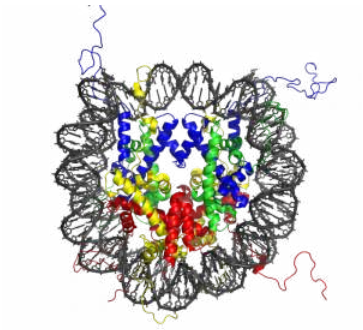


Figure 4.12: Life experiences, like a stressful event in childhood, can cause the modification of histone proteins (pictured) to help adapt to one's environment. For example, in response to a stressful event, histone modification of one's DNA might occur to encourage a more cautions personality—in order to avoid future, stressful encounters.

The modification of histone proteins comprises an important epigenetic mark related to gene expression. One of the most thoroughly studied modifications is histone acetylation, which is associated with gene activation and increased gene expression (Wade, Pruss, & Wolffe, 1997). Acetylation on histone tails is mediated by the opposing enzymatic activities of **histone acetyltransferases (HATs) and histone deacetylases (HDACs)** (Kuo & Allis, 1998). For example, acetylation of histone in gene regulatory regions by HAT enzymes is generally associated with DNA demethylation, gene activation, and increased gene expression (Hong, Schroth, Matthews, Yau, & Bradbury, 1993; Sealy & Chalkley, 1978). On the other hand, removal of the acetyl group (deacetylation) by HDAC enzymes is generally associated with DNA methylation, gene silencing, and decreased gene expression (Davie & Chadee, 1998). The relationship between patterns of **histone modifications** and gene activity provides evidence for the existence of a "histone code" for determining cell-specific gene expression programs (Jenuwein & Allis, 2001). Interestingly, recent research using animal models has demonstrated that histone modifications and DNA methylation of certain genes mediates the long-term behavioral effects of the level of care experienced during infancy.

Early childhood experience

The development of an individual is an active process of adaptation that occurs within a social and economic context. For example, the closeness or degree of positive attachment of the parent (typically mother)–infant bond and parental investment (including nutrient supply provided by the parent) that define early childhood experience also program the development of individual differences in stress responses in the brain, which then affect memory, attention, and emotion. In terms of evolution, this process provides the offspring with the ability to physiologically adjust gene expression profiles contributing to the organization and function of neural circuits and molecular pathways that support (1) biological defensive systems for survival (e.g., stress resilience), (2) reproductive success to promote establishment and persistence in the present environment, and (3) adequate parenting in the next generation (Bradshaw, 1965).

Parental investment and programming of stress responses in the offspring

The most comprehensive study to date of variations in parental investment and epigenetic inheritance in mammals is that of the maternally transmitted responses to stress in rats. In rat pups, maternal nurturing (licking and grooming) during the first week of life is associated with long-term programming of individual differences in stress responsiveness, emotionality, cognitive performance, and reproductive behavior (Caldji et al., 1998; Francis, Diorio, Liu, & Meaney, 1999; Liu et al., 1997; Myers, Brunelli, Shair, Squire, & Hofer, 1989; Stern, 1997). In adulthood, the offspring of mothers that exhibit increased levels of pup licking and grooming over the first week of life show increased expression of the glucocorticoid receptor in the hippocampus (a brain structure associated with stress responsivity as well as learning and memory) and a lower hormonal response to stress compared with adult animals reared by low licking and grooming mothers (Francis et al., 1999; Liu et al., 1997). Moreover, rat pups that received low levels of maternal licking and grooming during the first week of life showed decreased histone acetylation and increased DNA methylation of a neuron-specific promoter of the glucocorticoid receptor gene (Weaver et al., 2004). The expression of this gene is then reduced, the number of glucocorticoid receptors in the brain is decreased, and the animals show a higher hormonal response to stress throughout their life. The effects of maternal care on stress hormone responses and behaviour in the offspring can be eliminated in adulthood by pharmacological treatment (HDAC inhibitor trichostatin A, TSA) or dietary amino acid supplementation (methyl donor L-methionine), treatments that influence histone acetylation, DNA methylation, and expression of the glucocorticoid receptor gene (Weaver et al., 2004; Weaver et al., 2005). This series of experiments shows that histone acetylation and DNA methylation of the glucocorticoid receptor gene promoter is a necessary link in the process leading to the long-term physiological and behavioral sequelae of poor maternal care. This points to a possible molecular target for treatments that may reverse or ameliorate the traces of childhood maltreatment.



Figure 4.13: Parental care during one's childhood has important and consequential effects on the development of an individual, effects that persist even into adulthood.

Several studies have attempted to determine to what extent the findings from model animals are transferable to humans. Examination of post-mortem brain tissue from healthy human subjects found that the human equivalent of the glucocorticoid receptor gene promoter (NR3C1 exon 1F promoter) is also unique to the individual (Turner, Pelascini, Macedo, & Muller, 2008). A similar study examining newborns showed that methylation of the glucocorticoid receptor gene promoter maybe an early epigenetic marker of maternal mood and risk of increased hormonal responses to stress in infants 3 months of age (Oberlander et al., 2008). Although further studies are required to examine the functional consequence of this DNA methylation, these findings are consistent with our studies in the neonate and adult offspring of low licking and grooming mothers that show increased DNA methylation of

the promoter of the glucocorticoid receptor gene, decreased glucocorticoid receptor gene expression, and increased hormonal responses to stress (Weaver et al., 2004). Examination of brain tissue from suicide victims found that the human glucocorticoid receptor gene promoter is also more methylated in the brains of individuals who had experienced maltreatment during childhood (McGowan et al., 2009). These finding suggests that DNA methylation mediates the effects of early environment in both rodents and humans and points to the possibility of new therapeutic approaches stemming from translational epigenetic research. Indeed, similar processes at comparable epigenetic labile regions could explain why the adult offspring of high and low licking/grooming mothers exhibit widespread differences in hippocampal gene expression and cognitive function (Weaver, Meaney, & Szyf, 2006).

However, this type of research is limited by the inaccessibility of human brain samples. The translational potential of this finding would be greatly enhanced if the relevant epigenetic modification can be measured in an accessible tissue. Examination of blood samples from adult patients with bipolar disorder, who also retrospectively reported on their experiences of childhood abuse and neglect, found that the degree of DNA methylation of the human glucocorticoid receptor gene promoter was strongly positively related to the reported experience of childhood maltreatment decades earlier. For a relationship between a molecular measure and reported historical exposure, the effects size is extraordinarily large. This opens a range of new possibilities: given the large effect size and consistency of this association, measurement of the GR promoter methylation may effectively become a blood test measuring the physiological traces left on the genome by early experiences. Although this blood test cannot replace current methods of diagnosis, this unique and addition information adds to our knowledge of how disease may arise and be manifested throughout life. Near-future research will examine whether this measure adds value over and above simple reporting of early adversities when it comes to predicting important outcomes, such as response to treatment or suicide.

Child nutrition and the epigenome



Figure 4.14: Whether or not your parents knew the science behind it, telling you to eat your veggies as a kid really does make you healthier and stronger—at least your DNA, that is.

The old adage “you are what you eat” might be true on more than just a physical level: The food you choose (and even what your parents and grandparents chose) is reflected in your own personal development and risk for disease in adult life (Wells, 2003). Nutrients can reverse or change DNA methylation and histone modifications, thereby modifying the expression of critical genes associated with physiologic and pathologic processes, including embryonic development, aging, and carcinogenesis. It appears that nutrients can influence the epigenome either by directly inhibiting enzymes that catalyze DNA methylation or histone modifications, or by altering the availability of substrates necessary for those enzymatic reactions. For example, rat mothers fed a diet low in methyl group donors during pregnancy produce offspring with reduced DNMT-1 expression, decreased DNA methylation, and increased histone acetylation at promoter regions of specific genes, including the glucocorticoid receptor, and increased gene expression in the liver of juvenile offspring (Lillycrop, Phillips, Jackson, Hanson, & Burdge, 2005) and adult offspring (Lillycrop et al., 2007). These data suggest that early life nutrition has the potential to influence epigenetic programming in the brain not only during early development but also in adult life, thereby modulating health throughout life. In this regard, nutritional epigenetics has been viewed as an attractive tool to prevent pediatric developmental diseases and cancer, as well as to delay aging-associated processes.

The best evidence relating to the impact of adverse environmental conditions development and health comes from studies of the children of women who were pregnant during two civilian famines of World War II: the Siege of Leningrad (1941–44) (Bateson, 2001) and the Dutch Hunger Winter (1944–1945) (Stanner et al., 1997). In the Netherlands famine, women who were previously

well nourished were subjected to low caloric intake and associated environmental stressors. Women who endured the famine in the late stages of pregnancy gave birth to smaller babies (Lumey & Stein, 1997) and these children had an increased risk of insulin resistance later in life (Painter, Roseboom, & Bleker, 2005). In addition, offspring who were starved prenatally later experienced impaired glucose tolerance in adulthood, even when food was more abundant (Stanner et al., 1997). Famine exposure at various stages of gestation was associated with a wide range of risks such as increased obesity, higher rates of coronary heart disease, and lower birth weight (Lumey & Stein, 1997). Interestingly, when examined 60 years later, people exposed to famine prenatally showed reduced DNA methylation compared with their unexposed same-sex siblings (Heijmans et al., 2008).

Epigenetic regulation of learning and memory

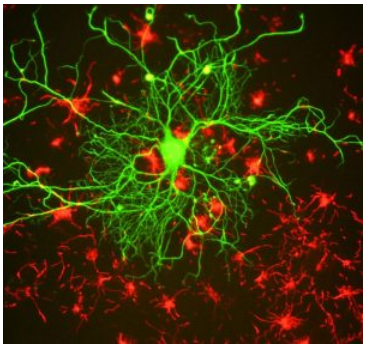


Figure 4.15: Neural plasticity is the change of neural pathways and synapses which allows for our ability to learn new things and remember them.

Memories are recollections of actual events stored within our brains. But how is our brain able to form and store these memories? Epigenetic mechanisms influence genomic activities in the brain to produce long-term changes in synaptic signaling, organization, and morphology, which in turn support learning and memory (Day & Sweatt, 2011).

Neuronal activity in the hippocampus of mice is associated with changes in DNA methylation (Guo et al., 2011), and disruption to genes encoding the DNA methylation machinery cause learning and memory impairments (Feng et al., 2010). DNA methylation has also been implicated in the maintenance of long-term memories, as pharmacological inhibition of DNA methylation and impaired memory (Day & Sweatt, 2011; Miller et al., 2010). These findings indicate the importance of DNA methylation in mediating synaptic plasticity and cognitive functions, both of which are disturbed in psychological illness.

Changes in histone modifications can also influence long-term memory formation by altering chromatin accessibility and the expression of genes relevant to learning and memory. Memory formation and the associated enhancements in synaptic transmission are accompanied by increases in histone acetylation (Guan et al., 2002) and alterations in histone methylation (Schaefer et al., 2009), which promote gene expression. Conversely, a neuronal increase in histone deacetylase activity, which promotes gene silencing, results in reduced synaptic plasticity and impairs memory (Guan et al., 2009). Pharmacological inhibition of histone deacetylases augments memory formation (Guan et al., 2009; Levenson et al., 2004), further suggesting that histone (de)acetylation regulates this process.

In humans genetic defects in genes encoding the DNA methylation and chromatin machinery exhibit profound effects on cognitive function and mental health (Jiang, Bressler, & Beaudet, 2004). The two best-characterized examples are Rett syndrome (Amir et al., 1999) and Rubinstein-Taybi syndrome (RTS) (Alarcon et al., 2004), which are profound intellectual disability disorders. Both MECP2 and CBP are highly expressed in neurons and are involved in regulating neural gene expression (Chen et al., 2003; Martinowich et al., 2003).

Rett syndrome patients have a mutation in their DNA sequence in a gene called MECP2. MECP2 plays many important roles within the cell: One of these roles is to read the DNA sequence, checking for DNA methylation, and to bind to areas that contain methylation, thereby preventing the wrong proteins from being present. Other roles for MECP2 include promoting the presence of particular, necessary, proteins, ensuring that DNA is packaged properly within the cell and assisting with the production of proteins. MECP2 function also influences gene expression that supports dendritic and synaptic development and hippocampus-dependent memory (Li, Zhong, Chau, Williams, & Chang, 2011; Skene et al., 2010). Mice with altered MECP2 expression exhibit genome-wide increases in histone acetylation, neuron cell death, increased anxiety, cognitive deficits, and social withdrawal (Shahbazian et

al., 2002). These findings support a model in which DNA methylation and MECP2 constitute a cell-specific epigenetic mechanism for regulation of histone modification and gene expression, which may be disrupted in Rett syndrome.

RTS patients have a mutation in their DNA sequence in a gene called CBP. One of these roles of CBP is to bind to specific histones and promote histone acetylation, thereby promoting gene expression. Consistent with this function, RTS patients exhibit a genome-wide decrease in histone acetylation and cognitive dysfunction in adulthood (Kalkhoven et al., 2003). The learning and memory deficits are attributed to disrupted neural plasticity (Korzus, Rosenfeld, & Mayford, 2004). Similar to RTS in humans, mice with a mutation of CBP perform poorly in cognitive tasks and show decreased genome-wide histone acetylation (for review, see Josselyn, 2005). In the mouse brain CBP was found to act as an epigenetic switch to promote the birth of new neurons in the brain. Interestingly, this epigenetic mechanism is disrupted in the fetal brains of mice with a mutation of CBP, which, as pups, exhibit early behavioral deficits following removal and separation from their mother (Wang et al., 2010). These findings provide a novel mechanism whereby environmental cues, acting through histone modifying enzymes, can regulate epigenetic status and thereby directly promote neurogenesis, which regulates neurobehavioral development.

Together, these studies demonstrate that misregulation of epigenetic modifications and their regulatory enzymes is capable of orchestrating prominent deficits in neuronal plasticity and cognitive function. Knowledge from these studies may provide greater insight into other mental disorders such as depression and suicidal behaviors.

Epigenetic mechanisms in psychological disorders



Figure 4.16: Pictured above is a chromatin, the spiral-looking macromolecule involved in depression.

Epigenome-wide studies have identified several dozen sites with DNA methylation alterations in genes involved in brain development and neurotransmitter pathways, which had previously been associated with mental illness (Mill et al., 2008). These disorders are complex and typically start at a young age and cause lifelong disability. Often, limited benefits from treatment make these diseases some of the most burdensome disorders for individuals, families, and society. It has become evident that the efforts to identify the primary causes of complex psychiatric disorders may significantly benefit from studies linking environmental effects with changes observed within the individual cells.

Epigenetic events that alter chromatin structure to regulate programs of gene expression have been associated with depression-related behavior and action of antidepressant medications, with increasing evidence for similar mechanisms occurring in post-mortem brains of depressed individuals. In mice, social avoidance resulted in decreased expression of hippocampal genes important in mediating depressive responses (Tsankova et al., 2006). Similarly, chronic social defeat stress was found to decrease expression of genes implicated in normal emotion processing (Lutter et al., 2008). Consistent with these findings, levels of histone markers of increased gene expression were down regulated in human post-mortem brain samples from individuals with a history of clinical depression (Covington et al., 2009).

Administration of antidepressants increased histone markers of increased gene expression and reversed the gene repression induced by defeat stress (Lee, Wynder, Schmidt, McCafferty, & Shiekhattar, 2006; Tsankova et al., 2006; Wilkinson et al., 2009). These results provide support for the use of HDAC inhibitors against depression. Accordingly, several HDAC inhibitors have been found to exert antidepressant effects by each modifying distinct cellular targets (Cassel et al., 2006; Schroeder, Lin, Crusio, & Akbarian, 2007).

There is also increasing evidence that aberrant gene expression resulting from altered epigenetic regulation is associated with the pathophysiology of suicide (McGowan et al., 2008; Poulter et al., 2008). Thus, it is tempting to speculate that there is an

epigenetically determined reduced capacity for gene expression, which is required for learning and memory, in the brains of suicide victims.

Epigenetic strategy to understanding gene-environment interactions



Figure 4.17: Although there is some evidence that a dysfunctional upbringing can increase one's likelihood for schizophrenia (an epigenetically inherited disease), some people who have both the predisposition and the stressful environment never develop the mental illness.

While the cellular and molecular mechanisms that influence on physical and mental health have long been a central focus of neuroscience, only in recent years has attention turned to the epigenetic mechanisms behind the dynamic changes in gene expression responsible for normal cognitive function and increased risk for mental illness. The links between early environment and epigenetic modifications suggest a mechanism underlying gene-environment interactions. Early environmental adversity alone is not a sufficient cause of mental illness, because many individuals with a history of severe childhood maltreatment or trauma remain healthy. It is increasingly becoming evident that inherited differences in the segments of specific genes may moderate the effects of adversity and determine who is sensitive and who is resilient through a gene-environment interplay. Genes such as the glucocorticoid receptor appear to moderate the effects of childhood adversity on mental illness. Remarkably, epigenetic DNA modifications have been identified that may underlie the long-lasting effects of environment on biological functions. This new epigenetic research is pointing to a new strategy to understanding gene-environment interactions.

The next decade of research will show if this potential can be exploited in the development of new therapeutic options that may alter the traces that early environment leaves on the genome. However, as discussed in this module, the epigenome is not static and can be molded by developmental signals, environmental perturbations, and disease states, which present an experimental challenge in the search for epigenetic risk factors in psychological disorders (Rakyan, Down, Balding, & Beck, 2011). The sample size and epigenomic assay required is dependent on the number of tissues affected, as well as the type and distribution of epigenetic modifications. The combination of genetic association maps studies with epigenome-wide developmental studies may help identify novel molecular mechanisms to explain features of inheritance of personality traits and transform our understanding of the biological basis of psychology. Importantly, these epigenetic studies may lead to identification of novel therapeutic targets and enable the development of improved strategies for early diagnosis, prevention, and better treatment of psychological and behavioral disorders.

Outside Resources

Reference: The "Encyclopedia of DNA Elements" (ENCODE) project http://encodeproject.org/ENCODE/

Reference: THREADS – A new way to explore the ENCODE Project http://www.nature.com/encode/#/threads

Web: Explore, view, and download genome-wide maps of DNA and histone modifications from the NCBI Epigenomics Portal http://www.ncbi.nlm.nih.gov/epigenomics

Web: NOVA ScienceNOW – Introduction to Epigenetics http://www.pbs.org/wgbh/nova/genes

Web: The University of Utah's Genetic Science Learning Center http://learn.genetics.utah.edu/content/epigenetics/

Discussion Questions

1. Describe the physical state of the genome when genes are active and inactive.
2. Often, the physical characteristics of genetically identical twins become increasingly different as they age, even at the molecular level. Explain why this is so (use the terms “environment” and “epigenome”).
3. Name 3–4 environmental factors that influence the epigenome and describe their effects.
4. The rat nurturing example shows us how parental behavior can shape the behavior of offspring on a biochemical level. Discuss how this relates to humans and include the personal and social implications.
5. Explain how the food we eat affects gene expression.
6. Can the diets of parents affect their offspring’s epigenome?
7. Why is converging evidence the best kind of evidence in the study of brain function?
8. If you were interested in whether a particular brain area was involved in a specific behavior, what neuroscience methods could you use?
9. If you were interested in the precise time in which a particular brain process occurred, which neuroscience methods could you use?

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4.5: Is Personality More Nature or More Nurture? Behavioural and Molecular Genetics

Charles Stangor and Jennifer Walinga

Learning Objectives

- Explain how genes transmit personality from one generation to the next.
- Outline the methods of behavioural genetics studies and the conclusions that we can draw from them about the determinants of personality.
- Explain how molecular genetics research helps us understand the role of genetics in personality.

One question that is exceedingly important for the study of personality concerns the extent to which it is the result of nature or nurture. If nature is more important, then our personalities will form early in our lives and will be difficult to change later. If nurture is more important, however, then our experiences are likely to be particularly important, and we may be able to flexibly alter our personalities over time. In this section we will see that the personality traits of humans and animals are determined in large part by their genetic makeup, and thus it is no surprise that identical twins Paula Bernstein and Elyse Schein turned out to be very similar even though they had been raised separately. But we will also see that genetics does not determine everything.

In the nucleus of each cell in your body are 23 pairs of *chromosomes*. One of each pair comes from your father, and the other comes from your mother. The **chromosomes** *are made up of strands of the molecule DNA (deoxyribonucleic acid), and the DNA* is grouped into segments known as *genes*. A **gene** is *the basic biological unit that transmits characteristics from one generation to the next*. Human cells have about 25,000 genes.

The genes of different members of the same species are almost identical. The DNA in your genes, for instance, is about 99.9% the same as the DNA in my genes and in the DNA of every other human being. These common genetic structures lead members of the same species to be born with a variety of behaviours that come naturally to them and that define the characteristics of the species. These abilities and characteristics are known as **instincts** — *complex inborn patterns of behaviours that help ensure survival and reproduction* (Tinbergen, 1951). Different animals have different instincts. Birds naturally build nests, dogs are naturally loyal to their human caretakers, and humans instinctively learn to walk and to speak and understand language.

But the strength of different traits and behaviours also varies within species. Rabbits are naturally fearful, but some are more fearful than others; some dogs are more loyal than others to their caretakers; and some humans learn to speak and write better than others do. These differences are determined in part by the small amount (in humans, the 0.1%) of the differences in genes among the members of the species.

Personality is not determined by any single gene, but rather by the actions of many genes working together. There is no “IQ gene” that determines intelligence and there is no “good marriage-partner gene” that makes a person a particularly good marriage bet. Furthermore, even working together, genes are not so powerful that they can control or create our personality. Some genes tend to increase a given characteristic and others work to decrease that same characteristic — the complex relationship among the various genes, as well as a variety of random factors, produces the final outcome. Furthermore, genetic factors always work with environmental factors to create personality. Having a given pattern of genes doesn’t necessarily mean that a particular trait will develop, because some traits might occur only in some environments. For example, a person may have a genetic variant that is known to increase his or her risk for developing emphysema from smoking. But if that person never smokes, then emphysema most likely will not develop.

Studying Personality Using Behavioural Genetics

Perhaps the most direct way to study the role of genetics in personality is to selectively breed animals for the trait of interest. In this approach the scientist chooses the animals that most strongly express the personality characteristics of interest and breeds these animals with each other. If the selective breeding creates offspring with even stronger traits, then we can assume that the trait has genetic origins. In this manner, scientists have studied the role of genetics in how worms respond to stimuli, how fish develop courtship rituals, how rats differ in play, and how pigs differ in their responses to stress.

Although selective breeding studies can be informative, they are clearly not useful for studying humans. For this psychologists rely on **behavioural genetics** — *a variety of research techniques that scientists use to learn about the genetic and environmental influences on human behaviour by comparing the traits of biologically and nonbiologically related family members* (Baker, 2004). Behavioural genetics is based on the results of *family studies*, *twin studies*, and *adoptive studies*.

A **family study** *starts with one person who has a trait of interest — for instance, a developmental disorder such as autism — and examines the individual's family tree to determine the extent to which other members of the family also have the trait.* The presence of the trait in first-degree relatives (parents, siblings, and children) is compared with the prevalence of the trait in second-degree relatives (aunts, uncles, grandchildren, grandparents, and nephews or nieces) and in more distant family members. The scientists then analyze the patterns of the trait in the family members to see the extent to which it is shared by closer and more distant relatives.

Although family studies can reveal whether a trait runs in a family, it cannot explain why. In a **twin study**, *researchers study the personality characteristics of twins.* Twin studies rely on the fact that identical (or monozygotic) twins have essentially the same set of genes, while fraternal (or dizygotic) twins have, on average, a half-identical set. The idea is that if the twins are raised in the same household, then the twins will be influenced by their environments to an equal degree, and this influence will be pretty much equal for identical and fraternal twins. In other words, if environmental factors are the same, then the only factor that can make identical twins more similar than fraternal twins is their greater genetic similarity.

In a twin study, the data from many pairs of twins are collected and the rates of similarity for identical and fraternal pairs are compared. A correlation coefficient is calculated that assesses the extent to which the trait for one twin is associated with the trait in the other twin. Twin studies divide the influence of nature and nurture into three parts:

- **Heritability** (i.e., genetic influence) is indicated when the correlation coefficient for identical twins exceeds that for fraternal twins, indicating that shared DNA is an important determinant of personality.
- **Shared environment** determinants are indicated when the correlation coefficients for identical and fraternal twins are greater than zero and also very similar. These correlations indicate that both twins are having experiences in the family that make them alike.
- **Nonshared environment** is indicated when identical twins do not have similar traits. These influences refer to experiences that are not accounted for either by heritability or by shared environmental factors. Nonshared environmental factors are the experiences that make individuals within the same family *less* alike. If a parent treats one child more affectionately than another, and as a consequence this child ends up with higher self-esteem, the parenting in this case is a nonshared environmental factor.

In the typical twin study, all three sources of influence are operating simultaneously, and it is possible to determine the relative importance of each type.

An **adoption study** *compares biologically related people, including twins, who have been reared either separately or apart.* Evidence for genetic influence on a trait is found when children who have been adopted show traits that are more similar to those of their biological parents than to those of their adoptive parents. Evidence for environmental influence is found when the adoptee is more like his or her adoptive parents than the biological parents.

The results of family, twin, and adoption studies are combined to get a better idea of the influence of genetics and environment on traits of interest. Table 4.1, "Data from Twin and Adoption Studies on the Heritability of Various Characteristics," presents data on the correlations and heritability estimates for a variety of traits based on the results of behavioural genetics studies (Bouchard, Lykken, McGue, Segal, & Tellegen, 1990).

Table 4.1 Data from Twin and Adoption Studies on the Heritability of Various Characteristics.

	Correlation between children raised together		Correlation between children raised apart		Estimated percent of total due to		
	Identical twins	Fraternal twins	Identical twins	Fraternal twins	Heritability (%)	Shared environment (%)	Nonshared environment (%)
Age of puberty					45	5	50
Aggression	0.43	0.14	0.46	0.06			
Alzheimer disease	0.54	0.16					
Fingerprint patterns	0.96	0.47	0.96	0.47	100	0	0
General cognitive ability					56	0	44
Likelihood of divorce	0.52	0.22					
Sexual orientation	0.52	0.22			18–39	0–17	61–66
Big Five dimensions					40–50		

This table presents some of the observed correlations and heritability estimates for various characteristics.
Sources: Långström, et al, 2010; Loehlin, 1992; McGue & Lykken, 1992; Plomin et al, 1997; Tellegen et al, 1988.

If you look in the second column of Table 4.1 , “Data from Twin and Adoption Studies on the Heritability of Various Characteristics,” you will see the observed correlations for the traits between identical twins who have been raised together in the same house by the same parents. This column represents the pure effects of genetics, in the sense that environmental differences have been controlled to be a small as possible. You can see that these correlations are higher for some traits than for others. Fingerprint patterns are very highly determined by our genetics (r = .96), whereas the Big Five trait dimensions have a heritability of 40% to 50%.

You can also see from the table that, overall, there is more influence of nature than of parents. Identical twins, even when they are raised in separate households by different parents (column 4), turn out to be quite similar in personality, and are more similar than fraternal twins who are raised in separate households (column 5). These results show that genetics has a strong influence on personality, and helps explain why Elyse and Paula were so similar when they finally met.

Despite the overall role of genetics, you can see in Table 4.1, “Data from Twin and Adoption Studies on the Heritability of Various Characteristics,” that the correlations between identical twins (column 2) and heritability estimates for most traits (column 6) are substantially less than 1.00, showing that the environment also plays an important role in personality (Turkheimer & Waldron, 2000). For instance, for sexual orientation the estimates of heritability vary from 18% to 39% of the total across studies, suggesting that 61% to 82% of the total influence is due to environment.

You might at first think that parents would have a strong influence on the personalities of their children, but this would be incorrect. As you can see by looking in column 7 of Table 4.1,” research finds that the influence of shared environment (i.e., the effects of parents or other caretakers) plays little or no role in adult personality (Harris, 2006). Shared environment does influence the personality and behaviour of young children, but this influence decreases rapidly as the child grows older. By the time we reach adulthood, the impact of shared environment on our personalities is weak at best (Roberts & DelVecchio, 2000). What this means is

that although parents must provide a nourishing and stimulating environment for children, no matter how hard they try they are not likely to be able to turn their children into geniuses or into professional athletes, nor will they be able to turn them into criminals.

If parents are not providing the environmental influences on the child, then what is? The last column in Table 4.1," the influence of nonshared environment, represents whatever is "left over" after removing the effects of genetics and parents. You can see that these factors — the largely unknown things that happen to us that make us different from other people — often have the largest influence on personality.

Studying Personality Using Molecular Genetics

In addition to the use of behavioural genetics, our understanding of the role of biology in personality recently has been dramatically increased through the use of **molecular genetics**, which is *the study of which genes are associated with which personality traits* (Goldsmith et al., 2003; Strachan & Read, 1999). These advances have occurred as a result of new knowledge about the structure of human DNA made possible through the Human Genome Project and related work that has identified the genes in the human body (Human Genome Project, 2010). Molecular genetics researchers have also developed new techniques that allow them to find the locations of genes within chromosomes and to identify the effects those genes have when activated or deactivated.



Figure 4.18 Laboratory Mice. These "knockout" mice are participating in studies in which some of their genes have been deactivated to determine the influence of the genes on behaviour.

One approach that can be used in animals, usually in laboratory mice, is the *knockout study* (as shown in Figure 4.18, "Laboratory Mice"). In this approach the researchers use specialized techniques to remove or modify the influence of a gene in a line of *knockout* mice (Crusio, Goldowitz, Holmes, & Wolfer, 2009). The researchers harvest embryonic stem cells from mouse embryos and then modify the DNA of the cells. *The DNA is created so that the action of certain genes will be eliminated* or **knocked out**. The cells are then injected into the embryos of other mice that are implanted into the uteruses of living female mice. When these animals are born, they are studied to see whether their behaviour differs from a control group of normal animals. Research has found that removing or changing genes in mice can affect their anxiety, aggression, learning, and socialization patterns.

In humans, a molecular genetics study normally begins with the collection of a DNA sample from the participants in the study, usually by taking some cells from the inner surface of the cheek. In the lab, the DNA is extracted from the sampled cells and is combined with a solution containing a marker for the particular genes of interest as well as a fluorescent dye. If the gene is present in the DNA of the individual, then the solution will bind to that gene and activate the dye. The more the gene is expressed, the stronger the reaction.

In one common approach, DNA is collected from people who have a particular personality characteristic and also from people who do not. The DNA of the two groups is compared to see which genes differ between them. These studies are now able to compare thousands of genes at the same time. Research using molecular genetics has found genes associated with a variety of personality traits including novelty-seeking (Ekelund, Lichtermann, Järvelin, & Peltonen, 1999), attention-deficit/hyperactivity disorder (Waldman & Gizer, 2006), and smoking behaviour (Thorgeirsson et al., 2008).

Reviewing the Literature: Is Our Genetics Our Destiny?

Over the past two decades scientists have made substantial progress in understanding the important role of genetics in behaviour. Behavioural genetics studies have found that, for most traits, genetics is more important than parental influence. And molecular

genetics studies have begun to pinpoint the particular genes that are causing these differences. The results of these studies might lead you to believe that your destiny is determined by your genes, but this would be a mistaken assumption.

For one, the results of all research must be interpreted carefully. Over time we will learn even more about the role of genetics, and our conclusions about its influence will likely change. Current research in the area of behavioural genetics is often criticized for making assumptions about how researchers categorize identical and fraternal twins, about whether twins are in fact treated in the same way by their parents, about whether twins are representative of children more generally, and about many other issues. Although these critiques may not change the overall conclusions, it must be kept in mind that these findings are relatively new and will certainly be updated with time (Plomin, 2000).

Furthermore, it is important to reiterate that although genetics is important, and although we are learning more every day about its role in many personality variables, genetics does not determine everything. In fact, the major influence on personality is nonshared environmental influences, which include all the things that occur to us that make us unique individuals. These differences include variability in brain structure, nutrition, education, upbringing, and even interactions among the genes themselves.

The genetic differences that exist at birth may be either amplified or diminished over time through environmental factors. The brains and bodies of identical twins are not exactly the same, and they become even more different as they grow up. As a result, even genetically identical twins have distinct personalities, resulting in large part from environmental effects.

Because these nonshared environmental differences are nonsystematic and largely accidental or random, it will be difficult to ever determine exactly what will happen to a child as he or she grows up. Although we do inherit our genes, we do not inherit personality in any fixed sense. The effect of our genes on our behaviour is entirely dependent on the context of our life as it unfolds day to day. Based on your genes, no one can say what kind of human being you will turn out to be or what you will do in life.

Key Takeaways

- Genes are the basic biological units that transmit characteristics from one generation to the next.
- Personality is not determined by any single gene, but rather by the actions of many genes working together.
- Behavioural genetics refers to a variety of research techniques that scientists use to learn about the genetic and environmental influences on human behaviour.
- Behavioural genetics is based on the results of family studies, twin studies, and adoptive studies.
- Overall, genetics has more influence than parents do on shaping our personality.
- Molecular genetics is the study of which genes are associated with which personality traits.
- The largely unknown environmental influences, known as the nonshared environmental effects, have the largest impact on personality. Because these differences are nonsystematic and largely accidental or random, we do not inherit our personality in any fixed sense.

Exercises and Critical Thinking

1. Think about the twins you know. Do they seem to be very similar to each other, or does it seem that their differences outweigh their similarities?
2. Describe the implications of the effects of genetics on personality, overall. What does it mean to say that genetics “determines” or “does not determine” our personality?

Image Attributions

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4.6: Summary, Key Terms, and Self-Test

Lee Sanders

Summary

The biological perspective emphasizes bodily events and changes associated with behaviour. Biological psychology emerged from scientific and philosophical traditions of the 18th and 19th centuries, including the ideas of William James (1890), who argued that psychological science should be grounded in biology.

Biological psychology applies the principles of biology to the study of mental processes and behaviour. Psychologists in this framework study human behaviours that are both different and alike.

Genetic and evolutionary approaches inform the *nature versus nurture* debate and seek to determine the origins of behavioural traits as being either biological or due to environment. Both frameworks contribute to the question, 'why do we behave the way we do?"

The genetic influence on behavior is a relatively recent discovery. Behavioural genetics is an interdisciplinary field concerned with how genes and the environment influence individual behaviour and traits including brain function.

Human genetic code is unique and sets us apart from other species, but the focus of this field is on the genetic bases of individual *difference* in how we think and act.

Our code involves genes, located on chromosomes, which are the rod-shaped structures found in the centre or 'nucleus' of every cell of the body. This genetic material is composed of thread-like strands of deoxyribonucleic acid or 'DNA'. DNA refers to the chromosomal molecule that transfers genetic characteristics by way of coded instructions.

Cells that develop from the union of sperm and ova (egg) will produce a karyotype of 46 chromosomes arranged in 23 pairs that an individual will inherit at conception. 22 of the pairs are autosomal chromosomes and one pair consists of two sex chromosomes.

DNA contains the four nucleotides adenine, cytosine, guanine, and thymine. Each coded gene is a unique combination of the four nucleotides, abbreviated using the first letter of each (A, C, G, T).

Gene sequences are responsible for guiding the process that creates the structure of proteins. Genes provide the instructions to make the proteins that we need to carry out life functions. Proteins make up our physical structures and regulate development and physiological process throughout the lifespan.

Some genes contribute directly to the development of individual traits while others are inherited in the same way for all humans. Offspring will inherit a combination of dominant and recessive alleles, the variations of a given gene, from their parents. The variation is sometimes observable as in the case of the interaction and variation of the genes involved in eye color.

The sum of this inherited information is called genotype. Genotype represent the unique set of genes that comprise an individual's unique code. Heredity also results in phenotype, which refers to the inherited physical traits and behavioural characteristics that show genetic variation in attributes like eye colour, height, and body weight, and personality and intelligence as well. Error in copying the original DNA sequence during division of sperm and egg cells are referred to as mutations that result from environmental hazards, toxins, and radiation.

Heredity and environment are constantly interacting to influence our psychological and physical traits. Genes affect the kind of experiences we have but experience also affects our genes.

Epigenetics is the study of heritable changes in gene expression that does not involve changes to the underlying DNA sequence. Epigenetic research seeks to understand the influence of genes on our behaviour and mental processes, and how the environment affects our genes, and influences their expression through biological mechanisms that switch them on and off. Epigenetics research also helps us to understand that the influence of nature and nurture on behaviour is more than an either-or equation.

While our genetic code is found in the nucleus of most of the cells in our body, cells also contain noncoding DNA that contributes indirectly to a trait by switching certain genes on or off over the course of a lifetime. Genes also contain information about environmental factors that influence whether a gene is 'expressed' or stays inactive. Whether a gene is expressed or not depends on heredity *and* environment.

Behavioural genomics is a complementary interdisciplinary field in the study of DNA, inherited traits, and the ways in which specific genes are related to behaviour. This perspective involves a shift in focus away from the influence of specific *individual* genes to genome, which refers to an organism's complete set of genes in each cell with the exceptions of sperm and egg cells.

Genetics research involves looking at markers across complete sets of DNA or genome, in the cells of many people to identify genetic variations associated with a disease or disorder.

Behavioural genomics research questions the role of genomes, genetics, heritability, and environmental factors as main contributors to behaviour. Research in this framework addresses the *differences* between genotypes of groups of people in order to determine and better understand the relevance of genome to health conditions in the population.

Researchers examine the influence of genomes on behaviour to understand the heritability of traits, and which genomes cause certain conditions. The technology behind the Human Genome Project has opened doors for research on complex diseases and behaviours affecting human populations including mental illness

Researchers are also interested in the interaction of *multiple genes* and numerous environmental factors that influence human behaviour. The *Human Genome Project*, for example, involves classifying the sequences of billions of nucleotides (ACGT) making up the genes. Between 20,000 to 25,000 genes have been identified in scientific research so far.

Behavioural genetics researchers use the methods of twin and adoption studies to calculate heritability, which is a measure of variability of behavioural traits among individuals that can be accounted for by genetic factors. Variability in IQ scores, for example, can be denoted by a heritability coefficient**,** which is a statistic expressed as a number between zero and one that represents the degree to which genetic differences between individuals contribute to individual differences in a behaviour or trait found in a population. This method is used to compare people of different levels of relatedness and measure any similarities or resemblance for a specific trait of interest.

Behavioural genomics research also involves twin studies to identify specific genes than can be linked to behavioural phenotypes.

Linkage mapping is also used to indicate the order of genes on a chromosome in behavioural genetics research.

The Candidate Gene approach involves assessing the impact of genes on inherited disorders by comparing the genome of people who express a trait or behaviour with those who do not.

Whole-genome association like the Human Genome and HapMap studies are undertaken with the goal of better detection, treatment, and prevention of physical and mental disease.

While behavioural genetics and genomics perspectives focus on the roles of genes, heredity, and environment in explaining individual differences in behaviour, researchers in evolutionary psychology concentrate on the evolutionary mechanisms that might explain the commonalities that aid in our survival and reproductive success, including human cognition, development, emotion, and social practices.

The focus of the evolutionary perspective is on the genetic dispositions that shape our similarities relating to survival and reproductive success. It is an approach that interprets and explains modern human behaviour in terms of forces acting upon our distant ancestors.

Evolutionary psychology is a field of psychology that emphasizes the evolutionary mechanisms at work in the commonalities of human behaviour including cognition, emotion, development, and social practice.

An evolutionary approach aims to interpret and explain modern human behaviour in terms of how our brains and behaviours have been shaped by the physical and social environment encountered by our ancestors, and the forces that acted upon them.

Genes hold messages about the past and our shared evolutionary heritage. While researchers in the perspectives of behavioural genetics and genomics search for the influence of genetics on human differences, evolutionary psychologists look for the genetic bases of our similarities.

The theories of Charles Darwin have a profound influence on evolutionary psychology. Natural selection and sexual selection are theories developed through his observations of the fitness of a species' characteristics to its environment.

Natural selection refers to the ability for a species to adapt to its environment, find food and water, and mate in order to stay alive long enough to reproduce and pass on genetic traits favorable to that setting. When this pattern continues, more offspring are born

with adaptive traits that are 'selected' by reproductive success and spread throughout the species. In this theory, Darwin proposed that nature determines the fate of genes in terms of which genes survive and reproduce. Species without adaptive traits are more likely to die before being able to reproduce and if this pattern continues, the species will eventually disappear.

Gene selection theory is a modern theory of evolution by selection, that suggests differential gene replication is the defining process of evolutionary change. Evolution through natural selection requires a trait to be heritable, and individuals within the breeding population must have a reproductive advantage for having the trait. If there is an environmental pressure – a change in climate or shortage of food for example – a certain trait may be better suited to survival and this will produce an increase in that trait within a population.

Darwin's theories can be applied to human behavior as well. All modern species are versions of the species that were the 'fittest' for their specific time and environment. Humans have several innate physical adaptations or traits that we are either born with or develop quickly thanks to the evolution of our species that enhance the chance of our survival. We have the physical ability to respond to temperature including sweat glands and shivering mechanisms. We crave foods rich in vitamins, fats, and sugars. We have a fear response to snakes, spiders, darkness, heights, and strangers.

Humans also have a 'thinking' capacity to solve inevitable problems with creative solutions regarding our survival and reproduction. The human brain contains specialized adaptations for performing certain cognitive and behavioural functions including perception.

What makes *Homo sapiens* stand out in evolutionary history is our roomy prefrontal cortex. This extra space enabled the development of more brain cells, which led to higher cognitive functions including logic and intelligence. The ability to calculate and 'think' our way out of challenging situations helped our ancestors overcome environmental problems.

Evolutionary useful behaviors have had a beneficial function in the cognitive development of our species. The brain, for example, has a set of cognitive adaptations for solving problems related to survival and reproductive fitness. A guiding assumption among many evolutionary psychologists is that the human mind developed as a collection of mental modules to help handle specific survival problems.

Error management theory (EMT) is a theory that deals with the evolution of how we think and evaluate certain situations to minimize costly mistakes that can cause death or damage, and impact on our survival and the ability to reproduce. We psychologically adapt to make choices that minimize a 'cost' in judgement, or error. Visual descent illusion, auditory looming bias, and sexual overperception bias are all examples of psychological adaptations in this regard.

All modern species are versions of the species that were the 'fittest' for their specific time and environment. Humans have several innate traits that we are either born with or develop quickly thanks to the evolution of our species. We pass physical and behavioural traits from one generation to the next through sexual reproduction. The ability to anticipate and solve problems helped our ancestors overcome food shortages and other environmental problems. Individuals with these advantageous traits are more likely to survive and reproduce offspring with similar genes.

Humans also have adaptations for reproduction as proposed in Darwin's sexual selection theory. Sexual selection theory attempts to explain the fate of genes by suggesting that certain traits evolve to help some individuals increase their chances of mating and passing on their genes. Members of the same sex will compete for access to the other sex in a process called intrasexual selection.

Intersexual selection refers to the influence of physical factors signalling reproductive health and fitness, including a preference for youthful and beautiful females for males, and a preference for tall and muscular males by females.

Cultural factors are also important influences for female preferences including love, kindness, and social security.

Evolutionary research on attraction also highlights the importance of facial symmetry as an indicator of reproductive health in mate selection and reproduction.

Members of the same sex will compete for access to the other sex in a process called intrasexual selection.

Sexual strategies theory is a comprehensive evolutionary theory of human mating that defines the menu of mating strategies humans pursue, the adaptive problems women and men face when pursuing these strategies, and the evolved solutions to these mating problems.

Sexual overperception bias is a mating theory that suggests that males often misread sexual interest from women to prevent the costs of missing out on an opportunity for reproduction.

Evolutionary research on attraction highlights the importance of facial symmetry to mate selection and reproduction. Humans are genetically programmed to have, and to recognize symmetrical features. There is no sex difference in mate selection behaviour in this context.

An evolutionary psychologist would suggest that an individual with a symmetrical face is more likely to be fertile and in possession of good genes. Symmetry signals health to a potential mate, however, sometimes disease or environmental factors slightly alter facial symmetry.

Sociobiology contends that evolution has given us a genetic tendency to act in ways that maximize our chances of passing on our genes onto the next generations. Psychological traits are thought to be 'selected' to aid individuals in propagating their genes. Male and female problem-solving skills sometimes differ because of different survival issues. Physical characteristics often play a role in initial attraction and influence our desire to approach. For example, humans show a preference for body symmetry in mate selection. Sex role socialization appears to be another factor in mate selection in American samples.

One notable field is the study of sex differences in cognitive abilities examined in the framework of hunter-gatherer theory. Hunter-gatherer theory illustrates sex differences and suggests that our labour was divided based on sex as a means of survival. This theory suggests that males hunted, and females gathered because of physical and behavioural skills that are reproductively fit to this environment. Also, that the competencies selected for during the process of human evolution are still present today, including cognitive abilities and tasks with varying results.

The hunter-gather theory of human spatial sex differences starts from the premise that most of our time on earth has been spent living on the lands of the African savannah. In this environment, our labour was divided based on sex. Because of their size and strength, males took on the role of hunter and tracker of animals, and females remained closer to the home to care for children and gather plants and medicines rich in the vitamins needed for health.

Sex roles required individuals to use certain behavioural skills or 'competencies' needed to thrive and survive in their environment). Males required stamina and good wayfaring, orienteering, and spatial skills to be able to travel great distances without getting lost, as well as good coordination for throwing weapons used in the hunt. Females had to have good memory for the location and variety of edible plants. The theory further suggests that males with good spatial skills and females with good location memory would have been more successful or 'fit' to this environment, than males and females without these skills.

Biopsychosocial theory takes a complex approach to understanding human behaviour. Aspects of biology (genes), psychological components (thoughts, personality, mood), and social conditions (family support, stress, culture) are all considered in analyses of why we do what we do from this perspective. Research on specialized adaptation also relates to how the brain processes attraction. Cross-cultural studies have found "universals" in feelings of attraction.

Research in the evolutionary perspective also applies the principles of biology to the study of human behaviour. Evolutionary psychologists start from the position that cognitive structures are designed by natural selection to serve survival and reproduction. From this perspective, hearing, smell, vision, pain, and motor control are examined as functions of the nervous system that have been involved in survival and reproduction for thousands of generations and years.

Key Terms

- Adaptations
- Adoption study
- Behavioral genetics
- Chromosomes
- DNA methylation
- DNA Methyltransferases (DNMTs)
- Error Management Theory (EMT)
- Epigenetics
- Epigenome
- Evolution
- Family study
- Gene
- Gene Selection Theory
- Genotype
- Heritability
- Heritability Coefficient
- Histone Acetyltransferases (HATs) and Histone Deacetylases (HDACs)
- Histone modifications
- Identical twins
- Instincts
- Intrasexual competition
- Intersexual selection
- Knocked out
- Molecular genetics
- Natural selection
- Nonshared environment
- Phenotype
- Physiological adaptations
- Psychological adaptations
- Sexual selection
- Shared environment
- Twin studies
- Quantitative genetics

Self-Test

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CHAPTER OVERVIEW

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5.1: Introduction

Charles Stangor and Jennifer Walinga

Did a Neurological Disorder Cause a Musician to Compose Boléro and an Artist to Paint It 66 Years Later?

In 1986, Anne Adams was working as a cell biologist at the University of Toronto in Ontario, Canada. She took a leave of absence from her work to care for a sick child, and while she was away, she completely changed her interests, dropping biology entirely and turning her attention to art. In 1994 she completed her painting *Unravelling Boléro*, a translation of Maurice Ravel's famous orchestral piece onto canvas. As you can see on the *New Scientist* website (https://images.newscientist.com/wp-content/uploads/2008/04/dn13599-1_567.jpg), this artwork is filled with themes of repetition. Each bar of music is represented by a lacy vertical figure, with the height representing volume, the shape representing note quality, and the colour representing the music's pitch. Like Ravel's music (see the video below), which is a hypnotic piece consisting of two melodial themes repeated eight times over 340 musical bars, the theme in the painting repeats and builds, leading to a dramatic change in colour from blue to orange and pink, a representation of *Boléro*'s sudden and dramatic climax.

Video: *Maurice Ravel's composition Boléro (1928)* [http://www.youtube.com/watch?v=3-4J5j74VPw]. This is a video clip of Maurice Ravel's Boléro, composed in 1928 during the early phase of his illness.



Shortly after finishing the painting, Adams began to experience behavioural problems, including increased difficulty speaking. Neuroimages of Adams's brain taken during this time show that regions in the front part of her brain, which are normally associated with language processing, had begun to deteriorate, while at the same time, regions of the brain responsible for the integration of information from the five senses were unusually well developed (Seeley et al., 2008). The deterioration of the frontal cortex is a symptom of *frontotemporal dementia*, a disease that is associated with changes in artistic and musical tastes and skills (Miller, Boone, Cummings, Read, & Mishkin, 2000), as well as with an increase in repetitive behaviours (Aldhous, 2008).

What Adams did not know at the time was that her brain may have been undergoing the same changes that Ravel's had undergone 66 years earlier. In fact, it appears that Ravel may have suffered from the same neurological disorder. Ravel

composed *Boléro* at age 53, when he himself was beginning to show behavioural symptoms that were interfering with his ability to move and speak. Scientists have concluded, based on an analysis of his written notes and letters, that Ravel was also experiencing the effects of frontotemporal dementia (Amaducci, Grassi, & Boller, 2002). If Adams and Ravel were both affected by the same disease, this could explain why they both became fascinated with the repetitive aspects of their arts, and it would present a remarkable example of the influence of our brains on behaviour.

Every behaviour begins with biology. Our behaviours, as well as our thoughts and feelings, are produced by the actions of our brains, nerves, muscles, and glands. In this chapter we will begin our journey into the world of psychology by considering the biological makeup of the human being, including the most remarkable of human organs—the brain. We'll consider the structure of the brain and also the methods that psychologists use to study the brain and to understand how it works.

We will see that the body is controlled by an information highway known as the **nervous system**, *a collection of hundreds of billions of specialized and interconnected cells through which messages are sent between the brain and the rest of the body*. The nervous system consists of the **central nervous system (CNS)**, *made up of the brain and the spinal cord*, and the **peripheral nervous system (PNS)**, *the neurons that link the CNS to our skin, muscles, and glands*. And we will see that our behaviour is also influenced in large part by the **endocrine system**, *the chemical regulator of the body that consists of glands that secrete hormones*.

Although this chapter begins at a very low level of explanation, and although the topic of study may seem at first to be far from the everyday behaviours that we all engage in, a full understanding of the biology underlying psychological processes is an important cornerstone of your new understanding of psychology. We will consider throughout the chapter how our biology influences important human behaviours, including our mental and physical health, our reactions to drugs, as well as our aggressive responses and our perceptions of other people. This chapter is particularly important for contemporary psychology because the ability to measure biological aspects of behaviour, including the structure and function of the human brain, is progressing rapidly, and understanding the biological foundations of behaviour is an increasingly important line of psychological study.

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5.2: The Neuron Is the Building Block of the Nervous System

Charles Stangor and Jennifer Walinga

Learning Objectives

- Describe the structure and functions of the neuron.
- Draw a diagram of the pathways of communication within and between neurons.
- List three of the major neurotransmitters and describe their functions.

The nervous system is composed of more than 100 billion cells known as *neurons*. A **neuron** is *a cell in the nervous system whose function it is to receive and transmit information*. As you can see in Figure 5.1, "Components of the Neuron," neurons are made up of three major parts: a cell body, or **soma**, which *contains the nucleus of the cell and keeps the cell alive*; a branching treelike fibre known as the **dendrite**, which *collects information from other cells and sends the information to the soma*; and a long, segmented fibre known as the **axon**, which *transmits information away from the cell body toward other neurons or to the muscles and glands*. Figure 5.2 shows a photograph of neurons taken using confocal microscopy.

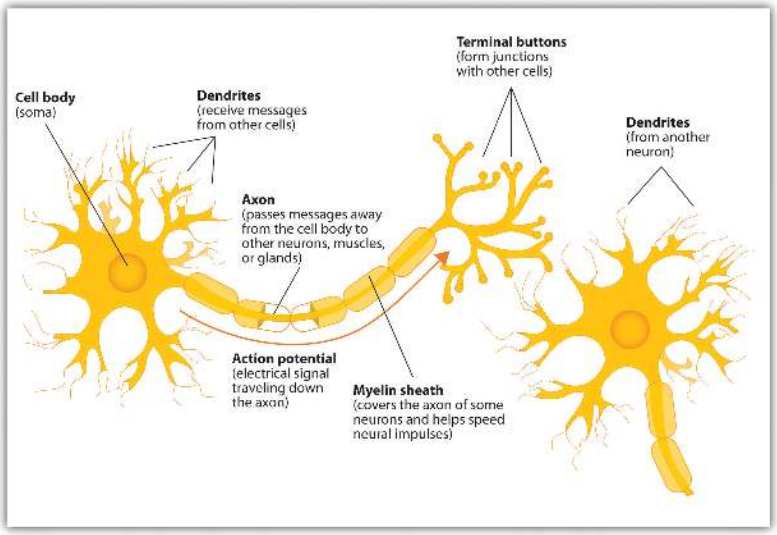


Figure 5.1 Components of the Neuron.

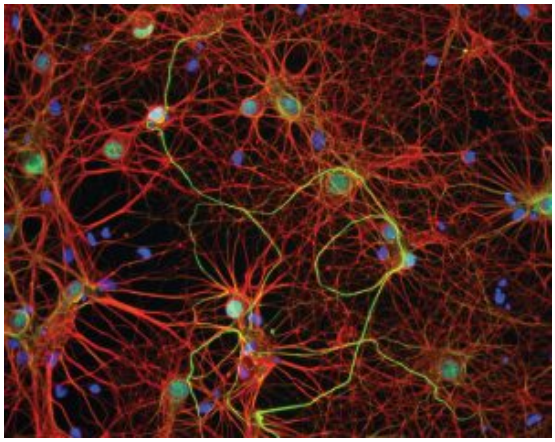


Figure 5.2 The nervous system, including the brain, is made up of billions of interlinked neurons. This vast interconnected web is responsible for all human thinking, feeling, and behaviour.

Some neurons have hundreds or even thousands of dendrites, and these dendrites may themselves be branched to allow the cell to receive information from thousands of other cells. The axons are also specialized, and some, such as those that send messages from the spinal cord to the muscles in the hands or feet, may be very long — even up to several feet in length. To improve the speed of their communication, and to keep their electrical charges from shorting out with other neurons, axons are often surrounded by a *myelin sheath*. The **myelin sheath** is *a layer of fatty tissue surrounding the axon of a neuron that both acts as an insulator and allows faster transmission of the electrical signal*. Axons branch out toward their ends, and at the tip of each branch is a *terminal button*.

Neurons Communicate Using Electricity and Chemicals

The nervous system operates using an *electrochemical* process. An electrical charge moves through the neuron itself, and chemicals are used to transmit information between neurons. Within the neuron, when a signal is received by the dendrites, it is transmitted to the soma in the form of an electrical signal, and, if the signal is strong enough, it may then be passed on to the axon and then to the terminal buttons. If the signal reaches the terminal buttons, they are signalled to emit chemicals known as *neurotransmitters*, which communicate with other neurons across the spaces between the cells, known as *synapses*.

Video: *The Electrochemical Action of the Neuron* [https://www.youtube.com/watch?v=TKG0MtH5crc]. This video clip shows a model of the electrochemical action of the neuron and neurotransmitters.



The electrical signal moves through the neuron as a result of changes in the electrical charge of the axon. Normally, the axon remains in the **resting potential**, *a state in which the interior of the neuron contains a greater number of negatively charged ions than does the area outside the cell*. When the segment of the axon that is closest to the cell body is stimulated by an electrical signal from the dendrites, and if this electrical signal is strong enough that it passes a certain level or *threshold*, the cell membrane in this first segment opens its gates, allowing positively charged sodium ions that were previously kept out to enter. This *change in electrical charge that occurs in a neuron when a nerve impulse is transmitted* is known as the **action potential**. Once the action

potential occurs, the number of positive ions exceeds the number of negative ions in this segment, and the segment temporarily becomes positively charged.

As you can see in Figure 5.3, “The Myelin Sheath and the Nodes of Ranvier,” the axon is segmented by a series of *breaks between the sausage-like segments of the myelin sheath*. Each of these gaps is a **node of Ranvier**.[1] The electrical charge moves down the axon from segment to segment, in a set of small jumps, moving from node to node. When the action potential occurs in the first segment of the axon, it quickly creates a similar change in the next segment, which then stimulates the next segment, and so forth as the positive electrical impulse continues all the way down to the end of the axon. As each new segment becomes positive, the membrane in the prior segment closes up again, and the segment returns to its negative resting potential. In this way the action potential is transmitted along the axon, toward the terminal buttons. The entire response along the length of the axon is very fast — it can happen up to 1,000 times each second.

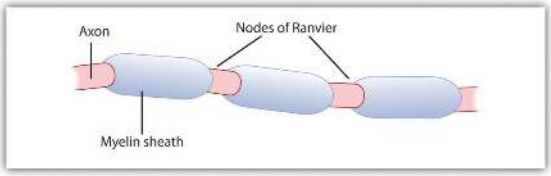


Figure 5.3 The Myelin Sheath and the Nodes of Ranvier. The myelin sheath wraps around the axon but also leaves small gaps called the nodes of Ranvier. The action potential jumps from node to node as it travels down the axon.

An important aspect of the action potential is that it operates in an *all or nothing* manner. What this means is that the neuron either fires completely, such that the action potential moves all the way down the axon, or it does not fire at all. Thus neurons can provide more energy to the neurons down the line by firing faster but not by firing more strongly. Furthermore, the neuron is prevented from repeated firing by the presence of a **refractory period** — *a brief time after the firing of the axon in which the axon cannot fire again because the neuron has not yet returned to its resting potential.*

Neurotransmitters: The Body’s Chemical Messengers

Not only do the neural signals travel via electrical charges *within* the neuron, but they also travel via chemical transmission *between* the neurons. Neurons are separated by junction areas known as **synapses**,[2] *areas where the terminal buttons at the end of the axon of one neuron nearly, but don’t quite, touch the dendrites of another*. The synapses provide a remarkable function because they allow each axon to communicate with many dendrites in neighbouring cells. Because a neuron may have synaptic connections with thousands of other neurons, the communication links among the neurons in the nervous system allow for a highly sophisticated communication system.

When the electrical impulse from the action potential reaches the end of the axon, it signals the terminal buttons to release *neurotransmitters* into the synapse. A **neurotransmitter** is *a chemical that relays signals across the synapses between neurons*. Neurotransmitters travel across the synaptic space between the terminal button of one neuron and the dendrites of other neurons, where they bind to the dendrites in the neighbouring neurons. Furthermore, different terminal buttons release different neurotransmitters, and different dendrites are particularly sensitive to different neurotransmitters. The dendrites will admit the neurotransmitters only if they are the right shape to fit in the receptor sites on the receiving neuron. For this reason, the receptor sites and neurotransmitters are often compared to a lock and key (Figure 5.4, “The Synapse”).

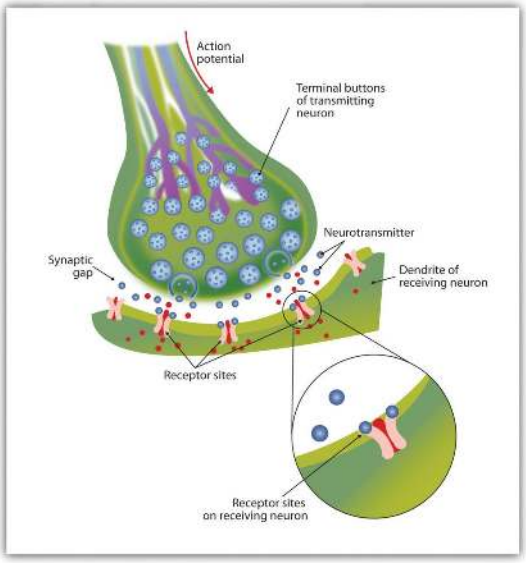


Figure 5.4 The Synapse. When the nerve impulse reaches the terminal button, it triggers the release of neurotransmitters into the synapse. The neurotransmitters fit into receptors on the receiving dendrites in the manner of a lock and key.

When neurotransmitters are accepted by the receptors on the receiving neurons, their effect may be either **excitatory** (i.e., *they make the cell more likely to fire*) or **inhibitory** (i.e., *they make the cell less likely to fire)*. Furthermore, if the receiving neuron is able to accept more than one neurotransmitter, it will be influenced by the excitatory and inhibitory processes of each. If the excitatory effects of the neurotransmitters are greater than the inhibitory influences of the neurotransmitters, the neuron moves closer to its firing threshold; if it reaches the threshold, the action potential and the process of transferring information through the neuron begins.

Neurotransmitters that are not accepted by the receptor sites must be removed from the synapse in order for the next potential stimulation of the neuron to happen. This process occurs in part through the breaking down of the neurotransmitters by enzymes, and in part through **reuptake**, *a process in which neurotransmitters that are in the synapse are reabsorbed into the transmitting terminal buttons, ready to again be released after the neuron fires*.

More than 100 chemical substances produced in the body have been identified as neurotransmitters, and these substances have a wide and profound effect on emotion, cognition, and behaviour. Neurotransmitters regulate our appetite, our memory, our emotions, as well as our muscle action and movement. And as you can see in Table 5.1, “The Major Neurotransmitters and Their Functions,” some neurotransmitters are also associated with psychological and physical diseases.

Drugs that we might ingest — either for medical reasons or recreationally — can act like neurotransmitters to influence our thoughts, feelings, and behaviour. An **agonist** is *a drug that has chemical properties similar to a particular neurotransmitter and thus mimics the effects of the neurotransmitter*. When an agonist is ingested, it binds to the receptor sites in the dendrites to excite the neuron, acting as if more of the neurotransmitter had been present. As an example, cocaine is an agonist for the neurotransmitter dopamine. Because dopamine produces feelings of pleasure when it is released by neurons, cocaine creates similar feelings when it is ingested. An antagonist is *a drug that reduces or stops the normal effects of a neurotransmitter*. When an **antagonist** is ingested, it binds to the receptor sites in the dendrite, thereby blocking the neurotransmitter. As an example, the poison curare is an antagonist for the neurotransmitter acetylcholine. When the poison enters the brain, it binds to the dendrites, stops communication among the neurons, and usually causes death. Still other drugs work by blocking the reuptake of the neurotransmitter itself — when reuptake is reduced by the drug, more neurotransmitter remains in the synapse, increasing its action.

Table 5.1 The Major Neurotransmitters and Their Functions

Neurotransmitter	Description and function	Notes
Acetylcholine (ACh)	A common neurotransmitter used in the spinal cord and motor neurons to stimulate muscle contractions. It's also used in the brain to regulate memory, sleeping, and dreaming.	Alzheimer's disease is associated with an undersupply of acetylcholine. Nicotine is an agonist that acts like acetylcholine.
Dopamine	Involved in movement, motivation, and emotion, Dopamine produces feelings of pleasure when released by the brain's reward system, and it's also involved in learning.	Schizophrenia is linked to increases in dopamine, whereas Parkinson's disease is linked to reductions in dopamine (and dopamine agonists may be used to treat it).
Endorphins	Released in response to behaviours such as vigorous exercise, orgasm, and eating spicy foods.	Endorphins are natural pain relievers. They are related to the compounds found in drugs such as opium, morphine, and heroin. The release of endorphins creates the runner's high that is experienced after intense physical exertion.
GABA (gamma-aminobutyric acid)	The major inhibitory neurotransmitter in the brain.	A lack of GABA can lead to involuntary motor actions, including tremors and seizures. Alcohol stimulates the release of GABA, which inhibits the nervous system and makes us feel drunk. Low levels of GABA can produce anxiety, and GABA agonists (tranquilizers) are used to reduce anxiety.
Glutamate	The most common neurotransmitter, it's released in more than 90% of the brain's synapses. Glutamate is found in the food additive MSG (monosodium glutamate).	Excess glutamate can cause overstimulation, migraines, and seizures.
Serotonin	Involved in many functions, including mood, appetite, sleep, and aggression.	Low levels of serotonin are associated with depression, and some drugs designed to treat depression (known as selective serotonin reuptake inhibitors, or SSRIs) serve to prevent their reuptake.

Key Takeaways

- The central nervous system (CNS) is the collection of neurons that make up the brain and the spinal cord.
- The peripheral nervous system (PNS) is the collection of neurons that link the CNS to our skin, muscles, and glands.
- Neurons are specialized cells, found in the nervous system, which transmit information. Neurons contain a dendrite, a soma, and an axon.
- Some axons are covered with a fatty substance known as the myelin sheath, which surrounds the axon, acting as an insulator and allowing faster transmission of the electrical signal.
- The dendrite is a treelike extension that receives information from other neurons and transmits electrical stimulation to the soma.
- The axon is an elongated fibre that transfers information from the soma to the terminal buttons.
- Neurotransmitters relay information chemically from the terminal buttons and across the synapses to the receiving dendrites using a lock and key type of system.
- The many different neurotransmitters work together to influence cognition, memory, and behaviour.

- Agonists are drugs that mimic the actions of neurotransmitters, whereas antagonists are drugs that block the actions of neurotransmitters.

Exercises and Critical Thinking

1. Draw a picture of a neuron and label its main parts.
2. Imagine an action that you engage in every day and explain how neurons and neurotransmitters might work together to help you engage in that action.

Image Attributions

Figure 5.2: "Confocal microscopy of mouse brain, cortex" by ZEISS Microscopy (http://www.flickr.com/photos/zeissmi...n/photostream/) used under CC BY-NC-ND 2.0 (http://creativecommons.org/licenses/...2.0/deed.en_CA) license.

Footnotes

1. The break in the myelin sheath of a nerve fibre.
2. The small gap between neurons across which nerve impulses are transmitted.

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5.3: Our Brains Control Our Thoughts, Feelings, and Behaviour

Charles Stangor and Jennifer Walinga

Learning Objectives

- Describe the structures and function of the "old brain" and its influence on behaviour.
- Explain the structure of the cerebral cortex (its hemispheres and lobes) and the function of each area of the cortex.
- Define the concepts of brain plasticity, neurogenesis, and brain lateralization.

If you were someone who understood brain anatomy and were to look at the brain of an animal that you had never seen before, you would nevertheless be able to deduce the likely capacities of the animal. This is because the brains of all animals are very similar in overall form. In each animal the brain is layered, and the basic structures of the brain are similar (see Figure 5.5, "The Major Structures in the Human Brain"). The innermost structures of the brain — the parts nearest the spinal cord — are the oldest part of the brain, and these areas carry out the same functions they did for our distant ancestors. The "old brain" regulates basic survival functions, such as breathing, moving, resting, and feeding, and creates our experiences of emotion. Mammals, including humans, have developed further brain layers that provide more advanced functions — for instance, better memory, more sophisticated social interactions, and the ability to experience emotions. Humans have a very large and highly developed outer layer known as the *cerebral cortex* (see Figure 5.6, "Cerebral Cortex"), which makes us particularly adept at these processes.

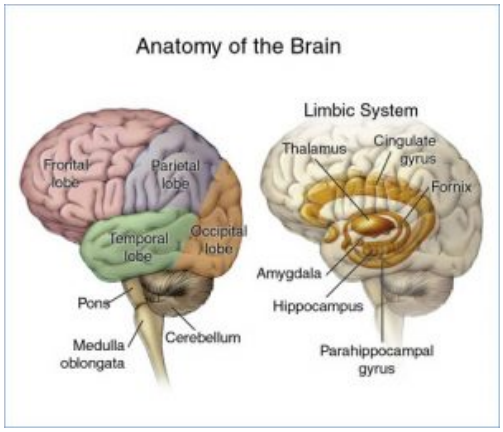


Figure 5.5 The Major Structures in the Human Brain.

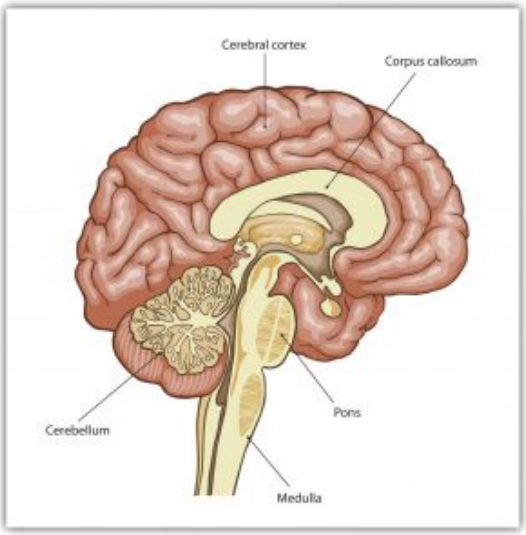


Figure 5.6 Cerebral Cortex. Humans have a very large and highly developed outer brain layer known as the cerebral cortex. The cortex provides humans with excellent memory, outstanding cognitive skills, and the ability to experience complex emotions.

The Old Brain: Wired for Survival

The **brain stem** is *the oldest and innermost region of the brain*. It's designed to control the most basic functions of life, including breathing, attention, and motor responses (Figure 5.7, "The Brain Stem and the Thalamus"). The brain stem begins where the spinal cord enters the skull and forms the **medulla**, *the area of the brain stem that controls heart rate and breathing*. In many cases the medulla alone is sufficient to maintain life — animals that have the remainder of their brains above the medulla severed are still able to eat, breathe, and even move. The spherical shape above the medulla is the **pons**, *a structure in the brain stem that helps control the movements of the body, playing a particularly important role in balance and walking*.

Running through the medulla and the pons is a long, narrow network of neurons known as the **reticular formation**. The job of the reticular formation is to filter out some of the stimuli that are coming into the brain from the spinal cord and to relay the remainder of the signals to other areas of the brain. The reticular formation also plays important roles in walking, eating, sexual activity, and sleeping. When electrical stimulation is applied to the reticular formation of an animal, it immediately becomes fully awake, and when the reticular formation is severed from the higher brain regions, the animal falls into a deep coma.

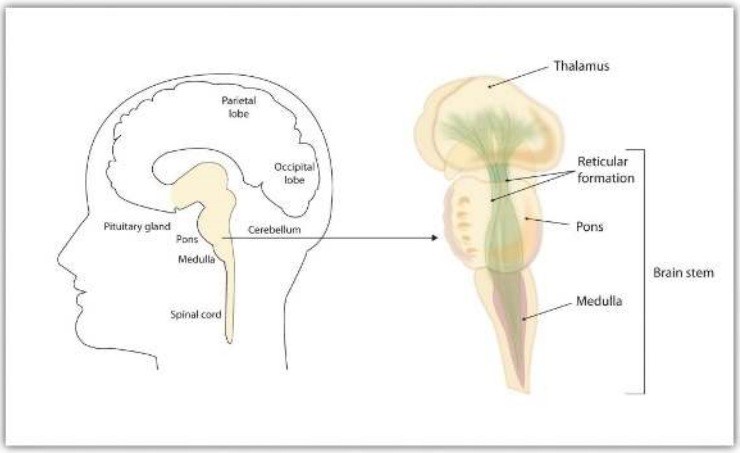


Figure 5.7 The Brain Stem and the Thalamus. The brain stem is an extension of the spinal cord, including the medulla, the pons, the thalamus, and the reticular formation.

Above the brain stem are other parts of the old brain that also are involved in the processing of behaviour and emotions (see Figure 5.8, "The Limbic System"). The **thalamus** is *the egg-shaped structure above the brain stem that applies still more filtering to the sensory information that is coming up from the spinal cord and through the reticular formation, and it relays some of these remaining signals to the higher brain levels* (Sherman & Guillery, 2006). The thalamus also receives some of the higher brain's replies, forwarding them to the medulla and the cerebellum. The thalamus is also important in sleep because it shuts off incoming signals from the senses, allowing us to rest.

Figure 5.8 The Limbic System. This diagram shows the major parts of the limbic system, as well as the pituitary gland, which is controlled by it.

The **cerebellum** (literally, "little brain") *consists of two wrinkled ovals behind the brain stem. It functions to coordinate voluntary movement*. People who have damage to the cerebellum have difficulty walking, keeping their balance, and holding their hands steady. Consuming alcohol influences the cerebellum, which is why people who are drunk have more difficulty walking in a straight line. Also, the cerebellum contributes to emotional responses, helps us discriminate between different sounds and textures, and is important in learning (Bower & Parsons, 2003).

Whereas the primary function of the brain stem is to regulate the most basic aspects of life, including motor functions, the *limbic system* is largely responsible for memory and emotions, including our responses to reward and punishment. The **limbic system** is *a brain area, located between the brain stem and the two cerebral hemispheres, that governs emotion and memory. It includes the amygdala, the hypothalamus, and the hippocampus*.

The **amygdala** *consists of two "almond-shaped" clusters (amygdala comes from the Latin word for "almond") and is primarily responsible for regulating our perceptions of, and reactions to, aggression and fear*. The amygdala has connections to other bodily systems related to fear, including the sympathetic nervous system (which we will see later is important in fear responses), facial responses (which perceive and express emotions), the processing of smells, and the release of neurotransmitters related to stress and aggression (Best, 2009). In one early study, Klüver and Bucy (1939) damaged the amygdala of an aggressive rhesus monkey. They found that the once angry animal immediately became passive and no longer responded to fearful situations with aggressive behaviour. Electrical stimulation of the amygdala in other animals also influences aggression. In addition to helping us experience fear, the amygdala also helps us learn from situations that create fear. When we experience events that are dangerous, the amygdala stimulates the brain to remember the details of the situation so that we learn to avoid it in the future (Sigurdsson, Doyère, Cain, & LeDoux, 2007).

Located just under the thalamus (hence its name), the **hypothalamus** is *a brain structure that contains a number of small areas that perform a variety of functions, including the regulation of hunger and sexual behaviour, as well as linking the nervous system to the endocrine system via the pituitary gland.* Through its many interactions with other parts of the brain, the hypothalamus helps regulate body temperature, hunger, thirst, and sex, and responds to the satisfaction of these needs by creating feelings of pleasure. Olds and Milner (1954) discovered these reward centres accidentally after they had momentarily stimulated the hypothalamus of a rat. The researchers noticed that after being stimulated, the rat continued to move to the exact spot in its cage where the stimulation had occurred, as if it were trying to re-create the circumstances surrounding its original experience. Upon further research into these reward centres, Olds (1958) discovered that animals would do almost anything to re-create enjoyable stimulation, including crossing a painful electrified grid to receive it. In one experiment a rat was given the opportunity to electrically stimulate its own hypothalamus by pressing a pedal. The rat enjoyed the experience so much that it pressed the pedal more than 7,000 times per hour until it collapsed from sheer exhaustion.

The **hippocampus** consists of *two "horns" that curve back from the amygdala*. The hippocampus is important in *storing information in long-term memory*. If the hippocampus is damaged, a person cannot build new memories, living instead in a strange

world where everything he or she experiences just fades away, even while older memories from the time before the damage are untouched.

The Cerebral Cortex Creates Consciousness and Thinking

All animals have adapted to their environments by developing abilities that help them survive. Some animals have hard shells, others run extremely fast, and some have acute hearing. Human beings do not have any of these particular characteristics, but we do have one big advantage over other animals — we are very, very smart.

You might think that we should be able to determine the intelligence of an animal by looking at the ratio of the animal's brain weight to the weight of its entire body. But this does not really work. The elephant's brain is one-thousandth of its weight, but the whale's brain is only one ten-thousandth of its body weight. On the other hand, although the human brain is one-sixtieth of its body weight, the mouse's brain represents one-fortieth of its body weight. Despite these comparisons, elephants do not seem 10 times smarter than whales, and humans definitely seem smarter than mice.

The key to the advanced intelligence of humans is not found in the size of our brains. What sets humans apart from other animals is our larger **cerebral cortex** — *the outer bark-like layer of our brain that allows us to so successfully use language, acquire complex skills, create tools, and live in social groups* (Gibson, 2002). In humans, the cerebral cortex is wrinkled and folded, rather than smooth as it is in most other animals. This creates a much greater surface area and size, and allows increased capacities for learning, remembering, and thinking. The folding of the cerebral cortex is referred to as *corticalization*.

Although the cortex is only about one-tenth of an inch thick, it makes up more than 80% of the brain's weight. The cortex contains about 20 billion nerve cells and 300 trillion synaptic connections (de Courten-Myers, 1999). Supporting all these neurons are billions more **glial cells** (glia), *cells that surround and link to the neurons, protecting them, providing them with nutrients, and absorbing unused neurotransmitters*. The glia come in different forms and have different functions. For instance, the myelin sheath surrounding the axon of many neurons is a type of glial cell. The glia are essential partners of neurons, without which the neurons could not survive or function (Miller, 2005).

The cerebral cortex is divided into two *hemispheres*, and each hemisphere is divided into four *lobes*, each separated by folds known as *fissures*. If we look at the cortex starting at the front of the brain and moving over the top (see Figure 5.9, "The Two Hemispheres"), we see first the **frontal lobe** (behind the forehead), *which is responsible primarily for thinking, planning, memory, and judgment*. Following the frontal lobe is the **parietal lobe,** *which extends from the middle to the back of the skull and which is responsible primarily for processing information about touch*. Then comes the **occipital lobe** *at the very back of the skull, which processes visual information*. Finally, in front of the occipital lobe (pretty much between the ears) is the **temporal lobe**, *responsible primarily for hearing and language*.

Figure 5.9 The Two Hemispheres. The brain is divided into two hemispheres (left and right), each of which has four lobes (temporal, frontal, occipital, and parietal). Furthermore, there are specific cortical areas that control different processes.

Functions of the Cortex

When the German physicists Gustav Fritsch and Eduard Hitzig (1870/2009) applied mild electric stimulation to different parts of a dog's cortex, they discovered that they could make different parts of the dog's body move. Furthermore, they discovered an important and unexpected principle of brain activity. They found that stimulating the right side of the brain produced movement in the left side of the dog's body, and vice versa. This finding follows from a general principle about how the brain is structured, called **contralateral control,** meaning *the brain is wired such that in most cases the left hemisphere receives sensations from and controls the right side of the body, and vice versa*.

Figure 5.10 The Sensory Cortex and the Motor Cortex. The portion of the sensory and motor cortex devoted to receiving messages that control specific regions of the body is determined by the amount of fine movement that area is capable of performing. Thus the hand and fingers have as much area in the cerebral cortex as does the entire trunk of the body.

Fritsch and Hitzig also found that the movement that followed the brain stimulation only occurred when they stimulated a specific arch-shaped region that runs across the top of the brain from ear to ear, just at the front of the parietal lobe (see Figure 5.10, "The Sensory Cortex and the Motor Cortex"). Fritsch and Hitzig had discovered the **motor cortex**, *the part of the cortex that controls and executes movements of the body by sending signals to the cerebellum and the spinal cord*. More recent research has mapped the motor cortex even more fully, by providing mild electronic stimulation to different areas of the motor cortex in fully conscious patients while observing their bodily responses (because the brain has no sensory receptors, these patients feel no pain). As you can see in Figure 5.10, "The Sensory Cortex and the Motor Cortex," this research has revealed that the motor cortex is specialized for providing control over the body, in the sense that the parts of the body that require more precise and finer movements, such as the face and the hands, also are allotted the greatest amount of cortical space.

Just as the motor cortex sends out messages to the specific parts of the body, the **somatosensory cortex**, *an area just behind and parallel to the motor cortex at the back of the frontal lobe, receives information from the skin's sensory receptors and the movements of different body parts*. Again, the more sensitive the body region, the more area is dedicated to it in the sensory cortex. Our sensitive lips, for example, occupy a large area in the sensory cortex, as do our fingers and genitals.

Other areas of the cortex process other types of sensory information. The **visual cortex** is *the area located in the occipital lobe (at the very back of the brain) that processes visual information*. If you were stimulated in the visual cortex, you would see flashes of light or colour, and perhaps you remember having had the experience of "seeing stars" when you were hit in, or fell on, the back of your head. The temporal lobe, located on the lower side of each hemisphere, contains the **auditory cortex**, *which is responsible for hearing and language*. The temporal lobe also processes some visual information, providing us with the ability to name the objects around us (Martin, 2007).

The motor and sensory areas of the cortex account for a relatively small part of the total cortex. The remainder of the cortex is made up of **association areas** *in which sensory and motor information is combined and associated with our stored knowledge*.

These association areas are the places in the brain that are responsible for most of the things that make human beings seem human. The association areas are involved in higher mental functions, such as learning, thinking, planning, judging, moral reflecting, figuring, and spatial reasoning.

The Brain Is Flexible: Neuroplasticity

The control of some specific bodily functions, such as movement, vision, and hearing, is performed in specified areas of the cortex, and if these areas are damaged, the individual will likely lose the ability to perform the corresponding function. For instance, if an infant suffers damage to facial recognition areas in the temporal lobe, it is likely that he or she will never be able to recognize faces (Farah, Rabinowitz, Quinn, & Liu, 2000). On the other hand, the brain is not divided up in an entirely rigid way. The brain's neurons have a remarkable capacity to reorganize and extend themselves to carry out particular functions in response to the needs of the organism and to repair damage. As a result, the brain constantly creates new neural communication routes and rewires existing ones. **Neuroplasticity** refers to *the brain's ability to change its structure and function in response to experience or damage*. Neuroplasticity enables us to learn and remember new things and adjust to new experiences.

Our brains are the most "plastic" when we are young children, as it is during this time that we learn the most about our environment. On the other hand, neuroplasticity continues to be observed even in adults (Kolb & Fantie, 1989). The principles of neuroplasticity help us understand how our brains develop to reflect our experiences. For instance, accomplished musicians have a larger auditory cortex compared with the general population (Bengtsson et al., 2005) and also require less neural activity to move their fingers over the keys than do novices (Münte, Altenmüller, & Jäncke, 2002). These observations reflect the changes in the brain that follow our experiences.

Plasticity is also observed when there is damage to the brain or to parts of the body that are represented in the motor and sensory cortexes. When a tumour in the left hemisphere of the brain impairs language, the right hemisphere will begin to compensate to help the person recover the ability to speak (Thiel et al., 2006). And if a person loses a finger, the area of the sensory cortex that previously received information from the missing finger will begin to receive input from adjacent fingers, causing the remaining digits to become more sensitive to touch (Fox, 1984).

Although neurons cannot repair or regenerate themselves as skin or blood vessels can, new evidence suggests that the brain can engage in **neurogenesis**, *the forming of new neurons* (Van Praag, Zhao, Gage, & Gazzaniga, 2004). These new neurons originate deep in the brain and may then migrate to other brain areas, where they form new connections with other neurons (Gould, 2007). This leaves open the possibility that someday scientists might be able to "rebuild" damaged brains by creating drugs that help grow neurons.

Research Focus: Identifying the Unique Functions of the Left and Right Hemisphe

We have seen that the left hemisphere of the brain primarily senses and controls the motor movements on the right side of the body, and vice versa. This fact provides an interesting way to study **brain lateralization** — *the idea that the left and the right hemispheres of the brain are specialized to perform different functions*. Gazzaniga, Bogen, and Sperry (1965) studied a patient, known as W. J., who had undergone an operation to relieve severe seizures. In this surgery, *the region that normally connects the two halves of the brain and supports communication between the hemispheres*, known as the **corpus callosum**, is severed. As a result, the patient essentially becomes a person with two separate brains. Because the left and right hemispheres are separated, each hemisphere develops a mind of its own, with its own sensations, concepts, and motivations (Gazzaniga, 2005).In their research, Gazzaniga and his colleagues tested the ability of W. J. to recognize and respond to objects and written passages that were presented to only the left or to only the right brain hemispheres (see Figure 5.11, "Visual and Verbal Processing in the Split-Brain Patient"). The researchers had W. J. look straight ahead and then flashed, for a fraction of a second, a picture of a geometrical shape to the left of where he was looking. By doing so, they ensured that — because the two hemispheres had been separated — the image of the shape was experienced only in the right brain hemisphere (remember that sensory input from the left side of the body is sent to the right side of the brain). Gazzaniga and his colleagues found that W. J. was able to identify what he had been shown when he was asked to pick the object from a series of shapes, using his left hand, but that he could not do this when the object was shown in the right visual field. On the other hand, W. J. could easily read written material presented in the right visual field (and thus experienced in the left hemisphere) but not when it was presented in the left visual field.

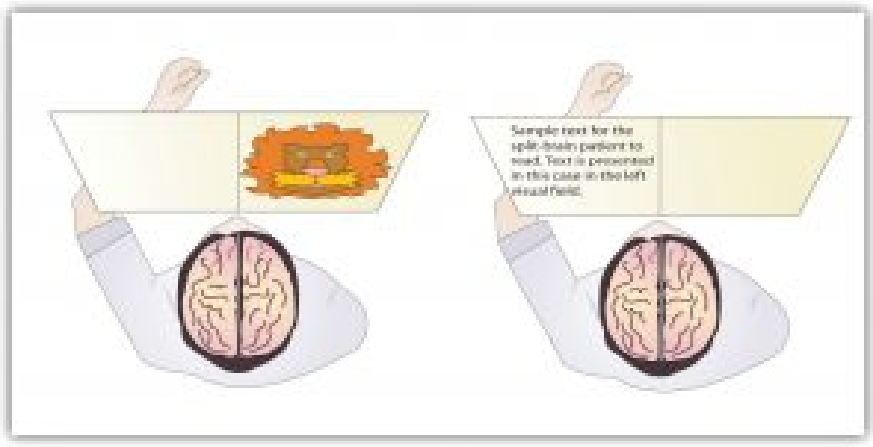


Figure 5.11 Visual and Verbal Processing in the Split-Brain Patient. The information that is presented on the left side of our field of vision is transmitted to the right brain hemisphere, and vice versa. In split-brain patients, the severed corpus callosum does not permit information to be transferred between hemispheres, which allows researchers to learn about the functions of each hemisphere. In the sample on the left, the split-brain patient could not choose which image had been presented because the left hemisphere cannot process visual information. In the sample on the right the patient could not read the passage because the right brain hemisphere cannot process language.

This research, and many other studies following it, has demonstrated that the two brain hemispheres specialize in different abilities. In most people the ability to speak, write, and understand language is located in the left hemisphere. This is why W. J. could read passages that were presented on the right side and thus transmitted to the left hemisphere, but could not read passages that were only experienced in the right brain hemisphere. The left hemisphere is also better at math and at judging time and rhythm. It is also superior in coordinating the order of complex movements — for example, lip movements needed for speech. The right hemisphere, on the other hand, has only very limited verbal abilities, and yet it excels in perceptual skills. The right hemisphere is able to recognize objects, including faces, patterns, and melodies, and it can put a puzzle together or draw a picture. This is why W. J. could pick out the image when he saw it on the left, but not the right, visual field.

Although Gazzaniga's research demonstrated that the brain is in fact lateralized, such that the two hemispheres specialize in different activities, this does not mean that when people behave in a certain way or perform a certain activity they are only using one hemisphere of their brains at a time. That would be drastically oversimplifying the concept of brain differences. We normally use both hemispheres at the same time, and the difference between the abilities of the two hemispheres is not absolute (Soroker et al., 2005).

Psychology in Everyday Life: Why Are Some People Left-Handed?

Across cultures and ethnic groups, about 90% of people are mainly right-handed, whereas only 10% are primarily left-handed (Peters, Reimers, & Manning, 2006). This fact is puzzling, in part because the number of left-handers is so low, and in part because other animals, including our closest primate relatives, do not show any type of handedness. The existence of right-handers and left-handers provides an interesting example of the relationship among evolution, biology, and social factors and how the same phenomenon can be understood at different levels of analysis (Harris, 1990; McManus, 2002).At least some handedness is determined by genetics. Ultrasound scans show that nine out of 10 fetuses suck the thumb of their right hand, suggesting that the preference is determined before birth (Hepper, Wells, & Lynch, 2005), and the mechanism of transmission has been linked to a gene on the X chromosome (Jones & Martin, 2000). It has also been observed that left-handed people are likely to have fewer children, and this may be in part because the mothers of left-handers are more prone to miscarriages and other prenatal problems (McKeever, Cerone, Suter, & Wu, 2000).

But culture also plays a role. In the past, left-handed children were forced to write with their right hands in many countries, and this practice continues, particularly in collectivistic cultures, such as India and Japan, where left-handedness is viewed

negatively as compared with individualistic societies, such as Canada and the United States. For example, India has about half as many left-handers as the United States (Ida & Mandal, 2003).

There are both advantages and disadvantages to being left-handed in a world where most people are right-handed. One problem for lefties is that the world is designed for right-handers. Automatic teller machines (ATMs), classroom desks, scissors, microscopes, drill presses, and table saws are just some examples of everyday machinery designed with the most important controls on the right side. This may explain in part why left-handers suffer somewhat more accidents than do right-handers (Dutta & Mandal, 2006).

Despite the potential difficulty living and working in a world designed for right-handers, there seem to be some advantages to being left-handed. Throughout history, a number of prominent artists have been left-handed, including Leonardo da Vinci, Michelangelo, Pablo Picasso, and Max Escher. Because the right hemisphere is superior in imaging and visual abilities, there may be some advantage to using the left hand for drawing or painting (Springer & Deutsch, 1998). Left-handed people are also better at envisioning three-dimensional objects, which may explain why there is such a high number of left-handed architects, artists, and chess players in proportion to their numbers (Coren, 1992). However, there are also more left-handers among those with reading disabilities, allergies, and migraine headaches (Geschwind & Behan, 2007), perhaps due to the fact that a small minority of left-handers owe their handedness to a birth trauma, such as being born prematurely (Betancur, Vélez, Cabanieu, & le Moal, 1990).

In sports in which handedness may matter, such as tennis, boxing, fencing, or judo, left-handers may have an advantage. They play many games against right-handers and learn how to best handle their styles. Right-handers, however, play very few games against left-handers, which may make them more vulnerable. This explains why a disproportionately high number of left-handers are found in sports where direct one-on-one action predominates. In other sports, such as golf, there are fewer left-handed players because the handedness of one player has no effect on the competition.

The fact that left-handers excel in some sports suggests the possibility that they may have also had an evolutionary advantage because their ancestors may have been more successful in important skills such as hand-to-hand combat (Bodmer & McKie, 1994). At this point, however, this idea remains only a hypothesis, and determinants of human handedness are yet to be fully understood.

Key Takeaways

- The old brain — including the brain stem, medulla, pons, reticular formation, thalamus, cerebellum, amygdala, hypothalamus, and hippocampus — regulates basic survival functions, such as breathing, moving, resting, feeding, emotions, and memory.
- The cerebral cortex, made up of billions of neurons and glial cells, is divided into the right and left hemispheres and into four lobes.
- The frontal lobe is primarily responsible for thinking, planning, memory, and judgment. The parietal lobe is primarily responsible for bodily sensations and touch. The temporal lobe is primarily responsible for hearing and language. The occipital lobe is primarily responsible for vision. Other areas of the cortex act as association areas, responsible for integrating information.
- The brain changes as a function of experience and potential damage in a process known as plasticity. The brain can generate new neurons through neurogenesis.
- The motor cortex controls voluntary movements. Body parts requiring the most control and dexterity take up the most space in the motor cortex.
- The sensory cortex receives and processes bodily sensations. Body parts that are the most sensitive occupy the greatest amount of space in the sensory cortex.
- The left cerebral hemisphere is primarily responsible for language and speech in most people, whereas the right hemisphere specializes in spatial and perceptual skills, visualization, and the recognition of patterns, faces, and melodies.
- The severing of the corpus callosum, which connects the two hemispheres, creates a “split-brain patient,” with the effect of creating two separate minds operating in one person.
- Studies with split-brain patients as research participants have been used to study brain lateralization.
- Neuroplasticity allows the brain to adapt and change as a function of experience or damage.

Exercises and Critical Thinking

1. Do you think that animals experience emotion? What aspects of brain structure might lead you to believe that they do or do not?
2. Consider your own experiences and speculate on which parts of your brain might be particularly well developed as a result of these experiences.
3. Which brain hemisphere are you likely to be using when you search for a fork in the silverware drawer? Which brain hemisphere are you most likely to be using when you struggle to remember the name of an old friend?
4. Do you think that encouraging left-handed children to use their right hands is a good idea? Why or why not?

Image Attributions

Figure 5.5: Anatomy of the Brain by artlessstacey (http://commons.wikimedia.org/wiki/Fi...headBorder.jpg) is in the public domain.

Figure 5.6: Adapted from Wikia Education. (n.d.). Cerebral cortex. Retrieved from http://psychology.wikia.com/wiki/Cerebral_cortex

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5.4: Putting It All Together- The Nervous System and the Endocrine System

Charles Stangor and Jennifer Walinga

Learning Objectives

- Summarize the primary functions of the CNS and of the subsystems of the PNS.
- Explain how the electrical components of the nervous system and the chemical components of the endocrine system work together to influence behaviour.

Now that we have considered how individual neurons operate and the roles of the different brain areas, it is time to ask how the body manages to put it all together. How do the complex activities in the various parts of the brain, the simple all-or-nothing firings of billions of interconnected neurons, and the various chemical systems within the body work together to allow the body to respond to the social environment and engage in everyday behaviours? In this section we will see that the complexities of human behaviour are accomplished through the joint actions of electrical and chemical processes in the nervous system and the endocrine system.

Electrical Control of Behaviour: The Nervous System

The nervous system (see Figure 5.12, "The Functional Divisions of the Nervous System"), the electrical information highway of the body, is made up of **nerves** — *bundles of interconnected neurons that fire in synchrony to carry messages*. The **central nervous system** (CNS), *made up of the brain and spinal cord, is the major controller of the body's functions, charged with interpreting sensory information and responding to it* with its own directives. The CNS interprets information coming in from the senses, formulates an appropriate reaction, and sends responses to the appropriate system to respond accordingly. Everything that we see, hear, smell, touch, and taste is conveyed to us from our sensory organs as neural impulses, and each of the commands that the brain sends to the body, both consciously and unconsciously, travels through this system as well.

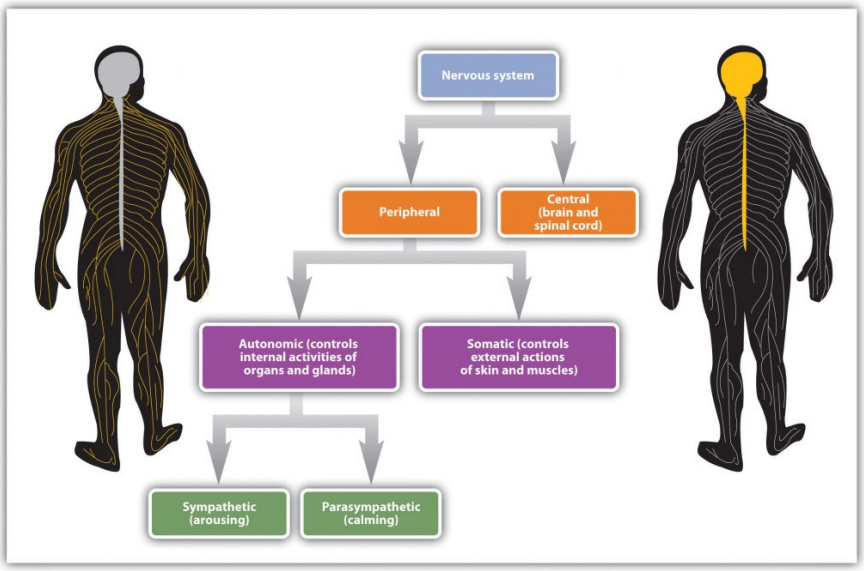


Figure 5.12 The Functional Divisions of the Nervous System. [Long Description]

Nerves are differentiated according to their function. A **sensory (or afferent) neuron** *carries information from the sensory receptors*, whereas a **motor (or efferent) neuron** *transmits information to the muscles and glands*. An **interneuron**, which is by far the most common type of neuron, is located primarily within the CNS and is *responsible for communicating among the neurons*. Interneurons allow the brain to combine the multiple sources of available information to create a coherent picture of the sensory information being conveyed.

The **spinal cord** is *the long, thin, tubular bundle of nerves and supporting cells that extends down from the brain*. It is the central throughway of information for the body. Within the spinal cord, ascending tracts of sensory neurons relay sensory information from the sense organs to the brain while descending tracts of motor neurons relay motor commands back to the body. When a quicker-

than-usual response is required, the spinal cord can do its own processing, bypassing the brain altogether. A **reflex** is *an involuntary and nearly instantaneous movement in response to a stimulus*. Reflexes are triggered when sensory information is powerful enough to reach a given threshold and the interneurons in the spinal cord act to send a message back through the motor neurons without relaying the information to the brain (see Figure 5.13, "The Reflex"). When you touch a hot stove and immediately pull your hand back, or when you fumble your cell phone and instinctively reach to catch it before it falls, reflexes in your spinal cord order the appropriate responses before your brain even knows what is happening.

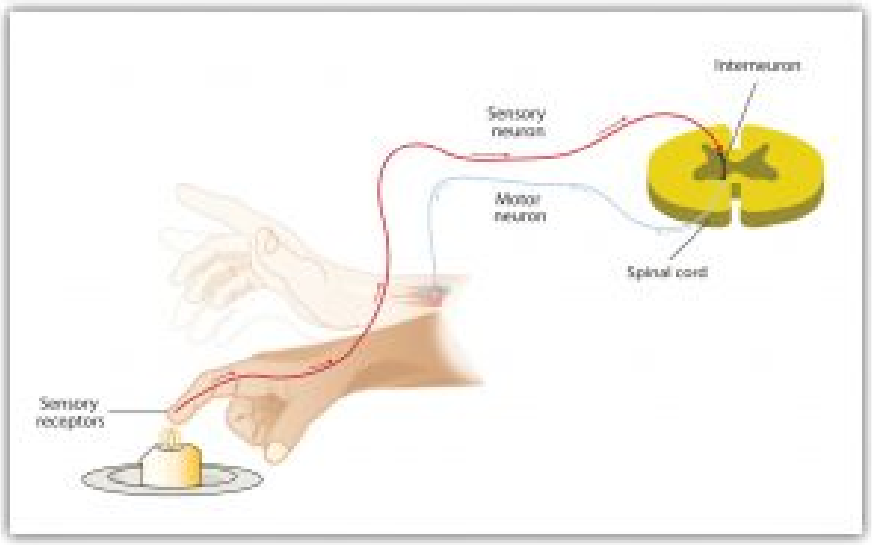


Figure 5.13 The Reflex. The central nervous system can interpret signals from sensory neurons and respond to them extremely quickly via the motor neurons without any need for the brain to be involved. These quick responses, known as reflexes, can reduce the damage that we might experience as a result of, for instance, touching a hot stove.

If the central nervous system is the command centre of the body, the *peripheral nervous system (PNS)* represents the front line. The **PNS** *links the CNS to the body's sense receptors, muscles, and glands*. As you can see in Figure 5.14, "The Autonomic Nervous System," the peripheral nervous system is itself divided into two subsystems, one controlling internal responses and one controlling external responses.

The **autonomic nervous system** (ANS) is *the division of the PNS that governs the internal activities of the human body, including heart rate, breathing, digestion, salivation, perspiration, urination, and sexual arousal*. Many of the actions of the ANS, such as heart rate and digestion, are automatic and out of our conscious control, but others, such as breathing and sexual activity, can be controlled and influenced by conscious processes.

The **somatic nervous system** (SNS) is *the division of the PNS that controls the external aspects of the body*, including the skeletal muscles, skin, and sense organs. The somatic nervous system consists primarily of motor nerves responsible for sending brain signals for muscle contraction.

The autonomic nervous system itself can be further subdivided into the *sympathetic* and *parasympathetic* systems. The **sympathetic division** of the ANS is *involved in preparing the body for behaviour, particularly in response to stress, by activating the organs and the glands in the endocrine system*. The **parasympathetic division** of the ANS *tends to calm the body by slowing the heart and breathing and by allowing the body to recover from the activities that the sympathetic system causes*. The sympathetic and the parasympathetic divisions normally function in opposition to each other, with the sympathetic division acting a bit like the accelerator pedal on a car and the parasympathetic division acting like the brake.

Figure 5.14 The Autonomic Nervous System. The autonomic nervous system has two divisions: The sympathetic division acts to energize the body, preparing it for action. The parasympathetic division acts to calm the body, allowing it to rest. [Long Description]

Our everyday activities are controlled by the interaction between the sympathetic and parasympathetic nervous systems. For example, when we get out of bed in the morning, we would experience a sharp drop in blood pressure if it were not for the action of the sympathetic system, which automatically increases blood flow through the body. Similarly, after we eat a big meal, the parasympathetic system automatically sends more blood to the stomach and intestines, allowing us to efficiently digest the food. And perhaps you have had the experience of not being at all hungry before a stressful event, such as a sports game or an exam (when the sympathetic division was primarily in action), but suddenly finding yourself feeling starved afterward, as the parasympathetic takes over. The two systems work together to maintain vital bodily functions, resulting in **homeostasis**, *the natural balance in the body's systems*.

The Body's Chemicals Help Control Behaviour: The Endocrine System

The nervous system is designed to protect us from danger through its interpretation of and reactions to stimuli. But a primary function of the sympathetic and parasympathetic nervous systems is to interact with the **endocrine system** to *elicit chemicals that provide another system for influencing our feelings and behaviours*.

A **gland** in the endocrine system is made up of *groups of cells that function to secrete hormones*. A **hormone** is *a chemical that moves throughout the body to help regulate emotions and behaviours*. When the hormones released by one gland arrive at receptor tissues or other glands, these receiving receptors may trigger the release of other hormones, resulting in a series of complex chemical chain reactions. The endocrine system works together with the nervous system to influence many aspects of human behaviour, including growth, reproduction, and metabolism. And the endocrine system plays a vital role in emotions. Because the glands in men and women differ, hormones also help explain some of the observed behavioural differences between men and women. The major glands in the endocrine system are shown in Figure 5.15, "The Major Glands of the Endocrine System."

Figure 5.15 The Major Glands of the Endocrine System. The male is shown on the left and the female on the right.

The **pituitary gland**, *a small pea-sized gland located near the centre of the brain, is responsible for controlling the body's growth*, but it also has many other influences that make it of primary importance to regulating behaviour. The pituitary secretes hormones that influence our responses to pain as well as hormones that signal the ovaries and testes to make sex hormones. The pituitary gland also controls ovulation and the menstrual cycle in women. Because the pituitary has such an important influence on other glands, it is sometimes known as the "master gland."

Other glands in the endocrine system include the **pancreas**, which *secretes hormones designed to keep the body supplied with fuel to produce and maintain stores of energy*; the **pineal gland**, *located in the middle of the brain, which secretes melatonin*, a hormone that helps regulate the wake-sleep cycle; and the **thyroid** and **parathyroid glands**, which are responsible for *determining how quickly the body uses energy and hormones, and controlling the amount of calcium in the blood and bones*.

The body has two triangular *adrenal glands*, one atop each kidney. The **adrenal glands** *produce hormones that regulate salt and water balance in the body, and they are involved in metabolism, the immune system, and sexual development and function*. The most important function of the adrenal glands is to secrete the hormones *epinephrine* (also known as *adrenaline*) and *norepinephrine* (also known as *noradrenaline*) when we are excited, threatened, or stressed. Epinephrine and norepinephrine stimulate the sympathetic division of the ANS, causing increased heart and lung activity, dilation of the pupils, and increases in blood sugar, which give the body a surge of energy to respond to a threat. The activity and role of the adrenal glands in response to stress provide an excellent example of the close relationship and interdependency of the nervous and endocrine systems. A quick-acting nervous system is essential for immediate activation of the adrenal glands, while the endocrine system mobilizes the body for action.

The male sex glands, known as the **testes**, secrete a number of hormones, the most important of which is **testosterone**, *the male sex hormone*. Testosterone regulates body changes associated with sexual development, including enlargement of the penis, deepening of the voice, growth of facial and pubic hair, and the increase in muscle growth and strength. The **ovaries**, *the female sex glands*, are located in the pelvis. They produce eggs and secrete the female hormones *estrogen* and *progesterone*. **Estrogen** is involved in the *development of female sexual features*, including breast growth, the accumulation of body fat around the hips and thighs, and the growth spurt that occurs during puberty. Both estrogen and progesterone are also involved in pregnancy and the regulation of the menstrual cycle.

Recent research has pinpointed some of the important roles of the sex hormones in social behaviour. Dabbs, Hargrove, and Heusel (1996) measured the testosterone levels of 240 men who were members of 12 fraternities at two universities. They also obtained descriptions of the fraternities from university officials, fraternity officers, yearbook and chapter house photographs, and researcher

field notes. The researchers correlated the testosterone levels and the descriptions of each fraternity. They found that the fraternities with the highest average testosterone levels were also more wild and unruly, and one of these fraternities was known across campus for the crudeness of its behaviour. On the other hand, the fraternities with the lowest average testosterone levels were more well behaved, friendly and pleasant, academically successful, and socially responsible. Banks and Dabbs (1996) found that juvenile delinquents and prisoners who had high levels of testosterone also acted more violently, and Tremblay and colleagues (1998) found that testosterone was related to toughness and leadership behaviours in adolescent boys. Although testosterone levels are higher in men than in women, the relationship between testosterone and aggression is not limited to males. Studies have also shown a positive relationship between testosterone and aggression and related behaviours (such as competitiveness) in women (Cashdan, 2003).

Keep in mind that the observed relationships between testosterone levels and aggressive behaviour that have been found in these studies do not prove that testosterone causes aggression — the relationships are only correlational. In fact, there is evidence that the relationship between violence and testosterone also goes in the other direction: playing an aggressive game, such as tennis or even chess, increases the testosterone levels of the winners and decreases the testosterone levels of losers (Gladue, Boechler, & McCaul, 1989; Mazur, Booth, & Dabbs, 1992), and perhaps this is why excited soccer fans sometimes riot when their team wins.

Recent research has also begun to document the role that female sex hormones may play in reactions to others. A study about hormonal influences on social-cognitive functioning (Macrae, Alnwick, Milne, & Schloerscheidt, 2002) found that women were more easily able to perceive and categorize male faces during the more fertile phases of their menstrual cycles. Although researchers did not directly measure the presence of hormones, it is likely that phase-specific hormonal differences influenced the women's perceptions.

At this point you can begin to see the important role the hormones play in behaviour. But the hormones we have reviewed in this section represent only a subset of the many influences that hormones have on our behaviours. In the chapters to come we will consider the important roles that hormones play in many other behaviours, including sleeping, sexual activity, and helping and harming others.

Key Takeaways

- The body uses both electrical and chemical systems to create homeostasis.
- The CNS is made up of bundles of nerves that carry messages to and from the PNS.
- The peripheral nervous system is composed of the autonomic nervous system (ANS) and the peripheral nervous system (PNS). The ANS is further divided into the sympathetic (activating) and parasympathetic (calming) nervous systems. These divisions are activated by glands and organs in the endocrine system.
- Specific nerves, including sensory neurons, motor neurons, and interneurons, each have specific functions.
- The spinal cord may bypass the brain by responding rapidly using reflexes.
- The pituitary gland is a master gland, affecting many other glands.
- Hormones produced by the pituitary and adrenal glands regulate growth, stress, sexual functions, and chemical balance in the body.
- The adrenal glands produce epinephrine and norepinephrine, the hormones responsible for our reactions to stress.
- The sex hormones, testosterone, estrogen, and progesterone, play an important role in sex differences.

Exercises and Critical Thinking

1. Recall a time when you were threatened or stressed. What physiological reactions did you experience in the situation, and what aspects of the endocrine system do you think created those reactions?
2. Consider the emotions that you have experienced over the past several weeks. What hormones do you think might have been involved in creating those emotions?

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Long Descriptions

Figure 5.12 long description: The nervous system is made up of two parts: The central nervous system consisting of the brain and spinal cord and the peripheral nervous system. The peripheral nervous system is both autonomic (controlling internal activities of organs and glands) and somatic (controlling external actions of skin and muscles).

Figure 5.14 long description:

Sympathetic Nervous System	Parasympathetic Nervous System
Dilates pupil	Contracts pupil
Accelerates heartbeat	Slows heartbeat
Inhibits digestive activity	Stimulates digestive activity
Stimulates glucose release	
Stimulates secretion of epinephrine and norepinephrine	

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5.5: Psychologists Study the Brain Using Many Different Methods

Charles Stangor and Jennifer Walinga

Learning Objectives

- Compare and contrast the techniques that scientists use to view and understand brain structures and functions.

One problem in understanding the brain is that it is difficult to get a good picture of what is going on inside it. But there are a variety of empirical methods that allow scientists to look at brains in action, and the number of possibilities has increased dramatically in recent years with the introduction of new *neuroimaging* techniques. In this section we will consider the various techniques that psychologists use to learn about the brain. Each of the different techniques has some advantages, and when we put them together, we begin to get a relatively good picture of how the brain functions and which brain structures control which activities. Perhaps the most immediate approach to visualizing and understanding the structure of the brain is to directly analyze the brains of human cadavers. When Albert Einstein died in 1955, his brain was removed and stored for later analysis. Researcher Marian Diamond (1999) later analyzed a section of Einstein's cortex to investigate its characteristics. Diamond was interested in the role of glia, and she hypothesized that the ratio of glial cells to neurons was an important determinant of intelligence. To test this hypothesis, she compared the ratio of glia to neurons in Einstein's brain with the ratio in the preserved brains of 11 other more "ordinary" men. However, Diamond was able to find support for only part of her research hypothesis. Although she found that Einstein's brain had relatively more glia in all the areas that she studied than did the control group, the difference was only statistically significant in one of the areas she tested. Diamond admits a limitation in her study is that she had only one Einstein to compare with 11 ordinary men.

Lesions Provide a Picture of What Is Missing

An advantage of the cadaver approach is that the brains can be fully studied, but an obvious disadvantage is that the brains are no longer active. In other cases, however, we can study living brains. The brains of living human beings may be damaged — as a result of strokes, falls, automobile accidents, gunshots, or tumours, for instance. These *damages* are called **lesions**. In rare occasions, brain lesions may be created intentionally through surgery, such as that designed to remove brain tumours or (as in split-brain patients) reduce the effects of epilepsy. Psychologists also sometimes intentionally create lesions in animals to study the effects on their behaviour. In so doing, they hope to be able to draw inferences about the likely functions of human brains from the effects of the lesions in animals. Lesions allow the scientist to observe any loss of brain function that may occur. For instance, when an individual suffers a stroke, a blood clot deprives part of the brain of oxygen, killing the neurons in the area and rendering that area unable to process information. In some cases, the result of the stroke is a specific lack of ability. For instance, if the stroke influences the occipital lobe, then vision may suffer, and if the stroke influences the areas associated with language or speech, these functions will suffer. In fact, our earliest understanding of the specific areas involved in speech and language were gained by studying patients who had experienced strokes.



Figure 5.16 Phineas Gage. Areas in the frontal lobe of Phineas Gage were damaged when a metal rod blasted through it.

It is now known that a good part of our moral reasoning abilities is located in the frontal lobe, and at least some of this understanding comes from lesion studies. For instance, consider the well-known case of Phineas Gage (Figure 5.16) , a 25-year-old railroad worker who, as a result of an explosion, had an iron rod driven into his cheek and out through the top of his skull, causing major damage to his frontal lobe (Macmillan, 2000). Although, remarkably, Gage was able to return to work after the wounds healed, he no longer seemed to be the same person to those who knew him. The amiable, soft-spoken Gage had become irritable, rude, irresponsible, and dishonest. Although there are questions about the interpretation of this case study (Kotowicz, 2007), it did provide early evidence that the frontal lobe is involved in emotion and morality (Damasio et al., 2005). More recent and more controlled research has also used patients with lesions to investigate the source of moral reasoning. Michael Koenigs and his colleagues (Koenigs et al., 2007) asked groups of normal persons, individuals with lesions in the frontal lobes, and individuals with lesions in other places in the brain to respond to scenarios that involved doing harm to a person, even though the harm ultimately saved the lives of other people (Miller, 2008). In one of the scenarios the participants were asked if they would be willing to kill one person in order to prevent five other people from being killed. As you can see in Figure 5.17, "The Frontal Lobe and Moral Judgment," they found that the individuals with lesions in the frontal lobe were significantly more likely to agree to do the harm than were individuals from the two other groups.

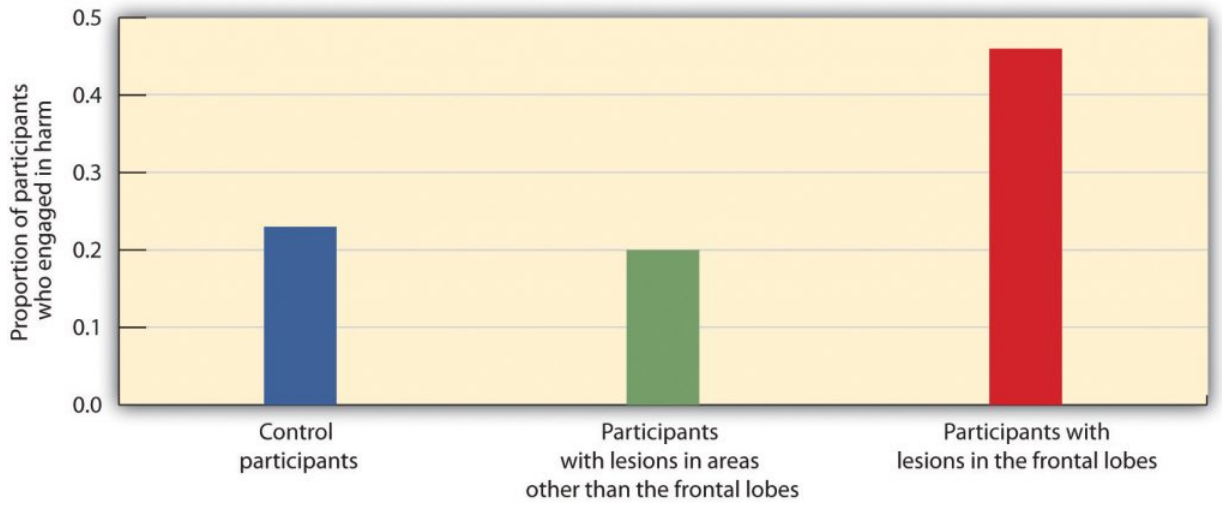


Figure 5.17 The Frontal Lobe and Moral Judgment. Koenigs and his colleagues (2007) found that the frontal lobe is important in moral judgment. Persons with lesions in the frontal lobe were more likely to be willing to harm one person in order to save the lives of five others than were control participants or those with lesions in other parts of the brain. [Long Description]

Recording Electrical Activity in the Brain

In addition to lesion approaches, it is also possible to learn about the brain by studying the electrical activity created by the firing of its neurons. One approach, primarily used with animals, is to place detectors in the brain to study the responses of specific neurons. Research using these techniques has found, for instance, that there are *specific neurons*, known as **feature detectors**, *in the visual cortex that detect movement, lines and edges, and even faces* (Kanwisher, 2000).

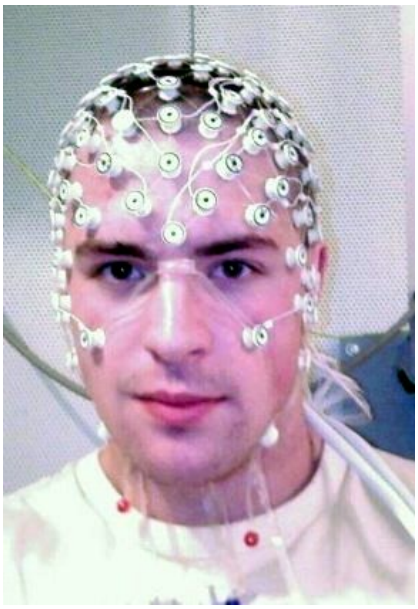


Figure 5.18 EEG Study. A participant in an EEG study with a number of electrodes placed around his head.

A less invasive approach, and one that can be used on living humans, is *electroencephalography (EEG)*, as shown in Figure 5.18. The **EEG** is *a technique that records the electrical activity produced by the brain's neurons through the use of electrodes that are placed around the research participant's head.* An EEG can show if a person is asleep, awake, or anesthetized because the brainwave patterns are known to differ during each state. EEGs can also track the waves that are produced when a person is reading, writing, and speaking, and are useful for understanding brain abnormalities, such as epilepsy. A particular advantage of EEG is that the participant can move around while the recordings are being taken, which is useful when measuring brain activity in children, who often have difficulty keeping still. Furthermore, by following electrical impulses across the surface of the brain, researchers can observe changes over very fast time periods.

Peeking inside the Brain: Neuroimaging

Although the EEG can provide information about the general patterns of electrical activity within the brain, and although the EEG allows the researcher to see these changes quickly as they occur in real time, the electrodes must be placed on the surface of the skull, and each electrode measures brainwaves from large areas of the brain. As a result, EEGs do not provide a very clear picture of the structure of the brain. But techniques exist to provide more specific brain images. **Functional magnetic resonance imaging** (fMRI) is *a type of brain scan that uses a magnetic field to create images of brain activity in each brain area*. The patient lies on a bed within a large cylindrical structure containing a very strong magnet. Neurons that are firing use more oxygen, and the need for oxygen increases blood flow to the area. The fMRI detects the amount of blood flow in each brain region, and thus is an indicator of neural activity. Very clear and detailed pictures of brain structures can be produced via fMRI (see Figure 5.19, "fMRI Image"). Often, the images take the form of cross-sectional "slices" that are obtained as the magnetic field is passed across the brain. The images of these slices are taken repeatedly and are superimposed on images of the brain structure itself to show how activity changes in different brain structures over time. When the research participant is asked to engage in tasks while in the scanner (e.g., by playing a game with another person), the images can show which parts of the brain are associated with which types of tasks. Another advantage of the fMRI is that it is noninvasive. The research participant simply enters the machine and the scans begin. Although the scanners themselves are expensive, the advantages of fMRIs are substantial, and they are now available in many university and hospital settings. The fMRI is now the most commonly used method of learning about brain structure.

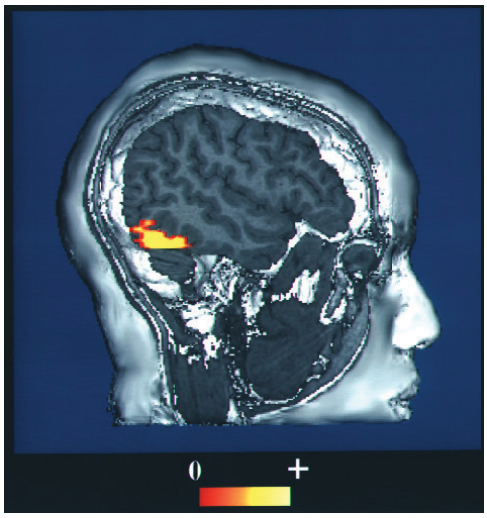


Figure 5.19 fMRI Image. The fMRI creates images of brain structure and activity. The red and yellow areas represent increased blood flow and thus increased activity.

There is still one more approach that is being more frequently implemented to understand brain function, and although it is new, it may turn out to be the most useful of all. **Transcranial magnetic stimulation** (TMS) is *a procedure in which magnetic pulses are applied to the brain of a living person with the goal of temporarily and safely deactivating a small brain region*. In TMS studies the research participant is first scanned in an fMRI machine to determine the exact location of the brain area to be tested. Then the electrical stimulation is provided to the brain before or while the participant is working on a cognitive task, and the effects of the stimulation on performance are assessed. If the participant's ability to perform the task is influenced by the presence of the stimulation, the researchers can conclude that this particular area of the brain is important to carrying out the task. The primary advantage of TMS is that it allows the researcher to draw causal conclusions about the influence of brain structures on thoughts, feelings, and behaviours. When the TMS pulses are applied, the brain region becomes less active, and this deactivation is expected to influence the research participant's responses. Current research has used TMS to study the brain areas responsible for emotion and cognition and their roles in how people perceive intention and approach moral reasoning (Kalbe et al., 2010; Van den Eynde et al., 2010; Young, Camprodon, Hauser, Pascual-Leone, & Saxe, 2010). TMS is also used as a treatment for a variety of psychological conditions, including migraine, Parkinson's disease, and major depressive disorder.

Research Focus: Cyberostracism

Neuroimaging techniques have important implications for understanding our behaviour, including our responses to those around us. Naomi Eisenberger and her colleagues (2003) tested the hypothesis that people who were excluded by others would report emotional distress and that images of their brains would show that they experienced pain in the same part of the brain where physical pain is normally experienced. In the experiment, 13 participants were each placed into an fMRI brain-imaging machine. The participants were told that they would be playing a computer "Cyberball" game with two other players who were also in fMRI machines (the two opponents did not actually exist, and their responses were controlled by the computer). Each of the participants was measured under three different conditions. In the first part of the experiment, the participants were told that as a result of technical difficulties, the link to the other two scanners could not yet be made, and thus at first they could not engage in, but only watch, the game play. This allowed the researchers to take a baseline fMRI reading. Then, during a second, inclusion, scan, the participants played the game, supposedly with the two other players. During this time, the other players threw the ball to the participants. In the third, exclusion, scan, however, the participants initially received seven throws from the other two players but were then excluded from the game because the two players stopped throwing the ball to the participants for the remainder of the scan (45 throws). The results of the analyses showed that activity in two areas of the frontal lobe was significantly greater during the exclusion scan than during the inclusion scan. Because these brain regions are known from prior research to be active for individuals who are experiencing physical pain, the authors concluded that these results show that the physiological brain responses associated with being socially excluded by others are similar to brain responses experienced upon physical injury. Further research (Chen, Williams, Fitness, & Newton, 2008; Wesselmann, Bagg,

& Williams, 2009) has documented that people react to being excluded in a variety of situations with a variety of emotions and behaviours. People who feel that they are excluded, or even those who observe other people being excluded, not only experience pain, but feel worse about themselves and their relationships with people more generally, and they may work harder to try to restore their connections with others.

Key Takeaways

- Studying the brains of cadavers can lead to discoveries about brain structure, but these studies are limited because the brain is no longer active.
- Lesion studies are informative about the effects of lesions on different brain regions.
- Electrophysiological recording may be used in animals to directly measure brain activity.
- Measures of electrical activity in the brain, such as electroencephalography (EEG), are used to assess brainwave patterns and activity.
- Functional magnetic resonance imaging (fMRI) measures blood flow in the brain during different activities, providing information about the activity of neurons and thus the functions of brain regions.
- Transcranial magnetic stimulation (TMS) is used to temporarily and safely deactivate a small brain region, with the goal of testing the causal effects of the deactivation on behaviour.

Exercise and Critical Thinking

1. Consider the different ways that psychologists study the brain, and think of a psychological characteristic or behaviour that could be studied using each of the different techniques.

Image Attributions

Figure 5.16: "Phineas gage – 1868 skull diagram" by John M. Harlow, M.D. (http://it.wikipedia.org/wiki/File:Ph...ll_diagram.jpg) is in the public domain.

Figure 5.18: "EEG cap" by Thuglas (http://commons.wikimedia.org/wiki/File:EEG_cap.jpg) is in the public domain.

Figure 5.19: Face recognition by National Institutes of Health (http://commons.wikimedia.org/wiki/Fi...ecognition.jpg) is in public domain.

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Long Descriptions

Figure 5.17 long description: The Frontal Lobe and Moral Judgement

	Control Participants	Participants with lesions in areas other than the frontal lobes	Participants with lesions in the frontal lobes
Proportion of participants who engaged in harm	0.23	0.20	0.46

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5.6: Summary, Key Terms, and Self-Test

Charles Stangor, Jennifer Walinga, and Lee Sanders

Summary

All human behaviour, thoughts, and feelings are produced by the actions of our brains, nerves, muscles, and glands.

The body is controlled by the nervous system, consisting of the central nervous system (CNS) and the peripheral nervous system (PNS) and the endocrine system, which is made up of glands that create and control hormones.

Neurons are the cells in the nervous system. Neurons are composed of a soma that contains the nucleus of the cell; a dendrite that collects information from other cells and sends the information to the soma; and a long segmented fiber, known as the axon, which transmits information away from the cell body toward other neurons and to the muscles and glands.

The nervous system operates using an electrochemical process. An electrical charge moves through the neuron itself, and chemicals are used to transmit information between neurons. Within the neuron, the electrical charge occurs in the form of an action potential. The action potential operates in an all-or-nothing manner.

Neurons are separated by junction areas known as synapses. Neurotransmitters travel across the synaptic space between the terminal button of one neuron and the dendrites of other neurons, where they bind to the dendrites in the neighboring neurons. More than 100 chemical substances produced in the body have been identified as neurotransmitters, and these substances have a wide and profound effect on emotion, cognition, and behaviour.

Drugs that we ingest may either mimic (agonists) or block (antagonists) the operations of neurotransmitters.

The brains of all animals are layered and generally quite similar in overall form.

The brain stem is the oldest and innermost region of the brain. It controls the most basic functions of life, including breathing, attention, and motor responses. The brain stem includes the medulla, the pons, and the reticular formation.

Above the brain stem are other parts of the old brain involved in the processing of behaviour and emotions, including the thalamus, the cerebellum, and the limbic system. The limbic system includes the amygdala, the hypothalamus, and the hippocampus.

The cerebral cortex contains about 20 billion nerve cells and 300 trillion synaptic connections, and it’s supported by billions more glial cells that surround and link to the neurons. The cerebral cortex is divided into two hemispheres, and each hemisphere is divided into four lobes, each separated by folds known as fissures.

The frontal lobe is primarily responsible for thinking, planning, memory, and judgment. The parietal lobe is responsible for processing information about touch. The occipital lobe processes visual information, and the temporal lobe is responsible for hearing and language. The cortex also includes the motor cortex, the somatosensory cortex, the visual cortex, the auditory cortex, and the association areas.

The brain can develop new neurons, a process known as neurogenesis, as well as new routes for neural communications (neuroplasticity).

Psychologists study the brain using cadaver and lesion approaches, as well as through neuroimaging techniques that include electroencephalography (EEG), functional magnetic resonance imaging (fMRI), and transcranial magnetic stimulation (TMS).

Sensory (afferent) neurons carry information from the sensory receptors, whereas motor (efferent) neurons transmit information to the muscles and glands. Interneurons, by far the most common of neurons, are located primarily within the CNS and responsible for communicating among the neurons.

The peripheral nervous system is itself divided into two subsystems, one controlling internal responses (the autonomic nervous system, ANS) and one controlling external responses (the somatic nervous system). The sympathetic division of the ANS is involved in preparing the body for behaviour by activating the organs and the glands in the endocrine system. The parasympathetic division of the ANS tends to calm the body by slowing the heart and breathing and by allowing the body to recover from the activities that the sympathetic system causes.

Glands in the endocrine system include the pituitary gland, the pancreas, the adrenal glands, and the male and female sex glands. The male sex hormone testosterone and the female sex hormones estrogen and progesterone play important roles in behaviour and contribute to gender differences.

Key Terms

- Action potential
- Adrenal glands
- Agonist
- Amygdala
- Antagonist
- Auditory cortex
- Autonomic Nervous System (ANS)
- Association areas
- Axon
- Brain lateralization
- Brain stem
- Central Nervous System (CNS)
- Cerebellum
- Cerebral cortex
- Contralateral control
- Corpus callosum
- Dendrite
- Electroencephalography (EEG)
- Endocrine system
- Estrogen
- Excitatory
- Feature detectors
- Frontal lobe
- Functional Magnetic Resonance Imaging (fMRI)
- Gland
- Glial cells
- Hippocampus
- Homeostasis
- Hormone
- Hypothalamus
- Inhibitory
- Interneuron
- Lesions
- Limbic system
- Nerves
- Nervous system
- Neurogenesis
- Neuron
- Neuroplasticity
- Neurotransmitter
- Node of Ranvier
- Medulla
- Motor cortex
- Motor neuron (or Efferent neuron)
- Myelin sheath
- Occipital lobe
- Ovaries
- Pancreas
- Parasympathetic division
- Parathyroid gland
- Parietal lobe
- Peripheral Nervous System (PNS)
- Pineal gland
- Pituitary gland
- Pons
- Reflex
- Refractory period
- Resting potential
- Reticular formation
- Reuptake
- Sensory neuron (or Afferent neuron)
- Soma
- Somatic Nervous System (SNS)
- Somatosensory Cortex
- Spinal cord
- Sympathetic division
- Synapses
- Temporal lobe
- Testes
- Testosterone
- Thalamus
- Thyroid gland
- Transcranial Magnetic Stimulation (TMS)
- Visual cortex

Self-Test

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CHAPTER OVERVIEW

6: Sensing and Perceiving

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6.1: Introduction

Charles Stangor and Jennifer Walinga

Misperception by Those Trained to Accurately Perceive a Threat

On September 6, 2007, the Asia-Pacific Economic Cooperation (APEC) leaders' summit was being held in downtown Sydney, Australia. World leaders were attending the summit. Many roads in the area were closed for security reasons, and police presence was high.

As a prank, eight members of the Australian television satire *The Chaser's War on Everything* assembled a false motorcade made up of two black four-wheel-drive vehicles, a black sedan, two motorcycles, bodyguards, and chauffeurs (see the video below). Group member Chas Licciardello was in one of the cars disguised as Osama bin Laden. The motorcade drove through Sydney's central business district and entered the security zone of the meeting. The motorcade was waved on by police, through two checkpoints, until the Chaser group decided it had taken the gag far enough and stopped outside the InterContinental Hotel where former U.S. president George W. Bush was staying. Licciardello stepped out onto the street and complained, in character as bin Laden, about not being invited to the APEC Summit. Only at this time did the police belatedly check the identity of the group members, finally arresting them.

Watch the video: *The Chaser – APEC Stunt* [https://www.youtube.com/watch?v=VfGkbekihyw]

Afterward, the group testified that it had made little effort to disguise its attempt as anything more than a prank. The group's only realistic attempt to fool police was its Canadian-flag-marked vehicles. Other than that, the group used obviously fake credentials, and its security passes were printed with "JOKE," "Insecurity," and "It's pretty obvious this isn't a real pass," all clearly visible to any police officer who might have been troubled to look closely as the motorcade passed. The required APEC 2007 official vehicle stickers had the name of the group's show printed on them, and this text: "This dude likes trees and poetry and certain types of carnivorous plants excite him." In addition, a few of the "bodyguards" were carrying camcorders, and one of the motorcyclists was dressed in jeans, both details that should have alerted police that something was amiss.

The Chaser pranksters later explained the primary reason for the stunt. They wanted to make a statement about the fact that bin Laden, a world leader, had not been invited to an APEC Summit where issues of terror were being discussed. The secondary motive was to test the event's security. The show's lawyers approved the stunt, under the assumption that the motorcade would be stopped at the APEC meeting.

The ability to detect and interpret the events that are occurring around us allows us to respond to these stimuli appropriately (Gibson & Pick, 2000). In most cases the system is successful, but as you can see from the above example, it is not perfect. In this chapter we will discuss the strengths and limitations of these capacities, focusing on both **sensation** — *awareness resulting from the stimulation of a sense organ* — and **perception** — *the organization and interpretation of sensations*. Sensation and perception work seamlessly together to allow us to experience the world through our eyes, ears, nose, tongue, and skin, but also to combine what we are currently learning from the environment with what we already know about it to make judgments and to choose appropriate behaviours.

The study of sensation and perception is exceedingly important for our everyday lives because the knowledge generated by psychologists is used in so many ways to help so many people. Psychologists work closely with mechanical and electrical engineers, with experts in defence and military contractors, and with clinical, health, and sports psychologists to help them apply this knowledge to their everyday practices. The research is used to help us understand and better prepare people to cope with such diverse events as driving cars, flying planes, creating robots, and managing pain (Fajen & Warren, 2003).



Figure 6.1 Sports psychologists, video game designers, and mechanical engineers use knowledge about sensation and perception to create and improve everyday objects and behaviours.

We will begin the chapter with a focus on the **six senses** of seeing, hearing, smelling, touching, tasting, and monitoring the body's positions (**proprioception**). We will see that sensation is sometimes relatively direct, in the sense that the wide variety of stimuli around us inform and guide our behaviours quickly and accurately, but nevertheless is always the result of at least some interpretation. We do not directly experience stimuli, but rather we experience those stimuli as they are created by our senses. Each sense accomplishes the basic process of **transduction** — *the conversion of stimuli detected by receptor cells to electrical impulses that are then transported to the brain* — in different, but related, ways.

After we have reviewed the basic processes of sensation, we will turn to the topic of perception, focusing on how the brain's processing of sensory experience can not only help us make quick and accurate judgments, but also mislead us into making perceptual and judgmental errors, such as those that allowed the Chaser group to breach security at the APEC meeting.

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6.2: We Experience Our World through Sensation

Charles Stangor, Jennifer Walinga, and Lee Sanders

Learning Objectives

- Review and summarize the capacities and limitations of human sensation.
- Explain the difference between sensation and perception and describe how psychologists measure sensory and difference thresholds.

Sensory Thresholds: What Can We Experience?

Humans possess powerful sensory capacities that allow us to sense the kaleidoscope of sights, sounds, smells, and tastes that surround us. Our eyes detect light energy and our ears pick up sound waves. Our skin senses touch, pressure, hot, and cold. Our tongues react to the molecules of the foods we eat, and our noses detect scents in the air. The human perceptual system is wired for accuracy, and people are exceedingly good at making use of the wide variety of information available to them (Stoffregen & Bardy, 2001).

In many ways our senses are quite remarkable. The human eye can detect the equivalent of a single candle flame burning 30 miles away and can distinguish among more than 300,000 different colours. The human ear can detect sounds as low as 20 **hertz** (*vibrations per second*) and as high as 20,000 hertz, and it can hear the tick of a clock about 20 feet away in a quiet room. We can taste a teaspoon of sugar dissolved in two gallons of water, and we are able to smell one drop of perfume diffused in a three-room apartment. We can feel the wing of a bee on our cheek dropped from one centimeter above (Galanter, 1962).

Test your hearing

To get an idea of the range of sounds that the human ear can sense, test your hearing by watching the following video. Use headphones!

Video: *How Old Are Your Ears? (Hearing Test)* [https://youtu.be/VxcbppCX6Rk]



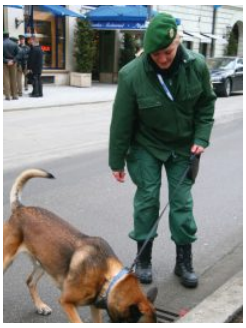


Figure 6.2 Smell. The dog's highly sensitive sense of smell is useful for searches of missing persons, explosives, foods, and drugs.

Although there is much that we do sense, there is even more that we do not. Dogs (Figure 6.2), bats, whales, and some rodents all have much better hearing than we do, and many animals have a far richer sense of smell. Birds are able to see the ultraviolet light that we cannot (see Figure 6.3, "Ultraviolet Light and Bird Vision") and can also sense the pull of the earth's magnetic field. Cats have an extremely sensitive and sophisticated sense of touch, and they are able to navigate in complete darkness using their whiskers. The fact that different organisms have different sensations is part of their evolutionary adaptation. Each species is adapted to sensing the things that are most important to them, while being blissfully unaware of the things that don't matter.

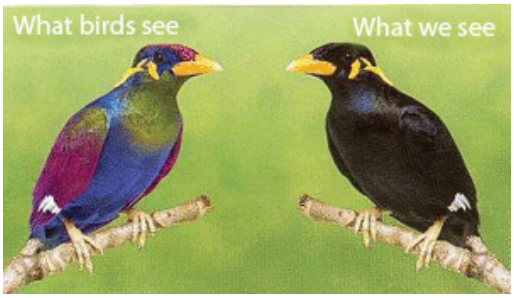


Figure 6.3 Ultraviolet Light and Bird Vision. Birds can see ultraviolet light; humans cannot. What looks like a black bird to us is in colour for a bird.

Measuring Sensation

Psychophysics is *the branch of psychology that studies the effects of physical stimuli on sensory perceptions and mental states*. The field of psychophysics was founded by the German psychologist Gustav Fechner (1801-1887), who was the first to study the relationship between the strength of a stimulus and a person's ability to detect the stimulus.

The measurement techniques developed by Fechner and his colleagues are designed in part to help determine the limits of human sensation. One important criterion is the ability to detect very faint stimuli. The **absolute threshold of a sensation** is defined as *the intensity of a stimulus that allows an organism to just barely detect it*.

In a typical psychophysics experiment, an individual is presented with a series of trials in which a signal is sometimes presented and sometimes not, or in which two stimuli are presented that are either the same or different. Imagine, for instance, that you were asked to take a hearing test. On each of the trials your task is to indicate either "yes" if you heard a sound or "no" if you did not. The signals are purposefully made to be very faint, making accurate judgments difficult.

The problem for you is that the very faint signals create uncertainty. Because our ears are constantly sending background information to the brain, you will sometimes think that you heard a sound when none was there, and you will sometimes fail to detect a sound that is there. Your task is to determine whether the neural activity that you are experiencing is due to the background noise alone or is the result of a signal within the noise.

The responses that you give on the hearing test can be analyzed using *signal detection analysis*. **Signal detection analysis** is *a technique used to determine the ability of the perceiver to separate true signals from background noise* (Macmillan & Creelman, 2005; Wickens, 2002). As you can see in Figure 6.4, "Outcomes of a Signal Detection Analysis," each judgment trial creates four possible outcomes: A *hit* occurs when you, as the listener, correctly say "yes" when there was a sound. A *false alarm* occurs when you respond "yes" to no signal. In the other two cases you respond "no" — either a *miss* (saying "no" when there was a signal) or a *correct rejection* (saying "no" when there was in fact no signal).

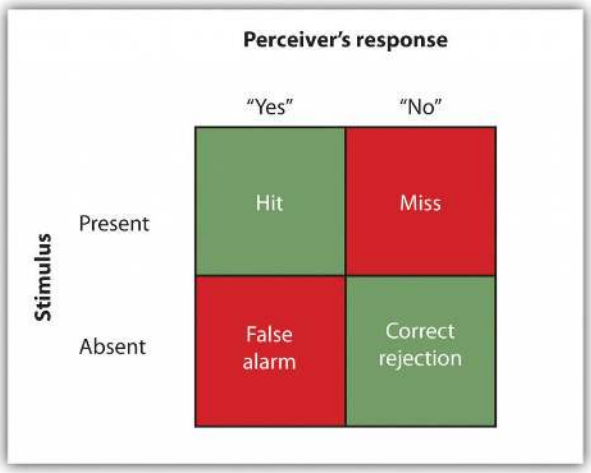


Figure 6.4 Outcomes of a Signal Detection Analysis. Our ability to accurately detect stimuli is measured using a signal detection analysis. Two of the possible decisions (hits and correct rejections) are accurate; the other two (misses and false alarms) are errors.

The analysis of the data from a psychophysics experiment creates two measures. One measure, known as **sensitivity**, refers to the *true ability of the individual to detect the presence or absence of signals*. People who have better hearing will have higher sensitivity than will those with poorer hearing. The other measure, **response bias**, refers to a *behavioural tendency to respond "yes" to the trials, which is independent of sensitivity*.

Imagine, for instance, that rather than taking a hearing test, you are a soldier on guard duty, and your job is to detect the very faint sound of the breaking of a branch that indicates that an enemy is nearby. You can see that in this case making a false alarm by alerting the other soldiers to the sound might not be as costly as a miss (a failure to report the sound), which could be deadly. Therefore, you might well adopt a very lenient response bias in which whenever you are at all unsure, you send a warning signal. In this case your responses may not be very accurate (your sensitivity may be low because you are making a lot of false alarms) and yet the extreme response bias can save lives.

Another application of signal detection occurs when medical technicians study body images for the presence of cancerous tumours. Again, a miss (in which the technician incorrectly determines that there is no tumour) can be very costly, but false alarms (referring patients who do not have tumours to further testing) also have costs. The ultimate decisions that the technicians make are based on the quality of the signal (clarity of the image), their experience and training (the ability to recognize certain shapes and textures of tumours), and their best guesses about the relative costs of misses versus false alarms.

Although we have focused to this point on the absolute threshold, a second important criterion concerns the ability to assess differences between stimuli. The **difference threshold** (or **just noticeable difference** [JND]), refers to *the change in a stimulus that can just barely be detected by the organism.* The German physiologist Ernst Weber (1795-1878) made an important discovery about the JND — namely, that the ability to detect differences depends not so much on the size of the difference but on the size of the difference in relation to the absolute size of the stimulus. **Weber's law** maintains that the *just noticeable difference of a stimulus is a constant proportion of the original intensity of the stimulus*. As an example, if you have a cup of coffee that has only a very little bit of sugar in it (say one teaspoon), adding another teaspoon of sugar will make a big difference in taste. But if you added that same teaspoon to a cup of coffee that already had five teaspoons of sugar in it, then you probably wouldn't taste the difference as much (in fact, according to Weber's law, you would have to add five more teaspoons to make the same difference in taste).

One interesting application of Weber's law is in our everyday shopping behaviour. Our tendency to perceive cost differences between products is dependent not only on the amount of money we will spend or save, but also on the amount of money saved relative to the price of the purchase. For example, if you were about to buy a soda or candy bar in a convenience store, and the price of the items ranged from $1 to $3, you would likely think that the $3 item cost "a lot more" than the $1 item. But now imagine that you were comparing between two music systems, one that cost $397 and one that cost $399. Probably you would think that the cost of the two systems was "about the same," even though buying the cheaper one would still save you $2.

Research Focus: Influence without Awareness

If you study Figure 6.5, "Absolute Threshold," you will see that the absolute threshold is the point where we become aware of a faint stimulus. After that point, we say that the stimulus is **conscious** because we can *accurately report on its existence (or its nonexistence) more than 50% of the time*. But can **subliminal stimuli** (*events that occur below the absolute threshold and of which we are not conscious*) have an influence on our behaviour?

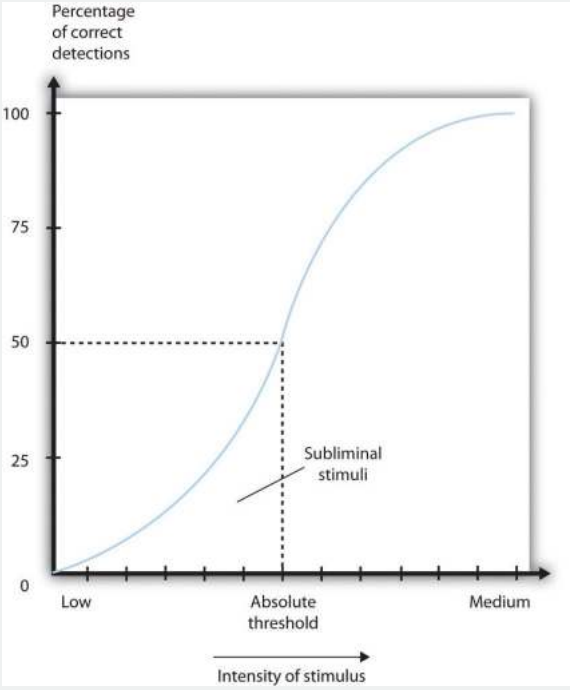


Figure 6.5 Absolute Threshold. As the intensity of a stimulus increases, we are more likely to perceive it. Stimuli below the absolute threshold can still have at least some influence on us, even though we cannot consciously detect them.

A variety of research programs have found that subliminal stimuli can influence our judgments and behaviour, at least in the short term (Dijksterhuis, 2010). But whether the presentation of subliminal stimuli can influence the products that we buy has been a more controversial topic in psychology. In one relevant experiment, Karremans, Stroebe, and Claus (2006) had Dutch college students view a series of computer trials in which a string of letters such as *BBBBBBBBB* or *BBBbBBBBB* were presented on the screen. To be sure they paid attention to the display, the students were asked to note whether the strings contained a small *b*. However, immediately before each of the letter strings, the researchers presented either the name of a drink that is popular in Holland (Lipton Ice) or a control string containing the same letters as Lipton Ice (NpeicTol). These words were presented so quickly (for only about one-fiftieth of a second) that the participants could not see them.

Then the students were asked to indicate their intention to drink Lipton Ice by answering questions such as "If you would sit on a terrace now, how likely is it that you would order Lipton Ice," and also to indicate how thirsty they were at the time. The researchers found that the students who had been exposed to the "Lipton Ice" words (and particularly those who indicated that they were already thirsty) were significantly more likely to say that they would drink Lipton Ice than were those who had been exposed to the control words.

If they were effective, procedures such as this (we can call the technique "subliminal advertising" because it advertises a product outside awareness) would have some major advantages for advertisers, because it would allow them to promote their products without directly interrupting the consumers' activity and without the consumers' knowing they are being persuaded. People cannot counterargue with, or attempt to avoid being influenced by, messages received outside awareness. Due to fears that people may be influenced without their knowing, subliminal advertising has been banned in many countries, including Australia, Canada, Great Britain, the United States, and Russia.

Although it has been proven to work in some research, subliminal advertising's effectiveness is still uncertain. Charles Trappey (1996) conducted a meta-analysis in which he combined 23 leading research studies that had tested the influence of subliminal

advertising on consumer choice. The results showed that subliminal advertising had a negligible effect on consumer choice. Saegert (1987, p. 107) concluded that “marketing should quit giving subliminal advertising the benefit of the doubt,” arguing that the influences of subliminal stimuli are usually so weak that they are normally overshadowed by the person’s own decision making about the behaviour.

Taken together then, the evidence for the effectiveness of subliminal advertising is weak, and its effects may be limited to only some people and in only some conditions. You probably don’t have to worry too much about being subliminally persuaded in your everyday life, even if subliminal ads are allowed in your country. But even if subliminal advertising is not all that effective itself, there are plenty of other indirect advertising techniques that are used and that do work. For instance, many ads for automobiles and alcoholic beverages are subtly sexualized, which encourages the consumer to indirectly (even if not subliminally) associate these products with sexuality. And there is the ever more frequent “product placement” technique, where images of brands (cars, sodas, electronics, and so forth) are placed on websites and in popular television shows and movies. Harris, Bargh, & Brownell (2009) found that being exposed to food advertising on television significantly increased child and adult snacking behaviours, again suggesting that the effects of perceived images, even if presented above the absolute threshold, may nevertheless be very subtle.

Another example of processing that occurs outside our awareness is seen when certain areas of the visual cortex are damaged, causing **blindsight**, *a condition in which people are unable to consciously report on visual stimuli but nevertheless are able to accurately answer questions about what they are seeing.* When people with blindsight are asked directly what stimuli look like, or to determine whether these stimuli are present at all, they cannot do so at better than chance levels. They report that they cannot see anything. However, when they are asked more indirect questions, they are able to give correct answers. For example, people with blindsight are able to correctly determine an object’s location and direction of movement, as well as identify simple geometrical forms and patterns (Weiskrantz, 1997). It seems that although conscious reports of the visual experiences are not possible, there is still a parallel and implicit process at work, enabling people to perceive certain aspects of the stimuli.

Key Takeaways

- Sensation is the process of receiving information from the environment through our sensory organs. Perception is the process of interpreting and organizing the incoming information so that we can understand it and react accordingly.
- Transduction is the conversion of stimuli detected by receptor cells to electrical impulses that are transported to the brain.
- Although our experiences of the world are rich and complex, humans — like all species — have their own adapted sensory strengths and sensory limitations.
- Sensation and perception work together in a fluid, continuous process.
- Our judgments in detection tasks are influenced by both the absolute threshold of the signal as well as our current motivations and experiences. Signal detection analysis is used to differentiate sensitivity from response biases.
- The difference threshold, or just noticeable difference, is the ability to detect the smallest change in a stimulus about 50% of the time. According to Weber’s law, the just noticeable difference increases in proportion to the total intensity of the stimulus.
- Research has found that stimuli can influence behaviour even when they are presented below the absolute threshold (i.e., subliminally). The effectiveness of subliminal advertising, however, has not been shown to be of large magnitude.

Exercises and Critical Thinking

1. Leaf through a magazine or watch several advertisements on television and pay attention to the persuasive techniques being used. What impact are these ads having on your senses? Based on what you know about psychophysics, sensation, and perception, what are some of the reasons why subliminal advertising might be banned in some countries?
2. If we pick up two letters, one that weighs one ounce and one that weighs two ounces, we can notice the difference. But if we pick up two packages, one that weighs three pounds one ounce, and one that weighs three pounds two ounces, we can’t tell the difference. Why?
3. Take a moment and lie down quietly in your bedroom. Notice the variety and levels of what you can see, hear, and feel. Does this experience help you understand the idea of the absolute threshold?

Image Attributions

Figure 6.2: Police officer with sniffer dog by Harald Dettenborn, http://commons.wikimedia.org/wiki/Fi..._dett_0036.jpg used under CC BY 3.0 license(http://creativecommons.org/licenses/by/3.0/de/deed.en).

Figure 6.3: Adapted from Fatal Light Awareness Program. (2008), http://www.flap.org/research.htm.

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6.3: Seeing

Charles Stangor and Jennifer Walinga

Learning Objectives

- Identify the key structures of the eye and the role they play in vision.
- Summarize how the eye and the visual cortex work together to sense and perceive the visual stimuli in the environment, including processing colours, shape, depth, and motion.

Whereas other animals rely primarily on hearing, smell, or touch to understand the world around them, human beings rely in large part on vision. A large part of our cerebral cortex is devoted to seeing, and we have substantial visual skills. Seeing begins when light falls on the eyes, initiating the process of transduction. Once this visual information reaches the visual cortex, it is processed by a variety of neurons that detect colours, shapes, and motion, and that create meaningful perceptions out of the incoming stimuli.

The air around us is filled with a sea of **electromagnetic energy**: *pulses of energy waves that can carry information from place to place*. As you can see in Figure 6.6, "The Electromagnetic Spectrum," electromagnetic waves vary in their **wavelength** — *the distance between one wave peak and the next wave peak* — with the shortest gamma waves being only a fraction of a millimeter in length and the longest radio waves being hundreds of kilometers long. Humans are blind to almost all of this energy — *our eyes detect only the range from about 400 to 700 billionths of a meter, the part of the electromagnetic spectrum known* as the **visible spectrum**.

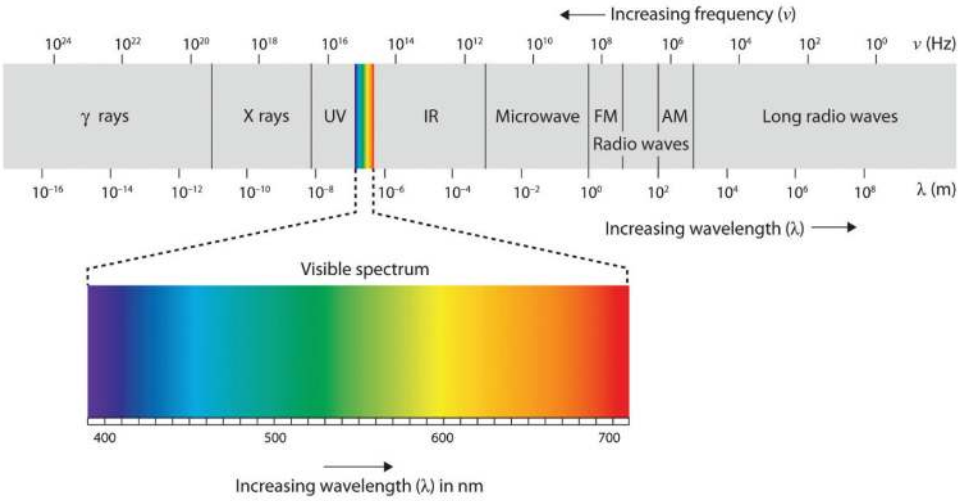


Figure 6.6 The Electromagnetic Spectrum

The Sensing Eye and the Perceiving Visual Cortex

As you can see in Figure 6.7, "Anatomy of the Human Eye," light enters the eye through the **cornea**, *a clear covering that protects the eye and begins to focus the incoming light.* The light then passes through the **pupil,** *a small opening in the centre of the eye*. The pupil is surrounded by the **iris**, *the coloured part of the eye that controls the size of the pupil by constricting or dilating in response to light intensity*. When we enter a dark movie theatre on a sunny day, for instance, muscles in the iris open the pupil and allow more light to enter. Complete adaptation to the dark may take up to 20 minutes.

Behind the pupil is the **lens**, *a structure that focuses the incoming light on the* **retina**, *the layer of tissue at the back of the eye that contains photoreceptor cells*. As our eyes move from near objects to distant objects, a process known as *visual accommodation* occurs. **Visual accommodation** is *the process of changing the curvature of the lens to keep the light entering the eye focused on the retina.* Rays from the top of the image strike the bottom of the retina and vice versa, and rays from the left side of the image strike the right part of the retina and vice versa, causing the image on the retina to be upside down and backward. Furthermore, the image projected on the retina is flat, and yet our final perception of the image will be three dimensional.

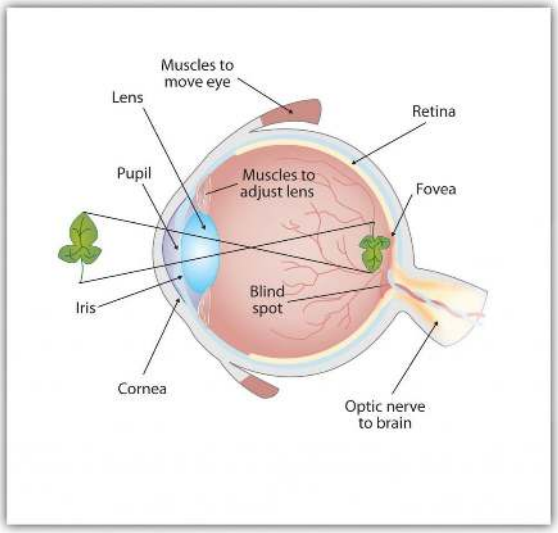


Figure 6.7 Anatomy of the Human Eye. Light enters the eye through the transparent cornea, passing through the pupil at the centre of the iris. The lens adjusts to focus the light on the retina, where it appears upside down and backward. Receptor cells on the retina send information via the optic nerve to the visual cortex.

Accommodation is not always perfect (Figure 6.8) *if the focus is in front of the retina*, we say that the person is **nearsighted**, and *when the focus is behind the retina*, we say that the person is **farsighted**. Eyeglasses and contact lenses correct this problem by adding another lens in front of the eye, and laser eye surgery corrects the problem by reshaping the eye's own lens.



Figure 6.8 Normal, Nearsighted, and Farsighted Eyes. For people with normal vision (left), the lens properly focuses incoming light on the retina. For people who are nearsighted (centre), images from far objects focus too far in front of the retina, whereas for people who are farsighted (right), images from near objects focus too far behind the retina. Eyeglasses solve the problem by adding a secondary, corrective lens.

The retina contains layers of neurons specialized to respond to light (see Figure 6.9, "The Retina with Its Specialized Cells"). As light falls on the retina, it first activates receptor cells known as *rods* and *cones.* The activation of these cells then spreads to the *bipolar cells* and then to the *ganglion cells*, which gather together and converge, like the strands of a rope, forming the *optic nerve*. The **optic nerve** is *a collection of millions of ganglion neurons that sends vast amounts of visual information, via the thalamus, to the brain*. Because the retina and the optic nerve are active processors and analyzers of visual information, it is appropriate to think of these structures as an extension of the brain itself.

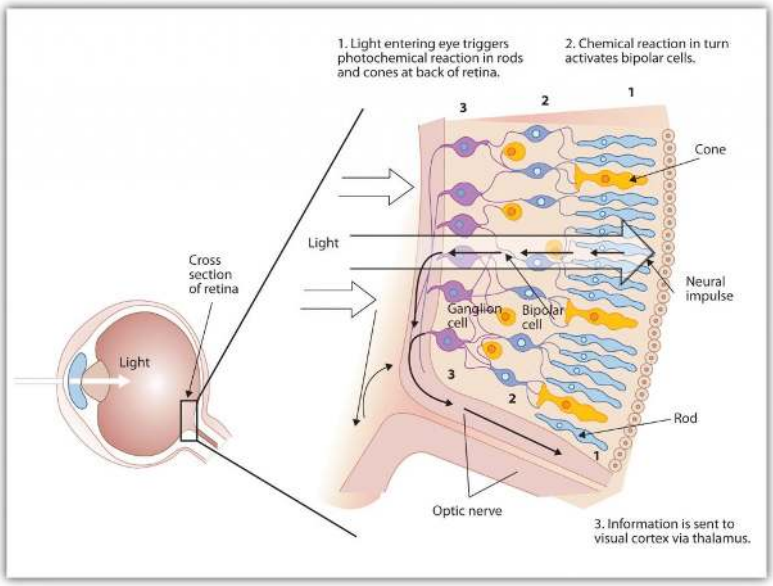


Figure 6.9 The Retina with Its Specialized Cells. When light falls on the retina, it creates a photochemical reaction in the rods and cones at the back of the retina. The reactions then continue to the bipolar cells, the ganglion cells, and eventually to the optic nerve.

Rods are *visual neurons that specialize in detecting black, white, and gray colours*. There are about 120 million rods in each eye. The rods do not provide a lot of detail about the images we see, but because they are highly sensitive to shorter-waved (darker) and weak light, they help us see in dim light — for instance, at night. Because the rods are located primarily around the edges of the retina, they are particularly active in peripheral vision (when you need to see something at night, try looking away from what you want to see). **Cones** are *visual neurons that are specialized in detecting fine detail and colours*. The five million or so cones in each eye enable us to see in colour, but they operate best in bright light. The cones are located primarily in and around the **fovea**, which is *the central point of the retina*.

To demonstrate the difference between rods and cones in attention to detail, choose a word in this text and focus on it. Do you notice that the words a few inches to the side seem more blurred? This is because the word you are focusing on strikes the detail-oriented cones, while the words surrounding it strike the less-detail-oriented rods, which are located on the periphery.

Margaret Livingstone (2000) (Figure 6.10) found an interesting effect that demonstrates the different processing capacities of the eye's rods and cones — namely, that the Mona Lisa's smile, which is widely referred to as "elusive," is perceived differently depending on how one looks at the painting. Because Leonardo da Vinci painted the smile in low-detail brush strokes, these details are better perceived by our peripheral vision (the rods) than by the cones. Livingstone found that people rated the Mona Lisa as more cheerful when they were instructed to focus on her eyes than they did when they were asked to look directly at her mouth. As Livingstone put it, "She smiles until you look at her mouth, and then it fades, like a dim star that disappears when you look directly at it."



Figure 6.10 Mona Lisa's Smile.

As you can see in Figure 6.11, "Pathway of Visual Images through the Thalamus and into the Visual Cortex," the sensory information received by the retina is relayed through the thalamus to corresponding areas in the visual cortex, which is located in the occipital lobe at the back of the brain. Although the principle of contralateral control might lead you to expect that the left eye would send information to the right brain hemisphere and vice versa, nature is smarter than that. In fact, the left and right eyes each send information to both the left and the right hemisphere, and the visual cortex processes each of the cues separately and in parallel. This is an adaptational advantage to an organism that loses sight in one eye, because even if only one eye is functional, both hemispheres will still receive input from it.

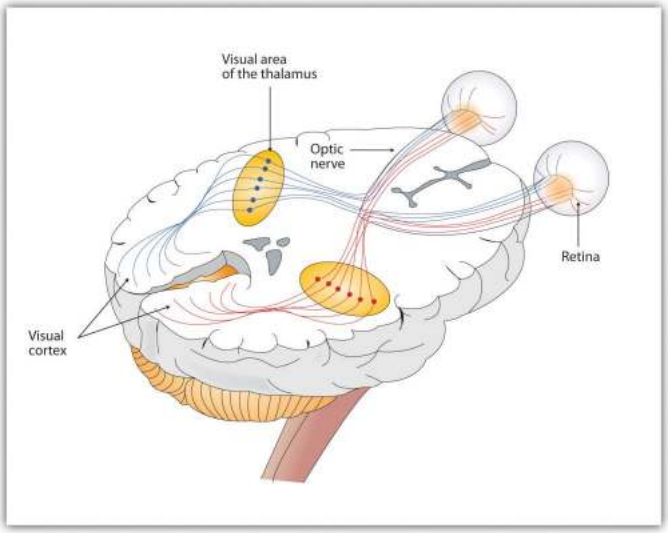


Figure 6.11 Pathway of Visual Images through the Thalamus and into the Visual Cortex. The left and right eyes each send information to both the left and the right brain hemisphere.

The visual cortex is made up of specialized neurons that turn the sensations they receive from the optic nerve into meaningful images. Because there are no photoreceptor cells at the place where the optic nerve leaves the retina, a *hole* or **blind spot** *in our vision* is created (see Figure 6.12, "Blind Spot Demonstration"). When both of our eyes are open, we don't experience a problem because our eyes are constantly moving, and one eye makes up for what the other eye misses. But the visual system is also designed to deal with this problem if only one eye is open — the visual cortex simply fills in the small hole in our vision with similar patterns from the surrounding areas, and we never notice the difference. The ability of the visual system to cope with the blind spot is another example of how sensation and perception work together to create meaningful experience.



Figure 6.12 Blind Spot Demonstration. You can get an idea of the extent of your blind spot (the place where the optic nerve leaves the retina) by trying this: close your left eye and stare with your right eye at the cross in the diagram. You should be able to see the elephant image to the right (don't look at it, just notice that it is there). If you can't see the elephant, move closer or farther away until you can. Now slowly move so that you are closer to the image while you keep looking at the cross. At one distance (probably a foot or so), the elephant will completely disappear from view because its image has fallen on the blind spot.

Perception is created in part through the simultaneous action of thousands of **feature detector neurons** — *specialized neurons, located in the visual cortex, that respond to the strength, angles, shapes, edges, and movements of a visual stimulus* (Kelsey, 1997; Livingstone & Hubel, 1988). The feature detectors work in parallel, each performing a specialized function. When faced with a red square, for instance, the parallel line feature detectors, the horizontal line feature detectors, and the red colour feature detectors all become activated. This activation is then passed on to other parts of the visual cortex, where other neurons compare the information supplied by the feature detectors with images stored in memory. Suddenly, in a flash of recognition, the many neurons fire together, creating the single image of the red square that we experience (Rodriguez et al., 1999). See Figure 6.13 for an explanation about the Necker cube.

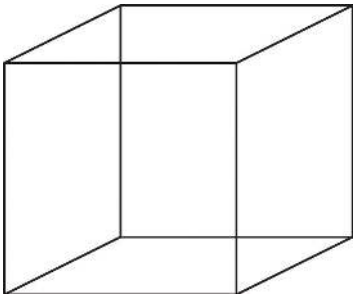


Figure 6.13 The Necker Cube. The Necker cube is an example of how the visual system creates perceptions out of sensations. We do not see a series of lines but, rather, a cube. Which cube we see varies depending on the momentary outcome of perceptual processes in the visual cortex.

Some feature detectors are tuned to selectively respond to particularly important objects, such as faces, smiles, and other parts of the body (Downing, Jiang, Shuman, & Kanwisher, 2001; Haxby et al., 2001). When researchers disrupted face recognition areas of the cortex using the magnetic pulses of transcranial magnetic stimulation (TMS), people were temporarily unable to recognize faces, and yet they were still able to recognize houses (McKone, Kanwisher, & Duchaine, 2007; Pitcher, Walsh, Yovel, & Duchaine, 2007).

Perceiving Colour

It has been estimated that the human visual system can detect and discriminate among seven million colour variations (Geldard, 1972), but these variations are all created by the combinations of the three primary colours: red, green, and blue. *The shade of a colour*, known as **hue**, is conveyed by the wavelength of the light that enters the eye (we see shorter wavelengths as more blue and longer wavelengths as more red), and we detect brightness from the *intensity* or height of the wave (bigger or more intense waves are perceived as brighter), as shown in Figure 6.14.

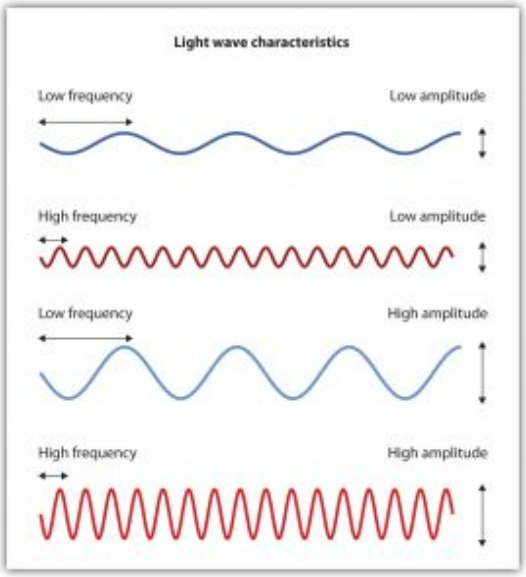


Figure 6.14 Low- and High-Frequency Sine Waves and Low- and High-Intensity Sine Waves and Their Corresponding Colours. Light waves with shorter frequencies are perceived as more blue than red; light waves with higher intensity are seen as brighter.

In his important research on colour vision, Hermann von Helmholtz (1821-1894) theorized that colour is perceived because the cones in the retina come in three types. One type of cone reacts primarily to blue light (short wavelengths), another reacts primarily to green light (medium wavelengths), and a third reacts primarily to red light (long wavelengths). The visual cortex then detects and compares the strength of the signals from each of the three types of cones, creating the experience of colour. According to this Young-Helmholtz **trichromatic colour theory** *what colour we see depends on the mix of the signals from the three types of cones*. If the brain is receiving primarily red and blue signals, for instance, it will perceive purple; if it is receiving primarily red and green signals it will perceive yellow; and if it is receiving messages from all three types of cones it will perceive white.

The different functions of the three types of cones are apparent in people who experience **colour blindness** — *the inability to detect green and/or red colours.* About one in 50 people, mostly men, lack functioning in the red- or green-sensitive cones, leaving them only able to experience either one or two colours (Figure 6.15).

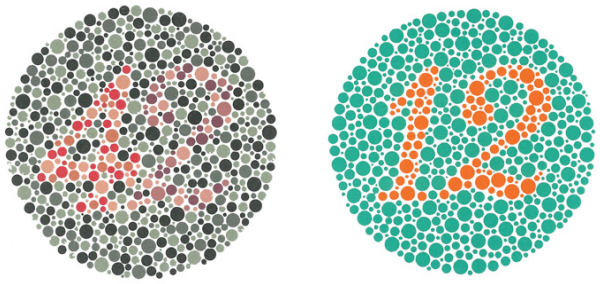


Figure 6.15 Colour Blindness. People with normal colour vision can see the number 42 in the first image and the number 12 in the second (they are vague but apparent). However, people who are colour blind cannot see the numbers at all.

The trichromatic colour theory cannot explain all of human vision, however. For one, although the colour purple does appear to us as a mix of red and blue, yellow does not appear to be a mix of red and green. And people with colour blindness, who cannot see either green or red, nevertheless can still see yellow. An alternative approach to the Young-Helmholtz theory, known as the **opponent-process colour theory**, *proposes that we analyze sensory information not in terms of three colours but rather in three sets of "opponent colours": red-green, yellow-blue, and white-black.* Evidence for the opponent-process theory comes from the fact that some neurons in the retina and in the visual cortex are excited by one colour (e.g., red) but inhibited by another colour (e.g., green).

One example of opponent processing occurs in the experience of an afterimage. If you stare at the shape on the top left side of Figure 6.16, “Afterimages,” for about 30 seconds (the longer you look, the better the effect), and then move your eyes to the blank area to the right of it, you will see the afterimage. Now try this by staring at the image of the Italian flag below and then shifting your eyes to the blank area beside it. When we stare at the green stripe, our green receptors habituate and begin to process less strongly, whereas the red receptors remain at full strength. When we switch our gaze, we see primarily the red part of the opponent process. Similar processes create blue after yellow and white after black.

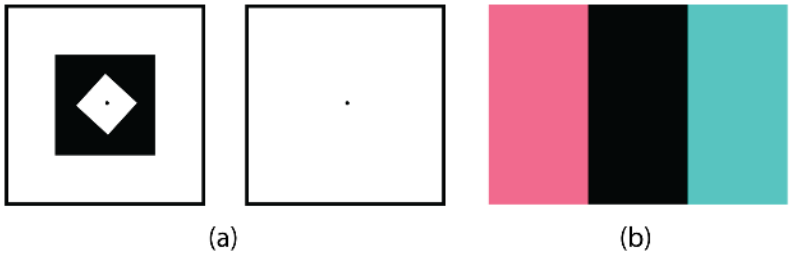


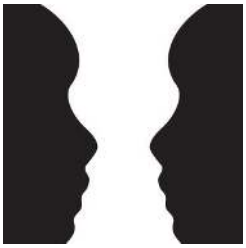
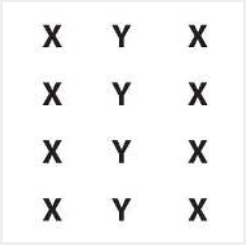
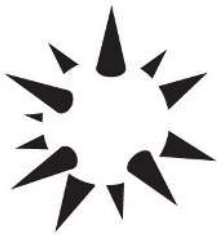
Figure 6.16 Afterimages.

The tricolour and the opponent-process mechanisms work together to produce colour vision. When light rays enter the eye, the red, blue, and green cones on the retina respond in different degrees and send different strength signals of red, blue, and green through the optic nerve. The colour signals are then processed both by the ganglion cells and by the neurons in the visual cortex (Gegenfurtner & Kiper, 2003).

Perceiving Form

One of the important processes required in vision is the perception of form. German psychologists in the 1930s and 1940s, including Max Wertheimer (1880-1943), Kurt Koffka (1886-1941), and Wolfgang Köhler (1887-1967), argued that we create forms out of their component sensations based on the idea of the **gestalt**, *a meaningfully organized whole*. The idea of the gestalt is that the “whole is more than the sum of its parts.” Some examples of how gestalt principles lead us to see more than what is actually there are summarized in Table 6.1, “Summary of Gestalt Principles of Form Perception.”

Table 6.1 Summary of Gestalt Principles of Form Perception.

Principle	Description	Example	Image
Figure and ground	We structure input so that we always see a figure (image) against a ground (background).	At right, you may see a vase or you may see two faces, but in either case, you will organize the image as a figure against a ground.	
Similarity	Stimuli that are similar to each other tend to be grouped together.	You are more likely to see three similar columns among the *XYX* characters at right than you are to see four rows.	
Proximity	We tend to group nearby figures together.	Do you see four or eight images at right? Principles of proximity suggest that you might see only four.	
Continuity	We tend to perceive stimuli in smooth, continuous ways rather than in more discontinuous ways.	At right, most people see a line of dots that moves from the lower left to the upper right, rather than a line that moves from the left and then suddenly turns down. The principle of continuity leads us to see most lines as following the smoothest possible path.	
Closure	We tend to fill in gaps in an incomplete image to create a complete, whole object.	Closure leads us to see a single spherical object at right rather than a set of unrelated cones.	

Principle	Description	Example	Image

Perceiving Depth

Depth perception is *the ability to perceive three-dimensional space and to accurately judge distance*. Without depth perception, we would be unable to drive a car, thread a needle, or simply navigate our way around the supermarket (Howard & Rogers, 2001). Research has found that depth perception is in part based on innate capacities and in part learned through experience (Witherington, 2005).

Psychologists Eleanor Gibson and Richard Walk (1960) tested the ability to perceive depth in six- to 14-month-old infants by placing them on a **visual cliff**, *a mechanism that gives the perception of a dangerous drop-off, in which infants can be safely tested for their perception of depth* (Figure 6.17 "Visual Cliff"). The infants were placed on one side of the "cliff," while their mothers called to them from the other side. Gibson and Walk found that most infants either crawled away from the cliff or remained on the board and cried because they wanted to go to their mothers, but the infants perceived a chasm that they instinctively could not cross. Further research has found that even very young children who cannot yet crawl are fearful of heights (Campos, Langer, & Krowitz, 1970). On the other hand, studies have also found that infants improve their hand-eye coordination as they learn to better grasp objects and as they gain more experience in crawling, indicating that depth perception is also learned (Adolph, 2000).

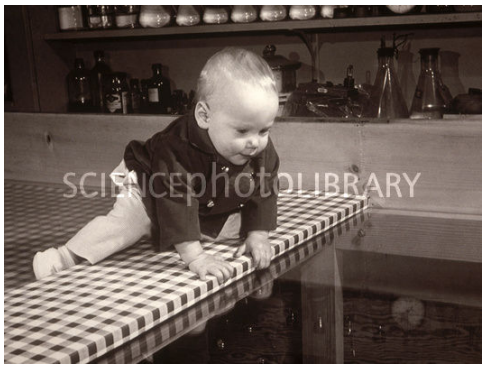


Figure 6.17 Visual Cliff. Babies appear to have the innate ability to perceive depth, as seen by this baby's reluctance to cross the "visual cliff."

Depth perception is the result of our use of **depth cues**, *messages from our bodies and the external environment that supply us with information about space and distance*. **Binocular depth cues** are *depth cues that are created by retinal image disparity — that is, the space between our eyes — and which thus require the coordination of both eyes.* One outcome of retinal disparity is that the images projected on each eye are slightly different from each other. The visual cortex automatically merges the two images into one, enabling us to perceive depth. Three-dimensional movies make use of retinal disparity by using 3-D glasses that the viewer wears to create a different image on each eye. The perceptual system quickly, easily, and unconsciously turns the disparity into 3-D.

An important binocular depth cue is **convergence**, *the inward turning of our eyes that is required to focus on objects that are less than about 50 feet away from us*. The visual cortex uses the size of the convergence angle between the eyes to judge the object's distance. You will be able to feel your eyes converging if you slowly bring a finger closer to your nose while continuing to focus on it. When you close one eye, you no longer feel the tension — convergence is a binocular depth cue that requires both eyes to work.

The visual system also uses **accommodation** to *help determine depth*. As the lens changes its curvature to focus on distant or close objects, information relayed from the muscles attached to the lens helps us determine an object's distance. Accommodation is only effective at short viewing distances, however, so while it comes in handy when threading a needle or tying shoelaces, it is far less effective when driving or playing sports.

Although the best cues to depth occur when both eyes work together, we are able to see depth even with one eye closed. **Monocular depth cues** are *depth cues that help us perceive depth using only one eye* (Sekuler & Blake, 2006). Some of the most important are summarized in Table 6.2, "Monocular Depth Cues That Help Us Judge Depth at a Distance."

Table 6.2 Monocular Depth Cues That Help Us Judge Depth at a Distance.

Name	Description	Example	Image
Position	We tend to see objects higher up in our field of vision as farther away.	The fence posts at right appear farther away not only because they become smaller but also because they appear higher up in the picture.	
Relative size	Assuming that the objects in a scene are the same size, smaller objects are perceived as farther away.	At right, the cars in the distance appear smaller than those nearer to us.	
Linear perspective	Parallel lines appear to converge at a distance.	We know that the tracks at right are parallel. When they appear closer together, we determine they are farther away.	
Light and shadow	The eye receives more reflected light from objects that are closer to us. Normally, light comes from above, so darker images are in shadow.	We see the images at right as extending and indented according to their shadowing. If we invert the picture, the images will reverse.	
Interposition	When one object overlaps another object, we view it as closer.	At right, because the blue star covers the pink bar, it is seen as closer than the yellow moon.	
Aerial perspective	Objects that appear hazy, or that are covered with smog or dust, appear farther away.	The artist who painted the picture on the right used aerial perspective to make the clouds more hazy and thus appear farther away.	

Perceiving Motion

Many animals, including human beings, have very sophisticated perceptual skills that allow them to coordinate their own motion with the motion of moving objects in order to create a collision with that object. Bats and birds use this mechanism to catch up with prey, dogs use it to catch a Frisbee, and humans use it to catch a moving football. The brain detects motion partly from the changing size of an image on the retina (objects that look bigger are usually closer to us) and in part from the relative brightness of objects.

We also experience motion when objects near each other change their appearance. The **beta effect** refers to *the perception of motion that occurs when different images are presented next to each other in succession* (see “Beta Effect and Phi Phenomenon”). The visual cortex fills in the missing part of the motion and we see the object moving. The beta effect is used in movies to create the experience of motion. A related effect is the **phi phenomenon**, in which *we perceive a sensation of motion caused by the appearance and disappearance of objects that are near each other*. The phi phenomenon looks like a moving zone or cloud of background colour surrounding the flashing objects. The beta effect and the phi phenomenon are other examples of the importance of the gestalt — our tendency to “see more than the sum of the parts.”

Beta Effect and Phi Phenomenon

In the beta effect, our eyes detect motion from a series of still images, each with the object in a different place. This is the fundamental mechanism of motion pictures (movies). In the phi phenomenon, the perception of motion is based on the momentary hiding of an image.

Phi phenomenon: http://upload.wikimedia.org/wikipedia/commons/6/6e/Lilac-Chaser.gif

Beta effect: http://upload.wikimedia.org/wikipedia/commons/0/09/Phi_phenomenom_no_watermark.gif

Key Takeaways

- Vision is the process of detecting the electromagnetic energy that surrounds us. Only a small fraction of the electromagnetic spectrum is visible to humans.
- The visual receptor cells on the retina detect shape, colour, motion, and depth.
- Light enters the eye through the transparent cornea and passes through the pupil at the centre of the iris. The lens adjusts to focus the light on the retina, where it appears upside down and backward. Receptor cells on the retina are excited or inhibited by the light and send information to the visual cortex through the optic nerve.
- The retina has two types of photoreceptor cells: rods, which detect brightness and respond to black and white, and cones, which respond to red, green, and blue. Colour blindness occurs when people lack function in the red- or green-sensitive cones.
- Feature detector neurons in the visual cortex help us recognize objects, and some neurons respond selectively to faces and other body parts.
- The Young-Helmholtz trichromatic colour theory proposes that colour perception is the result of the signals sent by the three types of cones, whereas the opponent-process colour theory proposes that we perceive colour as three sets of opponent colours: red-green, yellow-blue, and white-black.
- The ability to perceive depth occurs as the result of binocular and monocular depth cues.
- Motion is perceived as a function of the size and brightness of objects. The beta effect and the phi phenomenon are examples of perceived motion.

Exercises and Critical Thinking

1. Consider some ways that the processes of visual perception help you engage in an everyday activity, such as driving a car or riding a bicycle.
2. Imagine for a moment what your life would be like if you couldn't see. Do you think you would be able to compensate for your loss of sight by using other senses?

Image Attributions

Figure 6.10: Mona Lisa detail face (http://commons.wikimedia.org/wiki/Fi...etail_face.jpg) is in the public domain.

Figure 6.15: Ishihara Plate No.11 (http://commons.wikimedia.org/wiki/Fi...shihara_11.PNG) and Ishihara Plate No.23 (http://commons.wikimedia.org/wiki/Fi...shihara_23.PNG) is in the public domain.

Figure 6.16: Nachbild by Freddy2001 (http://commons.wikimedia.org/wiki/File:Nachbild-1.svg) and Italian Flag Inverted by Pcessna (http://commons.wikimedia.org/wiki/Fi...agInverted.gif) is in the public domain.

Figure 6.17: Perception-Conception (http://perception-connection.wikispaces.com/3)+Key+Findings) used with CC-BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0/).

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6.4: Hearing

Charles Stangor and Jennifer Walinga

Learning Objectives

- Draw a picture of the ear, label its key structures and functions, and describe the role they play in hearing.
- Describe the process of transduction in hearing.

Like vision and all the other senses, hearing begins with transduction. Sound waves that are collected by our ears are converted into neural impulses, which are sent to the brain where they are integrated with past experience and interpreted as the sounds we experience. The human ear is sensitive to a wide range of sounds, from the faint tick of a clock in a nearby room to the roar of a rock band at a nightclub, and we have the ability to detect very small variations in sound. But the ear is particularly sensitive to sounds in the same frequency as the human voice. A mother can pick out her child's voice from a host of others, and when we pick up the phone we quickly recognize a familiar voice. In a fraction of a second, our auditory system receives the sound waves, transmits them to the auditory cortex, compares them to stored knowledge of other voices, and identifies the caller.

The Ear

Just as the eye detects light waves, the ear detects sound waves. Vibrating objects (such as the human vocal cords or guitar strings) cause air molecules to bump into each other and produce sound waves, which travel from their source as peaks and valleys, much like the ripples that expand outward when a stone is tossed into a pond. Unlike light waves, which can travel in a vacuum, sound waves are carried within media such as air, water, or metal, and it is the changes in pressure associated with these media that the ear detects.

As with light waves, we detect both the wavelength and the *amplitude* of sound waves. The *wavelength of the sound wave* (known as **frequency**) is measured in terms of the number of waves that arrive per second and determines our perception of **pitch**, *the perceived frequency of a sound.* Longer sound waves have lower frequency and produce a lower pitch, whereas shorter waves have higher frequency and a higher pitch.

The **amplitude**, or *height of the sound wave*, determines how much energy it contains and is perceived as **loudness** (*the degree of sound volume*). Larger waves are perceived as louder. Loudness is measured using *the unit of relative loudness* known as the **decibel**. Zero decibels represent the absolute threshold for human hearing, below which we cannot hear a sound. Each increase in 10 decibels represents a tenfold increase in the loudness of the sound (see Figure 6.18, "Sounds in Everyday Life"). The sound of a typical conversation (about 60 decibels) is 1,000 times louder than the sound of a faint whisper (30 decibels), whereas the sound of a jackhammer (130 decibels) is 10 billion times louder than the whisper.



Figure 6.18 Sounds in Everyday Life. The human ear can comfortably hear sounds up to 80 decibels. Prolonged exposure to sounds above 80 decibels can cause hearing loss. [Long Description]

Audition begins in the **pinna**, *the external and visible part of the ear*, which is shaped like a funnel to draw in sound waves and guide them into the auditory canal. At the end of the canal, the sound waves strike the *tightly stretched, highly sensitive membrane* known as the **tympanic membrane** (or **eardrum**), which vibrates with the waves. The resulting vibrations are relayed into the middle ear through *three tiny bones*, known as the **ossicles** — the hammer (or malleus), anvil (or incus), and stirrup (or stapes) — to the **cochlea**, *a snail-shaped liquid-filled tube in the inner ear that contains the cilia*. The vibrations cause the **oval window**, *the membrane covering the opening of the cochlea*, to vibrate, disturbing the fluid inside the cochlea (Figure 6.19).

The movements of the fluid in the cochlea bend the hair cells of the inner ear, in much the same way that a gust of wind bends over wheat stalks in a field. The movements of the hair cells trigger nerve impulses in the attached neurons, which are sent to the auditory nerve and then to the auditory cortex in the brain. The cochlea contains about *16,000 hair cells, each of which holds a bundle of fibres* known as **cilia** on its tip. The cilia are so sensitive that they can detect a movement that pushes them the width of a single atom. To put things in perspective, cilia swaying the width of an atom is equivalent to the tip of the Eiffel Tower swaying half an inch (Corey et al., 2004).

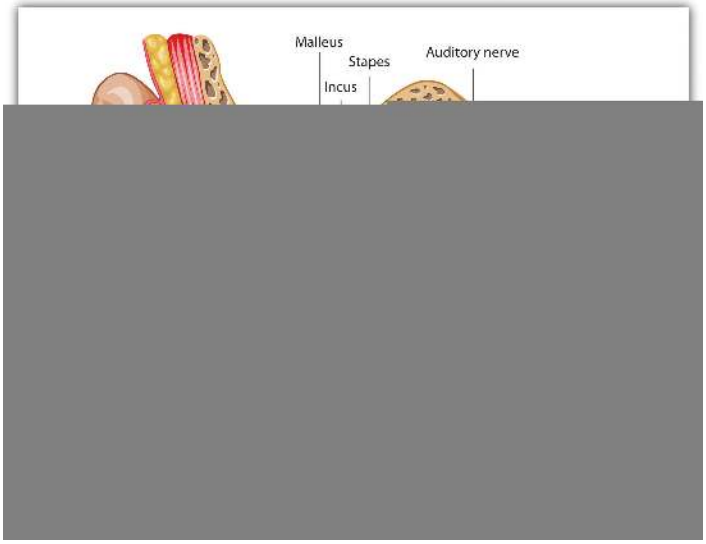


Figure 6.19 The Human Ear. Sound waves enter the outer ear and are transmitted through the auditory canal to the eardrum. The resulting vibrations are moved by the three small ossicles into the cochlea, where they are detected by hair cells and sent to the auditory nerve.

Although loudness is directly determined by the number of hair cells that are vibrating, two different mechanisms are used to detect pitch. The **frequency theory of hearing** proposes that *whatever the pitch of a sound wave, nerve impulses of a corresponding frequency will be sent to the auditory nerve*. For example, a tone measuring 600 hertz will be transduced into 600 nerve impulses a second. This theory has a problem with high-pitched sounds, however, because the neurons cannot fire fast enough. To reach the necessary speed, the neurons work together in a sort of volley system in which different neurons fire in sequence, allowing us to detect sounds up to about 4,000 hertz.

Not only is frequency important, but location is critical as well. The cochlea relays information about the specific area, or place, in the cochlea that is most activated by the incoming sound. The **place theory of hearing** proposes that *different areas of the cochlea respond to different frequencies*. Higher tones excite areas closest to the opening of the cochlea (near the oval window). Lower tones excite areas near the narrow tip of the cochlea, at the opposite end. Pitch is therefore determined in part by the area of the cochlea firing the most frequently.

Just as having two eyes in slightly different positions allows us to perceive depth, so the fact that the ears are placed on either side of the head enables us to benefit from stereophonic, or three-dimensional, hearing. If a sound occurs on your left side, the left ear will receive the sound slightly sooner than the right ear, and the sound it receives will be more intense, allowing you to quickly determine the location of the sound. Although the distance between our two ears is only about six inches, and sound waves travel at 750 miles an hour, the time and intensity differences are easily detected (Middlebrooks & Green, 1991). When a sound is equidistant from both ears, such as when it is directly in front, behind, beneath, or overhead, we have more difficulty pinpointing its location. It is for this reason that dogs (and people, too) tend to cock their heads when trying to pinpoint a sound, so that the ears receive slightly different signals.

Hearing Loss

In 2006, 1,266,120 (5.0%) Canadians aged 15 and older reported having a hearing limitation. Over eight in 10 (83.2%) hearing limitations were mild in nature, while the remaining 16.8% were classified as severe (Statistics Canada, 2006). *Conductive hearing loss* is caused by physical damage to the ear (such as to the eardrums or ossicles) that reduces the ability of the ear to transfer vibrations from the outer ear to the inner ear. *Sensorineural hearing loss*, which is caused by damage to the cilia or to the auditory nerve, is less common overall but frequently occurs with age (Tennesen, 2007). The cilia are extremely fragile, and by the time we are 65 years old, we will have lost 40% of them, particularly those that respond to high-pitched sounds (Chisolm, Willott, & Lister, 2003).

Prolonged exposure to loud sounds will eventually create sensorineural hearing loss as the cilia are damaged by the noise. People who constantly operate noisy machinery without using appropriate ear protection are at high risk of hearing loss, as are people who listen to loud music on their headphones or who engage in noisy hobbies, such as hunting or motorcycling. Sounds that are 85 decibels or more can cause damage to your hearing, particularly if you are exposed to them repeatedly. Sounds of more than 130 decibels are dangerous even if you are exposed to them infrequently. People who experience **tinnitus** (*a ringing or a buzzing sensation*) after being exposed to loud sounds have very likely experienced some damage to their cilia. Taking precautions when being exposed to loud sounds is important, as cilia do not grow back.

While conductive hearing loss can often be improved through hearing aids that amplify the sound, they are of little help to sensorineural hearing loss. But if the auditory nerve is still intact, a *cochlear implant* may be used. A **cochlear implant** is a *device made up of a series of electrodes that are placed inside the cochlea*. The device serves to bypass the hair cells by stimulating the auditory nerve cells directly. The latest implants utilize place theory, enabling different spots on the implant to respond to different levels of pitch. The cochlear implant can help children who would normally be deaf hear. If the device is implanted early enough, these children can frequently learn to speak, often as well as children born without hearing loss do (Dettman, Pinder, Briggs, Dowell, & Leigh, 2007; Dorman & Wilson, 2004).

Key Takeaways

- Sound waves vibrating through media such as air, water, or metal are the stimulus energy that is sensed by the ear.
- The hearing system is designed to assess frequency (pitch) and amplitude (loudness).
- Sound waves enter the outer ear (the pinna) and are sent to the eardrum via the auditory canal. The resulting vibrations are relayed by the three ossicles, causing the oval window covering the cochlea to vibrate. The vibrations are detected by the cilia (hair cells) and sent via the auditory nerve to the auditory cortex.
- There are two theories as to how we perceive pitch: The frequency theory of hearing suggests that as a sound wave's pitch changes, nerve impulses of a corresponding frequency enter the auditory nerve. The place theory of hearing suggests that we hear different pitches because different areas of the cochlea respond to higher and lower pitches.
- Conductive hearing loss is caused by physical damage to the ear or eardrum and may be improved by hearing aids or cochlear implants. Sensorineural hearing loss, caused by damage to the hair cells or auditory nerves in the inner ear, may be produced by prolonged exposure to sounds of more than 85 decibels.

Exercise and Critical Thinking

1. Given what you have learned about hearing in this chapter, are you engaging in any activities that might cause long-term hearing loss? If so, how might you change your behaviour to reduce the likelihood of suffering damage?

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Long Description

Figure 6.18 long description: Levels of Noise

Decibels (dB)	Description	Examples
140	Painful and dangerous, use hearing protection or avoid.	Fireworks, gunshots, custom car stereos (at full volume)
130	Painful and dangerous, use hearing protection or avoid.	Jackhammers, ambulances
120	Uncomfortable, dangerous over 30 seconds	Jet planes (during takeoff)
110	Very loud, dangerous over 30 seconds	Concerts, car horns, sporting events
100	Very loud, dangerous over 30 seconds	Snowmobiles, MP3 players (at full volume)
90	Very loud, dangerous over 30 seconds	Lawnmowers, power tools, blenders, hair dryers
85	Over 85 dB for extended periods can cause permanent hearing loss.	
80	Loud	Alarm clocks
70	Loud	Traffic, vacuum cleaners
60	Moderate	Normal conversation, dishwashers
50	Moderate	Moderate raindall
40	Soft	Quiet library
20	Faint	Leaves rustling

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6.5: Tasting, Smelling, and Touching

Charles Stangor and Jennifer Walinga

Learning Objectives

- Summarize how the senses of taste and olfaction transduce stimuli into perceptions.
- Describe the process of transduction in the senses of touch and proprioception.
- Outline the gate control theory of pain. Explain why pain matters and how it may be controlled.

Although vision and hearing are by far the most important senses, human sensation is rounded out by four others, each of which provides an essential avenue to a better understanding of and response to the world around us. These other senses are *touch*, *taste*, and *smell*, and our *sense of body position and movement (proprioception)*.

Tasting

Taste is important not only because it allows us to enjoy the food we eat, but, even more crucial, because it leads us toward foods that provide energy (sugar, for instance) and away from foods that could be harmful. Many children are picky eaters for a reason — they are biologically predisposed to be very careful about what they eat. Together with the sense of smell, taste helps us maintain appetite, assess potential dangers (such as the odour of a gas leak or a burning house), and avoid eating poisonous or spoiled food.

Our ability to taste begins at the taste receptors on the tongue. The tongue detects six different taste sensations, known respectively as *sweet*, *salty*, *sour*, *bitter*, *piquancy (spicy)*, and *umami (savory)*. Umami is a meaty taste associated with meats, cheeses, soy, seaweed, and mushrooms, and is particularly found in monosodium glutamate (MSG), a popular flavour enhancer (Ikeda, 1909/2002; Sugimoto & Ninomiya, 2005).

Our tongues are covered with **taste buds**, which are *designed to sense chemicals in the mouth*. Most taste buds are located in the top outer edges of the tongue, but there are also receptors at the back of the tongue as well as on the walls of the mouth and at the back of the throat. As we chew food, it dissolves and enters the taste buds, triggering nerve impulses that are transmitted to the brain (Northcutt, 2004). Human tongues are covered with 2,000 to 10,000 taste buds, and each bud contains between 50 and 100 taste receptor cells. Taste buds are activated very quickly; a salty or sweet taste that touches a taste bud for even one-tenth of a second will trigger a neural impulse (Kelling & Halpern, 1983). On average, taste buds live for about five days, after which new taste buds are created to replace them. As we get older, however, the rate of creation decreases, making us less sensitive to taste. This change helps explain why some foods that seem so unpleasant in childhood are more enjoyable in adulthood.

The area of the sensory cortex that responds to taste is in a very similar location to the area that responds to smell, a fact that helps explain why the sense of smell also contributes to our experience of the things we eat. You may remember having had difficulty tasting food when you had a bad cold, and if you block your nose and taste slices of raw potato, apple, and parsnip, you will not be able to taste the differences between them. Our experience of texture in a food (the way we feel it on our tongues) also influences how we taste it.

Smelling

As we breathe in air through our nostrils, we inhale airborne chemical molecules, which are detected by the *10 million to 20 million receptor cells* embedded in the **olfactory membrane** *of the upper nasal passage*. The **olfactory receptor cells** are *topped with tentacle-like protrusions that contain receptor proteins*. When an odour receptor is stimulated, the membrane sends neural messages up the olfactory nerve to the brain (see Figure 6.20. “Smell Receptors”).

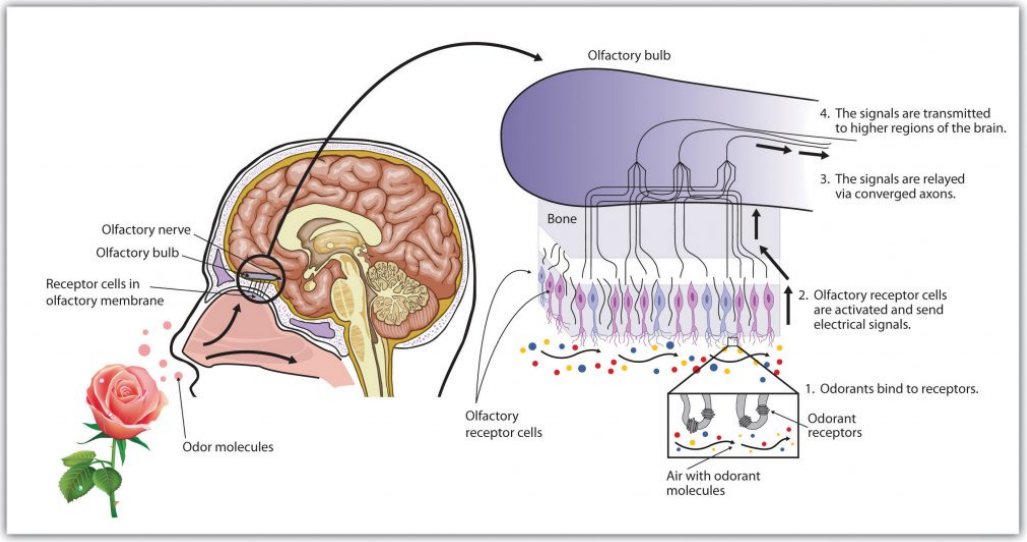


Figure 6.20 Smell Receptors. There are more than 1,000 types of odour receptor cells in the olfactory membrane.

We have approximately 1,000 types of *odour receptor cells* (Bensafi et al., 2004), and it is estimated that we can detect 10,000 different odours (Malnic, Hirono, Sato, & Buck, 1999). The receptors come in many different shapes and respond selectively to different smells. Like a lock and key, different chemical molecules fit into different receptor cells, and odours are detected according to their influence on a combination of receptor cells. Just as the 10 digits from 0 to 9 can combine in many different ways to produce an endless array of phone numbers, odour molecules bind to different combinations of receptors, and these combinations are decoded in the olfactory cortex. As you can see in Figure 6.21, "Age Differences in Smell," the sense of smell peaks in early adulthood and then begins a slow decline. By ages 60 to 70, the sense of smell has become sharply diminished. In addition, women tend to have a more acute sense of smell than men.

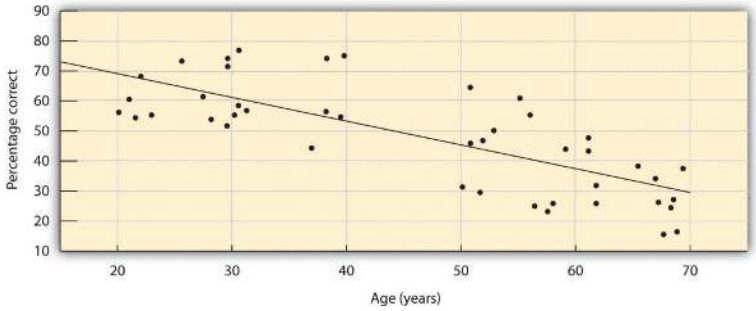


Figure 6.21 Age Differences in Smell. The ability to identify common odourants declines markedly between 20 and 70 years of age.

Touching

The sense of touch is essential to human development. Infants thrive when they are cuddled and attended to, but not if they are deprived of human contact (Baysinger, Plubell, & Harlow, 1973; Feldman, 2007; Haradon, Bascom, Dragomir, & Scripcaru, 1994). Touch communicates warmth, caring, and support, and is an essential part of the enjoyment we gain from our social interactions with close others (Field et al., 1997; Keltner, 2009).

The skin, the largest organ in the body, is the sensory organ for touch. The skin contains a variety of nerve endings, combinations of which respond to particular types of pressures and temperatures. When you touch different parts of the body, you will find that some areas are more ticklish, whereas other areas respond more to pain, cold, or heat.

The thousands of nerve endings in the skin respond to four basic sensations — *pressure*, *hot*, *cold*, and *pain* — but only the sensation of pressure has its own specialized receptors. Other sensations are created by a combination of the other four. For instance:

- The experience of a tickle is caused by the stimulation of neighbouring pressure receptors.
- The experience of heat is caused by the stimulation of hot and cold receptors.
- The experience of itching is caused by repeated stimulation of pain receptors.
- The experience of wetness is caused by repeated stimulation of cold and pressure receptors.

The skin is important not only in providing information about touch and temperature, but also in **proprioception** — *the ability to sense the position and movement of our body parts*. Proprioception is accomplished by specialized neurons located in the skin, joints, bones, ears, and tendons, which send messages about the compression and the contraction of muscles throughout the body. Without this feedback from our bones and muscles, we would be unable to play sports, walk, or even stand upright.

The ability to keep track of where the body is moving is also provided by the **vestibular system**, *a set of liquid-filled areas in the inner ear that monitors the head's position and movement, maintaining the body's balance*. As you can see in Figure 6.22, "The Vestibular System," the vestibular system includes the *semicircular canals* and the *vestibular sacs*. These sacs connect the canals with the cochlea. The semicircular canals sense the rotational movements of the body, and the vestibular sacs sense linear accelerations. The vestibular system sends signals to the neural structures that control eye movement and to the muscles that keep the body upright.

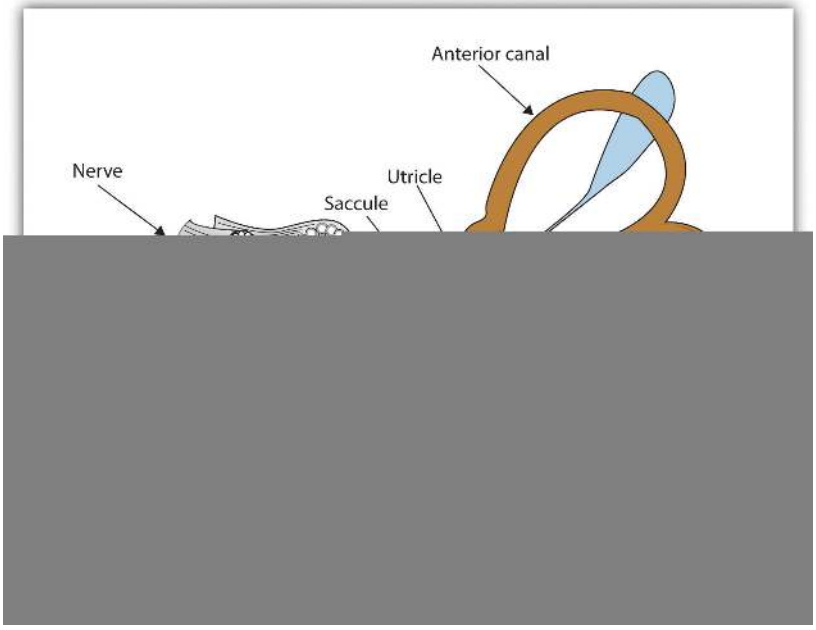


Figure 6.22 The Vestibular System. The vestibular system includes the semicircular canals (brown) that transduce the rotational movements of the body, and the vestibular sacs (blue) that sense linear accelerations.

Experiencing Pain

We do not enjoy it, but the experience of pain is how the body informs us that we are in danger. The burn when we touch a hot radiator and the sharp stab when we step on a nail lead us to change our behaviour, preventing further damage to our bodies. People who cannot experience pain are in serious danger of damage from wounds that others with pain would quickly notice and attend to.

The **gate control theory of pain** *proposes that pain is determined by the operation of two types of nerve fibres in the spinal cord.* One set of smaller nerve fibres carries pain from the body to the brain, whereas a second set of larger fibres is designed to stop or start (as a gate would) the flow of pain (Melzack & Wall, 1996). It is for this reason that massaging an area where you feel pain may help alleviate it — the massage activates the large nerve fibres that block the pain signals of the small nerve fibres (Wall, 2000).

Experiencing pain is a lot more complicated than simply responding to neural messages, however. It is also a matter of perception. We feel pain less when we are busy focusing on a challenging activity (Bantick et al., 2002), which can help explain why sports players may feel their injuries only after the game. We also feel less pain when we are distracted by humour (Zweyer, Velker, & Ruch, 2004). And pain is soothed by the brain's release of endorphins, natural hormonal pain killers. The release of endorphins can explain the euphoria experienced in the running of a marathon (Sternberg, Bailin, Grant, & Gracely, 1998).

Key Takeaways

- The ability to taste, smell, and touch are important because they help us avoid harm from environmental toxins.
- The many taste buds on our tongues and inside our mouths allow us to detect six basic taste sensations: sweet, salty, sour, bitter, piquancy, and umami.
- In olfaction, transduction occurs as airborne chemicals that are inhaled through the nostrils are detected by receptors in the olfactory membrane. Different chemical molecules fit into different receptor cells, creating different smells.
- The ability to smell diminishes with age and, on average, women have a better sense of smell than men.
- We have a range of different nerve endings embedded in the skin, combinations of which respond to the four basic sensations of pressure, hot, cold, and pain. But only the sensation of pressure has its own specialized receptors.
- Proprioception is our ability to sense the positions and movements of our body parts. Postural and movement information is detected by special neurons located in the skin, joints, bones, ears, and tendons, which pick up messages from the compression and the contraction of muscles throughout the body.
- The vestibular system, composed of structures in the inner ear, monitors the head's position and movement, maintaining the body's balance.
- Gate control theory explains how large and small neurons work together to transmit and regulate the flow of pain to the brain.

Exercises and Critical Thinking

1. Think of the foods that you like to eat the most. Which of the six taste sensations do these foods have, and why do you think that you like these particular flavours?
2. Why do you think that women might have a better developed sense of smell than do men?
3. Why is experiencing pain a benefit for human beings?

Image Attributions

Figure 6.21: Adapted from Murphy (1986).

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6.6: Accuracy and Inaccuracy in Perception

Charles Stangor and Jennifer Walinga

Learning Objectives

- Describe how sensation and perception work together through sensory interaction, selective attention, sensory adaptation, and perceptual constancy.
- Give examples of how our expectations may influence our perception, resulting in illusions and potentially inaccurate judgments.

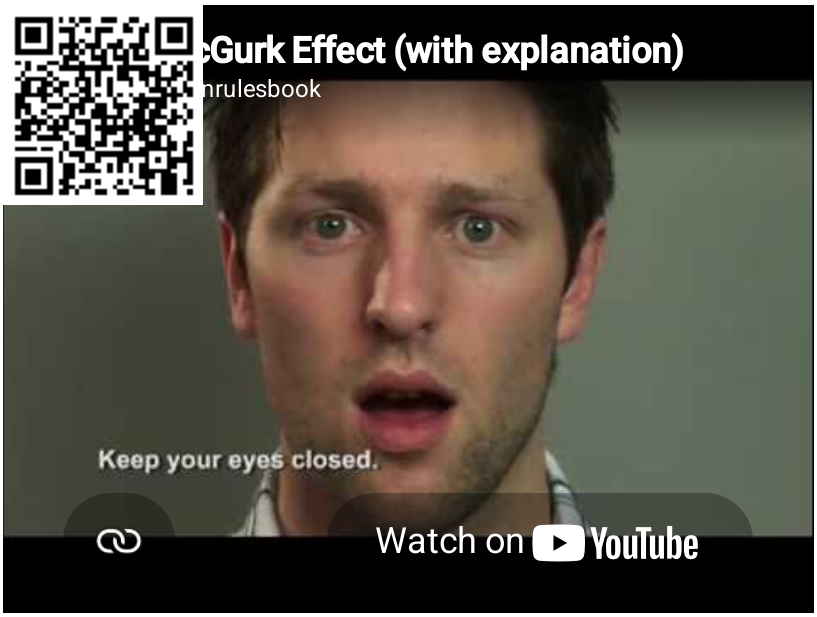
The eyes, ears, nose, tongue, and skin sense the world around us, and in some cases perform preliminary information processing on the incoming data. But by and large, we do not experience sensation — we experience the outcome of perception, the total package that the brain puts together from the pieces it receives through our senses and that the brain creates for us to experience. When we look out the window at a view of the countryside, or when we look at the face of a good friend, we don't just see a jumble of colours and shapes — we see, instead, an image of a countryside or an image of a friend (Goodale & Milner, 2006).

How the Perceptual System Interprets the Environment

This meaning making involves the automatic operation of a variety of essential perceptual processes. One of these is **sensory interaction** — *the working together of different senses to create experience*. Sensory interaction is involved when taste, smell, and texture combine to create the flavour we experience in food. It is also involved when we enjoy a movie because of the way the images and the music work together.

Although you might think that we understand speech only through our sense of hearing, it turns out that the visual aspect of speech is also important. One example of sensory interaction is shown in the **McGurk effect** — *an error in perception that occurs when we misperceive sounds because the audio and visual parts of the speech are mismatched*. You can witness the effect yourself by viewing "The McGurk Effect."

Video: *The McGurk Effect* [http://www.youtube.com/watch?v=jtsfidRq2tw]. The McGurk effect is an error in sound perception that occurs when there is a mismatch between the senses of hearing and seeing. You can experience it by watching this video.



Other examples of sensory interaction include the experience of nausea that can occur when the sensory information being received from the eyes and the body does not match information from the vestibular system (Flanagan, May, & Dobie, 2004) and **synesthesia** — *an experience in which one sensation (e.g., hearing a sound) creates experiences in another (e.g., vision)*. Most people do not experience synesthesia, but those who do link their perceptions in unusual ways, for instance, by experiencing colour when they taste a particular food or by hearing sounds when they see certain objects (Ramachandran, Hubbard, Robertson, & Sagiv, 2005).

Another important perceptual process is **selective attention** — *the ability to focus on some sensory inputs while tuning out others*. View "Video Clip: Selective Attention," and count the number of times the people in white playing with the ball pass it to each other. You may find that, like many other people who view it for the first time, you miss something important because you selectively attend to only one aspect of the video (Simons & Chabris, 1999). Perhaps knowledge of the process of selective attention can help you see why the security guards completely missed the fact that the Chaser group's motorcade was a fake — they focused on some aspects of the situation, such as the colour of the cars and the fact that they were there at all, and completely ignored others (the details of the security information).

Video: *Selective Attention* [http://www.youtube.com/watch?v=vJG698U2Mvo]. Watch this video and carefully count how many times the people in white pass the ball to each other.



Selective attention also allows us to focus on a single talker at a party while ignoring other conversations that are occurring around us (Broadbent, 1958; Cherry, 1953). Without this automatic selective attention, we'd be unable to focus on the single conversation we want to hear. But selective attention is not complete; we also, at the same time, monitor what's happening in the channels we are not focusing on. Perhaps you have had *the experience of being at a party and talking to someone in one part of the room, when suddenly you hear your name being mentioned by someone in another part of the room*. This **cocktail party phenomenon** shows us that although selective attention is limiting what we process, we are nevertheless simultaneously doing a lot of unconscious monitoring of the world around us — you didn't know you were attending to the background sounds of the party, but evidently you were.

A second fundamental process of perception is **sensory adaptation** — *a decreased sensitivity to a stimulus after prolonged and constant exposure*. When you step into a swimming pool, the water initially feels cold, but after a while you stop noticing it. After prolonged exposure to the same stimulus, our sensitivity toward it diminishes and we no longer perceive it. The ability to adapt to the things that don't change around us is essential to our survival, as it leaves our sensory receptors free to detect the important and informative changes in our environment and to respond accordingly. We ignore the sounds that our car makes every day, which leaves us free to pay attention to the sounds that are different from normal, and thus likely to need our attention. Our sensory receptors are alert to novelty and are fatigued after constant exposure to the same stimulus.

If sensory adaptation occurs with all senses, why doesn't an image fade away after we stare at it for a period of time? The answer is that, although we are not aware of it, our eyes are constantly flitting from one angle to the next, making *thousands of tiny movements* (called **saccades**) *every minute*. This constant eye movement guarantees that the image we are viewing always falls on fresh receptor cells. What would happen if we could stop the movement of our eyes? Psychologists have devised a way of testing the sensory adaptation of the eye by attaching an instrument that ensures a constant image is maintained on the eye's inner surface. Participants are fitted with a contact lens that has a miniature slide projector attached to it. Because the projector follows the exact movements of the eye, the same image is always projected, stimulating the same spot, on the retina. Within a few seconds, interesting things begin to happen. The image will begin to vanish, then reappear, only to disappear again, either in pieces or as a whole. Even the eye experiences sensory adaptation (Yarbus, 1967).

One of the major problems in perception is to ensure that we always perceive the same object in the same way, even when the sensations it creates on our receptors change dramatically. *The ability to perceive a stimulus as constant despite changes in sensation* is known as **perceptual constancy**. Consider our image of a door as it swings. When it is closed, we see it as rectangular, but when it is open, we see only its edge and it appears as a line. But we never perceive the door as changing shape as it swings — perceptual mechanisms take care of the problem for us by allowing us to see a constant shape.

The visual system also corrects for colour constancy. Imagine that you are wearing blue jeans and a bright white T-shirt. When you are outdoors, both colours will be at their brightest, but you will still perceive the white T-shirt as bright and the blue jeans as

darker. When you go indoors, the light shining on the clothes will be significantly dimmer, but you will still perceive the T-shirt as bright. This is because we put colours in context and see that, compared with its surroundings, the white T-shirt reflects the most light (McCann, 1992). In the same way, a green leaf on a cloudy day may reflect the same wavelength of light as a brown tree branch does on a sunny day. Nevertheless, we still perceive the leaf as green and the branch as brown.

Illusions

Although our perception is very accurate, it is not perfect. **Illusions** *occur when the perceptual processes that normally help us correctly perceive the world around us are fooled by a particular situation so that we see something that does not exist or that is incorrect*. Figure 6.23, "Optical Illusions as a Result of Brightness Constancy (Left) and Colour Constancy (Right)," presents two situations in which our normally accurate perceptions of visual constancy have been fooled.

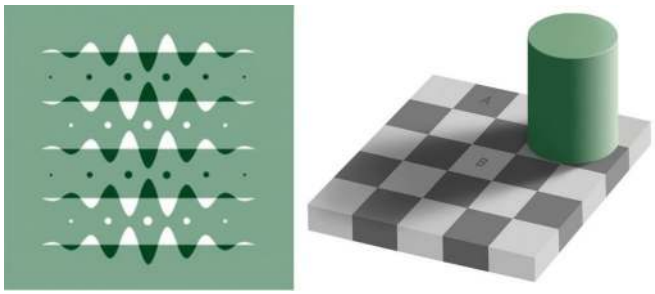


Figure 6.23 Optical Illusions as a Result of Brightness Constancy (Left) and Colour Constancy (Right). Look carefully at the snakelike pattern on the left. Are the green strips really brighter than the background? Cover the white curves and you'll see they are not. Square A in the right-hand image looks very different from square B, even though they are exactly the same.

Another well-known illusion is the **Mueller-Lyer illusion** (see Figure 6.24, "The Mueller-Lyer Illusion"). *The line segment in the bottom arrow looks longer to us than the one on the top, even though they are both actually the same length*. It is likely that the illusion is, in part, the result of the failure of monocular depth cues — the bottom line looks like an edge that is normally farther away from us, whereas the top one looks like an edge that is normally closer.

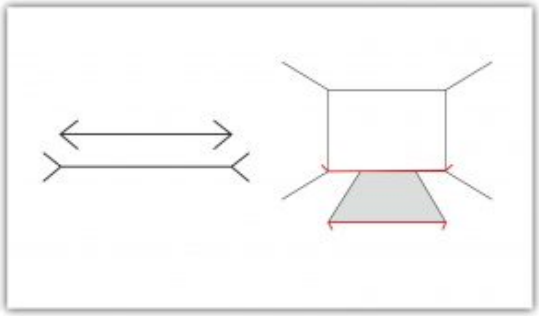


Figure 6.24 The Mueller-Lyer Illusion. The Mueller-Lyer illusion makes the line segment at the top of the left picture appear shorter than the one at the bottom. The illusion is caused, in part, by the monocular distance cue of depth — the bottom line looks like an edge that is normally farther away from us, whereas the top one looks like an edge that is normally closer.

The **moon illusion** refers to the fact that *the moon is perceived to be about 50% larger when it is near the horizon than when it is seen overhead, despite the fact that in both cases the moon is the same size* and casts the same size retinal image. The monocular depth cues of position and aerial perspective (see Figure 6.25, "The Moon Illusion") create the illusion that things that are lower and more hazy are farther away. The skyline of the horizon (trees, clouds, outlines of buildings) also gives a cue that the moon is far away, compared to when it is at its zenith. If we look at a horizon moon through a tube of rolled-up paper, taking away the surrounding horizon cues, the moon will immediately appear smaller.

Figure 6.25 The Moon Illusion. The moon always looks larger on the horizon than when it is high above. But if we take away the surrounding distance cues of the horizon, the illusion disappears.

The *Ponzo illusion* operates on the same principle. As you can see in Figure 6.26, "The Ponzo Illusion," the top yellow bar seems longer than the bottom one, but if you measure them you'll see that they are exactly the same length. The monocular depth cue of linear perspective leads us to believe that, given two similar objects, the distant one can only cast the same size retinal image as the closer object if it is larger. The topmost bar therefore appears longer.

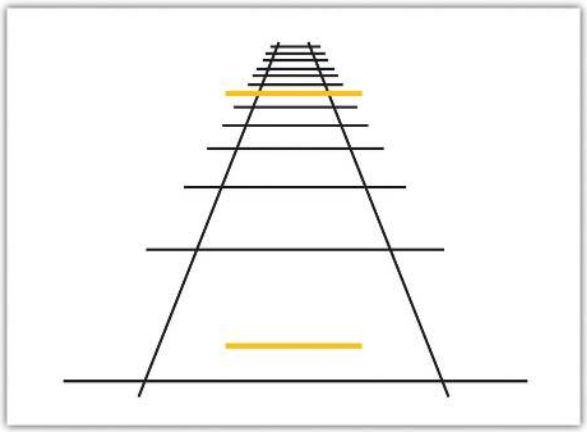


Figure 6.26 The Ponzo Illusion. The Ponzo illusion is caused by a failure of the monocular depth cue of linear perspective. Both bars are the same size, even though the top one looks larger.

Illusions demonstrate that our perception of the world around us may be influenced by our prior knowledge. But the fact that some illusions exist in some cases does not mean that the perceptual system is generally inaccurate — in fact, humans normally become so closely in touch with their environment that the physical body and the particular environment that we sense and perceive becomes **embodied** — *that is, built into and linked with our cognition, such that the world around us becomes part of our brain* (Calvo & Gomila, 2008). The close relationship between people and their environments means that, although illusions can be created in the lab and under some unique situations, they may be less common with active observers in the real world (Runeson, 1988).

The Important Role of Expectations in Perception

Our emotions, mindset, expectations, and the contexts in which our sensations occur all have a profound influence on perception. People who are warned that they are about to taste something bad rate what they do taste more negatively than people who are told that the taste won't be so bad (Nitschke et al., 2006), and people perceive a child and adult pair as looking more alike when they are told that they are parent and child (Bressan & Dal Martello, 2002). Similarly, participants who see images of the same baby rate it as stronger and bigger when they are told it is a boy as opposed to when they are told it is a girl (Stern & Karraker, 1989), and research participants who learn that a child is from a lower-class background perceive the child's scores on an intelligence test as lower than people who see the same test taken by a child they are told is from an upper-class background (Darley & Gross, 1983). Plassmann, O'Doherty, Shiv, and Rangel (2008) found that wines were rated more positively and caused greater brain

activity in brain areas associated with pleasure when they were said to cost more than when they were said to cost less. And even experts can be fooled: professional referees tended to assign more penalty cards to soccer teams for videotaped fouls when they were told that the team had a history of aggressive behaviour than when they had no such expectation (Jones, Paull, & Erskine, 2002).

Our perceptions are also influenced by our desires and motivations. When we are hungry, food-related words tend to grab our attention more than non-food-related words (Mogg, Bradley, Hyare, & Lee, 1998), we perceive objects that we can reach as bigger than those that we cannot reach (Witt & Proffitt, 2005), and people who favour a political candidate's policies view the candidate's skin colour more positively than do those who oppose the candidate's policies (Caruso, Mead, & Balcetis, 2009). Even our culture influences perception. Chua, Boland, and Nisbett (2005) showed American and Asian graduate students different images, such as an airplane, an animal, or a train, against complex backgrounds. They found that (consistent with their overall individualistic orientation) the American students tended to focus more on the foreground image, while Asian students (consistent with their interdependent orientation) paid more attention to the image's context. Furthermore, Asian-American students focused more or less on the context depending on whether their Asian or their American identity had been activated.

Psychology in Everyday Life: How Understanding Sensation and Perception Can Save Lives

Human factors is the *field of psychology that uses psychological knowledge, including the principles of sensation and perception, to improve the development of technology*. Human factors has worked on a variety of projects, ranging from nuclear reactor control centres and airplane cockpits to cell phones and websites (Proctor & Van Zandt, 2008). For instance, modern televisions and computer monitors were developed on the basis of the trichromatic colour theory, using three colour elements placed close enough together that the colours are blended by the eye. Knowledge of the visual system also helped engineers create new kinds of displays, such as those used on notebook computers and music players, and better understand how using cell phones while driving may contribute to automobile accidents (Lee & Strayer, 2004).

Human factors also has made substantial contributions to airline safety. About two-thirds of accidents on commercial airplane flights are caused by human error (Nickerson, 1998). During takeoff, travel, and landing, the pilot simultaneously communicates with ground control, maneuvers the plane, scans the horizon for other aircraft, and operates controls. The need for a usable interface that works easily and naturally with the pilot's visual perception is essential.

Psychologist Conrad Kraft (1978) hypothesized that as planes land, with no other distance cues visible, pilots may be subjected to a type of moon illusion, in which the city lights beyond the runway appear much larger on the retina than they really are, deceiving the pilot into landing too early. Kraft's findings caused airlines to institute new flight safety measures, where copilots must call out the altitude progressively during the descent, which has probably decreased the number of landing accidents.

Figure 6.27 presents images of an airplane instrument panel before and after it was redesigned by human factors psychologists. On the left is the initial design, in which the controls were crowded and cluttered, in no logical sequence, each control performing one task. The controls were more or less the same in colour, and the gauges were not easy to read. The redesigned digital cockpit (right on Figure 5.27) shows a marked improvement in usability. More of the controls are colour-coded and multifunctional so that there is less clutter on the dashboard. Screens make use of LCD and 3-D graphics. Text sizes are changeable — increasing readability — and many of the functions have become automated, freeing up the pilots' concentration for more important activities.



Figure 6.27 Airplane Cockpits. Initial design of the airplane cockpit (left); the digital design of the airplane cockpit (right), which has taken human factors into account.

One important aspect of the redesign was based on the principles of sensory adaptation. Displays that are easy to see in darker conditions quickly become unreadable when the sun shines directly on them. It takes the pilot a relatively long time to adapt to the suddenly much brighter display. Furthermore, perceptual contrast is important. The display cannot be so bright at night that the pilot is unable to see targets in the sky or on the land. Human factors psychologists used these principles to determine the appropriate stimulus intensity needed on these displays so that pilots would be able to read them accurately and quickly under a wide range of conditions. The psychologists accomplished this by developing an automatic control mechanism that senses the ambient light visible through the front cockpit windows and detects the light falling on the display surface, and then automatically adjusts the intensity of the display for the pilot (Silverstein, Krantz, Gomer, Yeh, & Monty, 1990; Silverstein & Merrifield, 1985).

Key Takeaways

- Sensory interaction occurs when different senses work together, for instance, when taste, smell, and touch together produce the flavour of food.
- Selective attention allows us to focus on some sensory experiences while tuning out others.
- Sensory adaptation occurs when we become less sensitive to some aspects of our environment, freeing us to focus on more important changes.
- Perceptual constancy allows us to perceive an object as the same, despite changes in sensation.
- Cognitive illusions are examples of how our expectations can influence our perceptions.
- Our emotions, motivations, desires, and even our culture can influence our perceptions.

Exercises and Critical Thinking

1. Consider the role of the security personnel at the APEC meeting who let the Chaser group's car enter the security area. List some perceptual processes that might have been at play.
2. Consider some cases where your expectations about what you thought you might be going to experience have influenced your perceptions of what you actually experienced.

Image Attributions

Figure 6.23: Grey Square Optical Illusion by Edward H. Adelson, http://commons.wikimedia.org/wiki/Fi...l_illusion.PNG is in the public domain.

Figure 6.25: "Full Moon Through The Clouds" by Jake Khuon (http://www.flickr.com/photos/wintrhawk/443408898/) is licensed under CC BY-NC 2.0 license(http://creativecommons.org/licenses/...2.0/deed.en_CA). "Last Sail Under a Full Moon" by Kipp Baker (http://www.flickr.com/photos/mrpixur...in/photostream) is licensed under CC BY-NC-ND 2.0 license (http://creativecommons.org/licenses/...2.0/deed.en_CA).

Figure 6.27: "DC-9 Cockpit" by Dmitry Denisenkov (http://en.wikipedia.org/wiki/File:DC-9_Cockpit.jpg) is licensed under the Creative Commons Attribution-Share Alike 3.0 Unported.(http://creativecommons.org/licenses/by-sa/3.0/deed.en) "Airbus A380 cockpit" by Naddsy (http://en.wikipedia.org/wiki/File:Ai...80_cockpit.jpg) used under the Creative Commons Attribution 2.0 Generic (http://creativecommons.org/licenses/by/2.0/deed.en).

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6.7: Summary, Key Terms, and Self-Test

Charles Stangor, Jennifer Walinga, and Lee Sanders

Summary

Sensation and perception work seamlessly together to allow us to detect both the presence of, and changes in, the stimuli around us.

The study of sensation and perception is exceedingly important for our everyday lives because the knowledge generated by psychologists is used in so many ways to help so many people.

Each sense accomplishes the basic process of transduction — the conversion of stimuli detected by receptor cells into electrical impulses that are then transported to the brain — in different, but related, ways.

Psychophysics is the branch of psychology that studies the effects of physical stimuli on sensory perceptions. Psychophysicists study the absolute threshold of sensation as well as the difference threshold, or just noticeable difference (JND). Weber's law maintains that the JND of a stimulus is a constant proportion of the original intensity of the stimulus.

Most of our cerebral cortex is devoted to seeing, and we have substantial visual skills. The eye is a specialized system that includes the cornea, pupil, iris, lens, and retina. Neurons, including rods and cones, react to light landing on the retina and send it to the visual cortex via the optic nerve.

Images are perceived, in part, through the action of feature detector neurons.

The shade of a colour, known as hue, is conveyed by the wavelength of the light that enters the eye. The Young-Helmholtz trichromatic colour theory and the opponent-process colour theory are theories of how the brain perceives colour.

Depth is perceived using both binocular and monocular depth cues. Monocular depth cues are based on gestalt principles. The beta effect and the phi phenomenon are important in detecting motion.

The ear detects both the amplitude (loudness) and frequency (pitch) of sound waves.

Important structures of the ear include the pinna, eardrum, ossicles, cochlea, and oval window.

The frequency theory of hearing proposes that as the pitch of a sound wave increases, nerve impulses of a corresponding frequency are sent to the auditory nerve. The place theory of hearing proposes that different areas of the cochlea respond to different frequencies.

Sounds that are 85 decibels or more can cause damage to your hearing, particularly if you are exposed to them repeatedly. Sounds that exceed 130 decibels are dangerous, even if you are exposed to them infrequently.

The tongue detects six different taste sensations, known respectively as sweet, salty, sour, bitter, piquancy (spicy), and umami (savory).

We have approximately 1,000 types of odour receptor cells and it is estimated that we can detect 10,000 different odours.

Thousands of nerve endings in the skin respond to four basic sensations — pressure, hot, cold, and pain — but only the sensation of pressure has its own specialized receptors. The ability to keep track of where the body is moving is provided by the vestibular system.

Perception involves the processes of sensory interaction, selective attention, sensory adaptation, and perceptual constancy.

Although our perception is very accurate, it is not perfect. Our expectations and emotions colour our perceptions and may result in illusions.

Key Terms

- Absolute threshold of a sensation
- Accommodation
- Amplitude
- Beta effect
- Binocular depth cues
- Blindsight
- Blind spot
- Cilia
- Clock time
- Cochlea
- Cochlear implant
- Cocktail party phenomenon
- Color blindness
- Cones
- Conscious
- Convergence
- Cornea
- Decibel
- Depth cues
- Depth perception
- Difference threshold (or Just Noticeable Difference [JND])
- Electromagnetic energy
- Embodied
- Event time
- Farsighted
- Feature detector neurons
- Fovea
- Frequency
- Frequency theory of hearing
- Gate control theory of pain
- Gestalt
- Hertz
- Hue
- Human factors
- Illusions
- Iris
- Lens
- Loudness
- Ma
- McGurk effect
- Monochronic (M-time)
- Monocular depth cues
- Moon illusion
- Mueller-Lyer Illusion
- Nearsighted
- Olfactory membrane
- Olfactory receptor cells
- Opponent-process color theory
- Optic nerve
- Ossicles
- Oval window
- Pace of life
- Perception
- Perceptual constancy
- Phi phenomenon
- Pinna
- Pitch
- Place theory of hearing
- Polychronic (P-time)
- Proprioception
- Psychophysics
- Pupil
- Response bias
- Retina
- Rods
- Saccades
- Selective attention
- Sensation
- Sensitivity
- Sensory adaptation
- Sensory interaction
- Signal detection analysis
- Silent language
- Six senses
- Social time
- Subliminal stimuli
- Synesthesia
- Taste buds
- Temporal perspective
- Tinnitus
- Transduction
- Trichromatic colour theory
- Tympanic membrane (or Eardrum)
- Wavelength
- Weber’s Law
- Vestibular system
- Visible spectrum
- Visual accommodation
- Visual cliff

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CHAPTER OVERVIEW

7: States of Consciousness

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7.1: Introduction

Charles Stangor, Jennifer Walinga, and Lee Sanders

An Unconscious Killing

During the night of May 23, 1987, Kenneth Parks, a 23-year-old Canadian with a wife, a baby daughter, and heavy gambling debts, got out of his bed, climbed into his car, and drove 15 miles to the home of his wife's parents in the suburbs of Toronto. There, he attacked them with a knife, killing his mother-in-law and severely injuring his father-in-law. Parks then drove to a police station and stumbled into the building, holding up his bloody hands and saying, "I think I killed some people…my hands." The police arrested him and took him to a hospital, where surgeons repaired several deep cuts on his hands. Only then did police discover that he had indeed assaulted his in-laws.

Parks claimed that he could not remember anything about the crime. He said that he remembered going to sleep in his bed, then awakening in the police station with bloody hands, but nothing in between. His defence was that he had been asleep during the entire incident and was not aware of his actions (Martin, 2009).

Not surprisingly, no one believed this explanation at first. However, further investigation established that he did have a long history of sleepwalking, he had no motive for the crime, and despite repeated attempts to trip him up in numerous interviews, he was completely consistent in his story, which also fit the timeline of events. Parks was examined by a team of sleep specialists, who found that the pattern of brainwaves that occurred while he slept was very abnormal (Broughton, Billings, Cartwright, & Doucette, 1994). The specialists eventually concluded that sleepwalking, probably precipitated by stress and anxiety over his financial troubles, was the most likely explanation of his aberrant behaviour. They also agreed that such a combination of stressors was unlikely to happen again, so he was not likely to undergo another such violent episode and was probably not a hazard to others. Given this combination of evidence, the jury acquitted Parks of murder and assault charges. He walked out of the courtroom a free man (Wilson, 1998).

Consciousness is defined as *our subjective awareness of ourselves and our environment* (Koch, 2004). The experience of consciousness is fundamental to human nature. We all know what it means to be conscious, and we assume (although we can never be sure) that other human beings experience their consciousness similarly to how we experience ours.

Philosophies of human consciousness inform the present study of behaviour and mental processes. Socrates (490–399 BC) argued that free will is limited after he noticed that people often do things they really do not want to do. He called this **akrasia** or *a lack of control over oneself*. A few centuries later, the Roman thinker Plotinus (AD 205–270) was presumably the first to allude to the possibility of unconscious psychological processes where he noted that the absence of conscious perception does not necessarily prove the absence of mental activity.

Some philosophers and religious practices argue that the mind (or soul) and the body are separate entities. For instance, the French philosopher René Descartes (1596-1650), shown in Figure 7.1, was a proponent of **dualism**, *the idea that the mind, a nonmaterial entity, is separate from (although connected to) the physical body*. In contrast to the dualists, psychologists believe that consciousness (and thus the mind) exists in the brain, not separate from it. In fact, psychologists believe that consciousness is the result of the activity of the many neural connections in the brain, and that we experience different states of consciousness depending on what our brain is currently doing (Dennett, 1991; Koch & Greenfield, 2007).



Figure 7.1 Portrait of René Descartes. The French philosopher René Descartes (1596-1650) was a proponent of dualism, the theory that the mind and body are two separate entities. Psychologists reject this idea, however, believing that consciousness is a result of activity in the brain, not separate from it.

The study of consciousness plays an important role in many important psychological theories. Freud's personality theories differentiated between the unconscious and the conscious aspects of behaviour. His concept of *subconscious* accounts for things like memory and motivations that remain outside of the realm of consciousness (Biswas-Diener & Teeny, 2019). As discussed in Chapter 2, the idea of *preconscious* refers to information that we could pay attention to if desired, and where memories are stored for easy retrieval.

Consciousness is also important to the fundamental psychological question regarding the presence of free will. Although we may understand and believe that some of our behaviours are caused by forces that are outside our awareness (i.e., unconscious), we nevertheless believe that we have control over, and are aware that we are engaging in, most of our behaviours. To discover that we have, or someone else has, engaged in a complex behaviour, such as driving in a car and causing severe harm to others, without being at all conscious of these actions, is so unusual as to be shocking. And yet psychologists are increasingly certain that a great deal of our behaviour is caused by processes of which we are unaware and over which we have little or no control (Libet, 1999; Wegner, 2003).

Our experience of consciousness is functional because we use it to guide and control our behaviour, and to think logically about problems (DeWall, Baumeister, & Masicampo, 2008). Consciousness allows us to plan activities and to monitor our progress toward the goals we set for ourselves. And consciousness is fundamental to our sense of morality — we believe that we have the free will to perform moral actions while avoiding immoral behaviours.

Present-day psychologists distinguish between automatic (*unconscious*) and **controlled** (*conscious*) behaviours and between **implicit** (*unconscious)* and **explicit** (*conscious*) memory (Petty, Wegener, Chaiken, & Trope, 1999; Shanks, 2005). **Awareness** operates on two levels and humans fluctuate between the high and low thinking states. **Low awareness** of subtle and even subliminal influences can become conscious as a result of **cues** or *stimulus* of significant meaning. **High awareness** refers to our consciousness of what is going on around us. **Mindfulness** is a state of heightened awareness, focus, and evaluation of our thoughts. **Attention** is what William James (1890) referred to as a *concentration of consciousness.* It is a mental resource that can be vigilant and sustained or divided and selective (Biswas-Diener & Teeny, 2019).

Priming studies aim to activate certain concepts and associations in people's memory below conscious awareness in order to understand the effect on subsequent behaviour. Researchers engage the **implicit associations test** (IAT) to study unconscious motives and beliefs. The **Flexible Correction Model** suggests that humans have an ability to correct or change beliefs and evaluations that have been influenced or biased by an undue, outside source.

Because the brain varies in its current level and type of activity, consciousness is transitory. If we drink too much coffee or beer, the caffeine or alcohol influences the activity in our brain, and our consciousness may change. When we are anesthetized before an operation or experience a concussion after a knock on the head, we may lose consciousness entirely as a result of changes in brain activity. We also lose consciousness when we sleep.

Sleep is unique because while we lack full awareness in this state of consciousness, the brain is still active. Sleep serves the function of mental and physical restoration. Dreams are an interesting aspect of sleep. Theories suggest that dreaming is our nonconscious attempt to make sense of daily experience and learning (Biswas-Diener & Teeny, 2019). According to Freud, dreams represent troublesome wishes and desires.

Hypnosis is *a mental state characterized by reduced peripheral awareness* (Kihlstrom, 2003). It is usually induced by a procedure known as *hypnotic induction*, which consists of heightened suggestibility, deep relaxation, and intense focus (Nash & Barnier, 2008). **Sensory deprivation** is the *intentional reduction of stimuli affecting one or more of the five senses, with the possibility of resulting changes in consciousness*. **Meditation** refers to *techniques in which the individual focuses on something specific, such as an object, a word, or one's breathing, with the goal of ignoring external distractions, focusing on one's internal state, and achieving a state of relaxation and well-being*. A **trance state** involves a dissociation of the self where people are said to have less voluntary control over their behaviors and actions.

In some cases, consciousness may become aversive — for instance, when we become aware that we are not living up to our own goals or expectations, or when we believe that other people perceive us negatively. In these cases, we may engage in behaviours that help us escape from consciousness, through the use of psychoactive drugs for example (Baumeister, 1998).

Some substances can have a powerful effect on perception and on consciousness. A **psychoactive drug** is *a chemical that changes our states of consciousness, and particularly our perceptions and moods.* **Opioids** are *chemicals that increase activity in opioid receptor neurons in the brain and in the digestive system. Opioids produce euphoria, analgesia, slower breathing, and constipation*. **Hallucinogens** are substances that alter a person's perceptions, often by creating visions or hallucinations that are not real. **Depressants** *reduce the activity of the CNS* and slow down the body's physiology and mental processes. **Stimulants** speed up the body's physiological and mental processes and *operate by blocking the reuptake of dopamine, norepinephrine, and serotonin in the synapses of the CNS.* Stimulants are highly addictive, and we will discuss why in terms of their effect on the brain further along in this chapter.

Even when we know the potential costs of using drugs, we may engage in using them anyway because the rewards from using the drugs are occurring right now, whereas the potential costs are abstract and only in the future. And drugs are not the only things we enjoy or can abuse. It is normal to refer to the abuse of other behaviours, such as gambling, sex, overeating, and even overworking, as "addictions" to describe the overuse of pleasant stimuli.

Image Attributions

Figure 7.1: Portrait of René Descartes by André Hatala, (http://commons.wikimedia.org/wiki/Fi..._Descartes.jpg) is in the public domain.

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7.2: States of Consciousness

Robert Biswas-Diener and Jake Teeny

No matter what you're doing–solving homework, playing a video game, simply picking out a shirt–all of your actions and decisions relate to your consciousness. But as frequently as we use it, have you ever stopped to ask yourself: What really is consciousness? In this module, we discuss the different levels of consciousness and how they can affect your behavior in a variety of situations. As well, we explore the role of consciousness in other, "altered" states like hypnosis and sleep.

Learning Objectives

- Define consciousness and distinguish between high and low conscious states
- Explain the relationship between consciousness and bias
- Understand the difference between popular portrayals of hypnosis and how it is currently used therapeutically

Introduction

Have you ever had a fellow motorist stopped beside you at a red light, singing his brains out, or picking his nose, or otherwise behaving in ways he might not normally do in public? There is something about being alone in a car that encourages people to zone out and forget that others can see them. Although these little lapses of attention are amusing for the rest of us, they are also instructive when it comes to the topic of consciousness.



Figure 7.2 This guy is singing his heart out in his one-man mobile music studio. Have you ever done this?

Consciousness is a term meant to indicate awareness. It includes awareness of the self, of bodily sensations, of thoughts and of the environment. In English, we use the opposite word "unconscious" to indicate senselessness or a barrier to awareness, as in the case of "Theresa fell off the ladder and hit her head, knocking herself unconscious." And yet, psychological theory and research suggest that consciousness and unconsciousness are more complicated than falling off a ladder. That is, consciousness is more than just being "on" or "off." For instance, Sigmund Freud (1856 – 1939)—a psychological theorist—understood that even while we are awake, many things lay outside the realm of our conscious awareness (like being in the car and forgetting the rest of the world can see into your windows). In response to this notion, Freud introduced the concept of the "subconscious" (Freud, 2001) and proposed that some of our memories and even our basic motivations are not always accessible to our conscious minds.

Upon reflection, it is easy to see how slippery a topic consciousness is. For example, are people conscious when they are daydreaming? What about when they are drunk? In this module, we will describe several levels of consciousness and then discuss altered states of consciousness such as hypnosis and sleep.

Levels of Awareness

In 1957, a marketing researcher inserted the words "Eat Popcorn" onto one frame of a film being shown all across the United States. And although that frame was only projected onto the movie screen for 1/24th of a second—a speed too fast to be perceived by conscious awareness—the researcher reported an increase in popcorn sales by nearly 60%. Almost immediately, all forms of "subliminal messaging" were regulated in the US and banned in countries such as Australia and the United Kingdom. Even though it was later shown that the researcher had made up the data (he hadn't even inserted the words into the film), this fear about influences on our subconscious persists. At its heart, this issue pits various levels of awareness against one another. On the one hand, we have the "low awareness" of subtle, even subliminal influences. On the other hand, there is you—the conscious thinking, feeling you which includes all that you are currently aware of, even reading this sentence. However, when we consider these different levels of awareness separately, we can better understand how they operate.

Low Awareness

You are constantly receiving and evaluating sensory information. Although each moment has too many sights, smells, and sounds for them all to be consciously considered, our brains are nonetheless processing all that information. For example, have you ever been at a party, overwhelmed by all the people and conversation, when out of nowhere you hear your name called? Even though you have no idea what else the person is saying, you are somehow conscious of your name (for more on this, "the cocktail party effect," see Noba's Module on Attention). So, even though you may not be *aware* of various stimuli in your environment, your brain is paying closer attention than you think.

Similar to a reflex (like jumping when startled), some **cues**, or significant sensory information, will automatically elicit a response from us even though we never consciously perceive it. For example, Öhman and Soares (1994) measured subtle variations in sweating of participants with a fear of snakes. The researchers flashed pictures of different objects (e.g., mushrooms, flowers, and most importantly, snakes) on a screen in front of them, but did so at speeds that left the participant clueless as to what he or she had actually seen. However, when snake pictures were flashed, these participants started sweating more (i.e., a sign of fear), even though they had no idea what they'd just viewed!

Although our brains perceive some stimuli without our conscious awareness, do they really affect our subsequent thoughts and behaviors? In a landmark study, Bargh, Chen, and Burrows (1996) had participants solve a word search puzzle where the answers pertained to words about the elderly (e.g., "old," "grandma") or something random (e.g., "notebook," "tomato"). Afterward, the researchers secretly measured how fast the participants walked down the hallway exiting the experiment. And although none of the participants were aware of a theme to the answers, those who had solved a puzzle with elderly words (vs. those with other types of words) walked more slowly down the hallway!

Priming Studies and Replication

If the results of priming studies sound too fantastic to be believed, you are not alone in your skepticism. Recently, many studies in psychology—including many priming studies—have come under scrutiny because they do not "replicate." This means that when later researchers have attempted to recreate certain studies, they have not always gotten the same—or even similar—results. Non-replication does not suggest that the original researchers "faked" the results, but that there may have been flaws in the original sampling or research methods. Fortunately, researchers are very aware of the problem of non-replication and have taken steps to address the issue. For an in-depth exploration of the so-called "replication crisis" in psychology, please see the chapter on that topic.

Figure 7.3 Priming Studies and Replication

This effect is called **priming** (i.e., readily "activating" certain concepts and associations from one's memory) has been found in a number of other studies. For example, priming people by having them drink from a warm glass (vs. a cold one) resulted in behaving more "warmly" toward others (Williams & Bargh, 2008). Although all of these influences occur beneath one's conscious awareness, they still have a significant effect on one's subsequent thoughts and behaviors.

In the last two decades, researchers have made advances in studying aspects of psychology that exist beyond conscious awareness. As you can understand, it is difficult to use self-reports and surveys to ask people about motives or beliefs that they, themselves, might not even be aware of! One way of side-stepping this difficulty can be found in the **implicit associations test**, or IAT (Greenwald, McGhee & Schwartz, 1998). This research method uses computers to assess people's reaction times to various stimuli and is a very difficult test to fake because it records automatic reactions that occur in milliseconds. For instance, to shed light on deeply held biases, the IAT might present photographs of Caucasian faces and Asian faces while asking research participants to click buttons indicating either "good" or "bad" as quickly as possible. Even if the participant clicks "good" for every face shown, the IAT can still pick up tiny delays in responding. Delays are associated with more mental effort needed to process information. When information is processed quickly—as in the example of white faces being judged as "good"—it can be contrasted with slower processing—as in the example of Asian faces being judged as "good"—and the difference in processing speed is reflective of bias. In this regard, the IAT has been used for investigating stereotypes (Nosek, Banaji & Greenwald, 2002) as well as self-esteem (Greenwald & Farnam, 2000). This method can help uncover non-conscious biases as well as those that we are motivated to suppress.

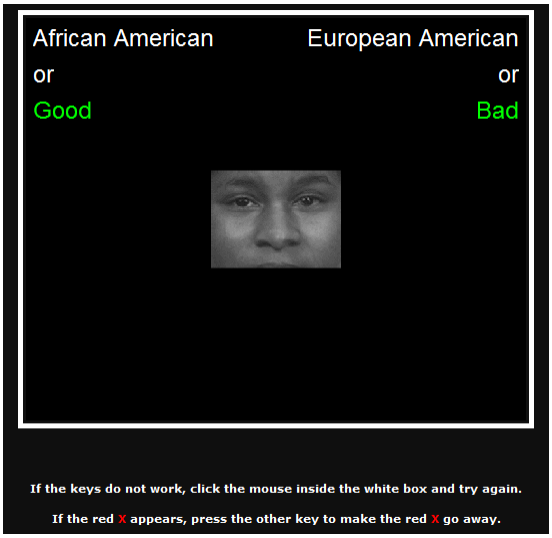


Figure 7.4 An actual screenshot from an IAT (Implicit Association Test) that a person might take to test their own mental representations of various cognitive constructs. In this particular case, this is an item testing an individual's unconscious reaction towards members of various ethnic groups. [Image: Courtesy of Anthony Greenwald from Project Implicit]

High Awareness

Just because we may be influenced by these "invisible" factors, it doesn't mean we are helplessly controlled by them. The other side of the awareness continuum is known as "high awareness." This includes effortful attention and careful decision making. For example, when you listen to a funny story on a date, or consider which class schedule would be preferable, or complete a complex math problem, you are engaging a state of consciousness that allows you to be highly aware of and focused on particular details in your environment.

Figure 7.5 Meditation has been practiced for centuries in religious contexts. In the past 50 years it has become increasingly popular as a secular practice. Scientific studies have linked meditation to lower stress and higher well-being.

Mindfulness is a state of higher consciousness that includes an awareness of the thoughts passing through one's head. For example, have you ever snapped at someone in frustration, only to take a moment and reflect on why you responded so aggressively? This more effortful consideration of your thoughts could be described as an expansion of your conscious awareness as you take the time to consider the possible influences on your thoughts. Research has shown that when you engage in this more deliberate consideration, you are less persuaded by irrelevant yet biasing influences, like the presence of a celebrity in an advertisement (Petty & Cacioppo, 1986). Higher awareness is also associated with recognizing when you're using a stereotype, rather than fairly evaluating another person (Gilbert & Hixon, 1991).

Humans alternate between low and high thinking states. That is, we shift between focused attention and a less attentive default state, and we have neural networks for both (Raichle, 2015). Interestingly, the less we're paying attention, the more likely we are to be influenced by non-conscious stimuli (Chaiken, 1980). Although these subtle influences may affect us, we can use our higher conscious awareness to protect against external influences. In what's known as the **Flexible Correction Model** (Wegener & Petty, 1997), people who are aware that their thoughts or behavior are being influenced by an undue, outside source, can correct their attitude against the bias. For example, you might be aware that you are influenced by mention of specific political parties. If you were motivated to consider a government policy you can take your own biases into account to attempt to consider the policy in a fair way (on its own merits rather than being attached to a certain party).

To help make the relationship between lower and higher consciousness clearer, imagine the brain is like a journey down a river. In low awareness, you simply float on a small rubber raft and let the currents push you. It's not very difficult to just drift along but you also don't have total control. Higher states of consciousness are more like traveling in a canoe. In this scenario, you have a paddle and can steer, but it requires more effort. This analogy applies to many states of consciousness, but not all. What about other states such as like sleeping, daydreaming, or hypnosis? How are these related to our conscious awareness?

Table 7.1 States of Consciousness

	Costs	Benefits
Low Awareness	Influenced by subtle factors	Saves mental effort
High Awareness	Uses mental effort	Can overcome some biases

Other States of Consciousness

Hypnosis

If you've ever watched a stage hypnotist perform, it may paint a misleading portrait of this state of consciousness. The hypnotized people on stage, for example, appear to be in a state similar to sleep. However, as the hypnotist continues with the show, you would recognize some profound differences between sleep and hypnosis. Namely, when you're asleep, hearing the word "strawberry" doesn't make you flap your arms like a chicken. In stage performances, the hypnotized participants appear to be highly suggestible, to the point that they are seemingly under the hypnotist's control. Such performances are entertaining but have a way of sensationalizing the true nature of hypnotic states.

Figure 7.6 People being hypnotized on stage.

Hypnosis is an actual, documented phenomenon—one that has been studied and debated for over 200 years (Pekala et al., 2010). Franz Mesmer (1734 – 1815) is often credited as among the first people to "discover" hypnosis, which he used to treat members of elite society who were experiencing psychological distress. It is from Mesmer's name that we get the English word, "mesmerize" meaning "to entrance or transfix a person's attention." Mesmer attributed the effect of hypnosis to "animal magnetism," a supposed universal force (similar to gravity) that operates through all human bodies. Even at the time, such an account of hypnosis was not scientifically supported, and Mesmer himself was frequently the center of controversy.

Over the years, researchers have proposed that **hypnosis** is a mental state characterized by reduced peripheral awareness and increased focus on a singular stimulus, which results in an enhanced susceptibility to suggestion (Kihlstrom, 2003). For example, the hypnotist will usually induce hypnosis by getting the person to pay attention only to the hypnotist's voice. As the individual focuses more and more on that, s/he begins to forget the context of the setting and responds to the hypnotist's suggestions as if they were his or her own. Some people are naturally more suggestible, and therefore more "hypnotizable" than are others, and this is especially true for those who score high in empathy (Wickramasekera II & Szlyk, 2003). One common "trick" of stage hypnotists is to discard volunteers who are less suggestible than others.

Dissociation is the separation of one's awareness from everything besides what one is centrally focused on. For example, if you've ever been daydreaming in class, you were likely so caught up in the fantasy that you didn't hear a word the teacher said. During hypnosis, this dissociation becomes even more extreme. That is, a person concentrates so much on the words of the hypnotist that s/he loses perspective of the rest of the world around them. As a consequence of dissociation, a person is less effortful, and less self-conscious in consideration of his or her own thoughts and behaviors. Similar to low awareness states, where one often acts on the first thought that comes to mind, so, too, in hypnosis does the individual simply follow the first thought that comes to mind, i.e., the hypnotist's suggestion. Still, just because one is more susceptible to suggestion under hypnosis, it doesn't mean s/he will do anything that's ordered. To be hypnotized, you must first *want* to be hypnotized (i.e., you can't be hypnotized

against your will; Lynn & Kirsh, 2006), and once you are hypnotized, you won't do anything you wouldn't also do while in a more natural state of consciousness (Lynn, Rhue, & Weekes, 1990).

Today, **hypnotherapy** is still used in a variety of formats, and it has evolved from Mesmer's early tinkering with the concept. Modern hypnotherapy often uses a combination of relaxation, suggestion, motivation and expectancies to create a desired mental or behavioral state. Although there is mixed evidence on whether hypnotherapy can help with addiction reduction (e.g., quitting smoking; Abbot et al., 1998) there is some evidence that it can be successful in treating sufferers of acute and chronic pain (Ewin, 1978; Syrjala et al., 1992). For example, one study examined the treatment of burn patients with either hypnotherapy, pseudo-hypnosis (i.e., a placebo condition), or no treatment at all. Afterward, even though people in the placebo condition experienced a 16% decrease in pain, those in the actual hypnosis condition experienced a reduction of nearly 50% (Patterson et al., 1996). Thus, even though hypnosis may be sensationalized for television and movies, its ability to disassociate a person from their environment (or their pain) in conjunction with increased suggestibility to a clinician's recommendations (e.g., "you will feel less anxiety about your chronic pain") is a documented practice with actual medical benefits.

Now, similar to hypnotic states, **trance states** also involve a dissociation of the self; however, people in a trance state are said to have less voluntary control over their behaviors and actions. Trance states often occur in religious ceremonies, where the person believes he or she is "possessed" by an otherworldly being or force. While in trance, people report anecdotal accounts of a "higher consciousness" or communion with a greater power. However, the body of research investigating this phenomenon tends to reject the claim that these experiences constitute an "altered state of consciousness."

Most researchers today describe both hypnosis and trance states as "subjective" alterations of consciousness, not an actually distinct or evolved form (Kirsch & Lynn, 1995). Just like you feel different when you're in a state of deep relaxation, so, too, are hypnotic and trance states simply shifts from the standard conscious experience. Researchers contend that even though both hypnotic and trance states appear and feel wildly different than the normal human experience, they can be explained by standard socio-cognitive factors like imagination, expectation, and the interpretation of the situation.

Sleep

Figure 7.7 Sleep is necessary in order for people to function well.

You may have experienced the sensation– as you are falling asleep– of falling and then found yourself physically jerking forward and grabbing out as if you were really falling. Sleep is a unique state of consciousness; it lacks full awareness but the brain is still active. People generally follow a "biological clock" that impacts when they naturally become drowsy, when they fall asleep, and the time they naturally awaken. The hormone **melatonin** increases at night and is associated with becoming sleepy. Your natural daily rhythm, or **Circadian Rhythm**, can be influenced by the amount of daylight to which you are exposed as well as your work and activity schedule. Changing your location, such as flying from Canada to England, can disrupt your natural sleep rhythms, and we call this **jet lag**. You can overcome jet lag by synchronizing yourself to the local schedule by exposing yourself to daylight and forcing yourself to stay awake even though you are naturally sleepy.

Interestingly, sleep itself is more than shutting off for the night (or for a nap). Instead of turning off like a light with a flick of a switch, your shift in consciousness is reflected in your brain's electrical activity. While you are awake and alert your brain activity is marked by *beta*waves. Beta waves are characterized by being high in frequency but low in intensity. In addition, they are the most inconsistent brain wave and this reflects the wide variation in sensory input that a person processes during the day. As you begin to relax these change to *alpha* waves. These waves reflect brain activity that is less frequent, more consistent and more intense. As you slip into actual sleep you transition through many stages. Scholars differ on how they characterize sleep stages with some experts arguing that there are four distinct stages (Manoach et al., 2010), while others recognize five (Šušmáková, & Krakovská, 2008) but they all distinguish between those that include rapid eye movement (REM) and those that are non-rapid eye movement (NREM). In addition, each stage is typically characterized by its own unique pattern of brain activity:

- Stage 1 (called NREM 1, or N1) is the "falling asleep" stage and is marked by theta waves.

- Stage 2 (called NREM 2, or N2) is considered a light sleep. Here, there are occasional “sleep spindles,” or very high intensity brain waves. These are thought to be associated with the processing of memories. NREM 2 makes up about 55% of all sleep.
- Stage 3 (called NREM 3, or N3) makes up between 20-25% of all sleep and is marked by greater muscle relaxation and the appearance of delta waves.
- Finally, REM sleep is marked by rapid eye movement (REM). Interestingly, this stage—in terms of brain activity—is similar to wakefulness. That is, the brain waves occur less intensely than in other stages of sleep. REM sleep accounts for about 20% of all sleep and is associated with dreaming.

Figure 7.8 Changes in brain activity or brainwaves across different stages of consciousness – from being awake and throughout various stages of sleep.

Dreams are, arguably, the most interesting aspect of sleep. Throughout history dreams have been given special importance because of their unique, almost mystical nature. They have been thought to be predictions of the future, hints of hidden aspects of the self, important lessons about how to live life, or opportunities to engage in impossible deeds like flying. There are several competing theories of why humans dream. One is that it is our nonconscious attempt to make sense of our daily experiences and learning. Another, popularized by Freud, is that dreams represent taboo or troublesome wishes or desires. Regardless of the specific reason we know a few facts about dreams: all humans dream, we dream at every stage of sleep, but dreams during REM sleep are especially vivid. One under-explored area of dream research is the possible social functions of dreams: we often share our dreams with others and use them for entertainment value.

Sleep serves many functions, one of which is to give us a period of mental and physical restoration. Children generally need more sleep than adults since they are developing. It is so vital, in fact, that a lack of sleep is associated with a wide range of problems. People who do not receive adequate sleep are more irritable, have slower reaction time, have more difficulty sustaining attention, and make poorer decisions. Interestingly, this is an issue relevant to the lives of college students. In one highly cited study researchers found that 1 in 5 students took more than 30 minutes to fall asleep at night, 1 in 10 occasionally took sleep medications, and more than half reported being “mostly tired” in the mornings (Buboltz, et al, 2001).

Psychoactive Drugs

On April 16, 1943, Albert Hoffman—a Swiss chemist working in a pharmaceutical company—accidentally ingested a newly synthesized drug. The drug—lysergic acid diethylimide (LSD)—turned out to be a powerful hallucinogen. Hoffman went home and later reported the effects of the drug, describing them as seeing the world through a “warped mirror” and experiencing visions of “extraordinary shapes with intense, kaleidoscopic play of colors.” Hoffman had discovered what members of many traditional cultures around the world already knew: there are substances that, when ingested, can have a powerful effect on perception and on consciousness.

Drugs operate on human physiology in a variety of ways and researchers and medical doctors tend to classify drugs according to their effects. Here we will briefly cover 3 categories of drugs: hallucinogens, depressants, and stimulants.

Hallucinogens

It is possible that hallucinogens are the substance that have, historically, been used the most widely. Traditional societies have used plant-based hallucinogens such as peyote, ebene, and psilocybin mushrooms in a wide range of religious ceremonies. **Hallucinogens** are substances that alter a person’s perceptions, often by creating visions or hallucinations that are not real. There are a wide range of hallucinogens and many are used as recreational substances in industrialized societies. Common examples include marijuana, LSD, and MDMA (also known as “ecstasy”). Marijuana is the dried flowers of the hemp plant and is often smoked to produce **euphoria**. The active ingredient in marijuana is called THC and can produce distortions in the perception of time, can create a sense of rambling, unrelated thoughts, and is sometimes associated with increased hunger or excessive laughter. The use and possession of marijuana is illegal in most places but this appears to be a trend that is changing. Uruguay, Bangladesh,

and several of the United States, have recently legalized marijuana. This may be due, in part, to changing public attitudes or to the fact that marijuana is increasingly used for medical purposes such as the management of nausea or treating glaucoma.

Depressants

Depressants are substances that, as their name suggests, slow down the body's physiology and mental processes. Alcohol is the most widely used depressant. Alcohol's effects include the reduction of inhibition, meaning that intoxicated people are more likely to act in ways they would otherwise be reluctant to. Alcohol's psychological effects are the result of it increasing the neurotransmitter GABA. There are also physical effects, such as loss of balance and coordination, and these stem from the way that alcohol interferes with the coordination of the visual and motor systems of the brain. Despite the fact that alcohol is so widely accepted in many cultures it is also associated with a variety of dangers. First, alcohol is toxic, meaning that it acts like a poison because it is possible to drink more alcohol than the body can effectively remove from the bloodstream. When a person's **blood alcohol content (BAC)** reaches .3 to .4% there is a serious risk of death. Second, the lack of judgment and physical control associated with alcohol is associated with more risk taking behavior or dangerous behavior such as drunk driving. Finally, alcohol is addictive and heavy drinkers often experience significant interference with their ability to work effectively or in their close relationships.

Other common depressants include opiates (also called "narcotics"), which are substances synthesized from the poppy flower. Opiates stimulate endorphin production in the brain and because of this they are often used as pain killers by medical professionals. Unfortunately, because opiates such as Oxycontin so reliably produce euphoria they are increasingly used—illegally—as recreational substances. Opiates are highly addictive.

Stimulants

Figure 7.9 Caffeine is the most widely consumed stimulant in the world. Be honest, how many cups of coffee, tea, or energy drinks have you had today?

Stimulants are substances that "speed up" the body's physiological and mental processes. Two commonly used stimulants are caffeine—the drug found in coffee and tea—and nicotine, the active drug in cigarettes and other tobacco products. These substances are both legal and relatively inexpensive, leading to their widespread use. Many people are attracted to stimulants because they feel more alert when under the influence of these drugs. As with any drug there are health risks associated with consumption. For example, excessive consumption of these types of stimulants can result in anxiety, headaches, and insomnia. Similarly, smoking cigarettes—the most common means of ingesting nicotine—is associated with higher risks of cancer. For instance, among heavy smokers 90% of lung cancer is directly attributable to smoking (Stewart & Kleihues, 2003).

There are other stimulants such as cocaine and methamphetamine (also known as "crystal meth" or "ice") that are illegal substances that are commonly used. These substances act by blocking "re-uptake" of dopamine in the brain. This means that the brain does not naturally clear out the dopamine and that it builds up in the synapse, creating euphoria and alertness. As the effects wear off it stimulates strong cravings for more of the drug. Because of this these powerful stimulants are highly addictive.

Conclusion

When you think about your daily life it is easy to get lulled into the belief that there is one "setting" for your conscious thought. That is, you likely believe that you hold the same opinions, values, and memories across the day and throughout the week. But "you" are like a dimmer switch on a light that can be turned from full darkness increasingly on up to full brightness. This switch is consciousness. At your brightest setting you are fully alert and aware; at dimmer settings you are day dreaming; and sleep or being knocked unconscious represent dimmer settings still. The degree to which you are in high, medium, or low states of conscious awareness affect how susceptible you are to persuasion, how clear your judgment is, and how much detail you can recall. Understanding levels of awareness, then, is at the heart of understanding how we learn, decide, remember and many other vital psychological processes.

Outside Resources

App: Visual illusions for the iPad. http://www.exploratorium.edu/explore/apps/color-uncovered

Book: A wonderful book about how little we know about ourselves: Wilson, T. D. (2004). *Strangers to ourselves*. Cambridge, MA: Harvard University Press. http://www.hup.harvard.edu/catalog.php?isbn=9780674013827

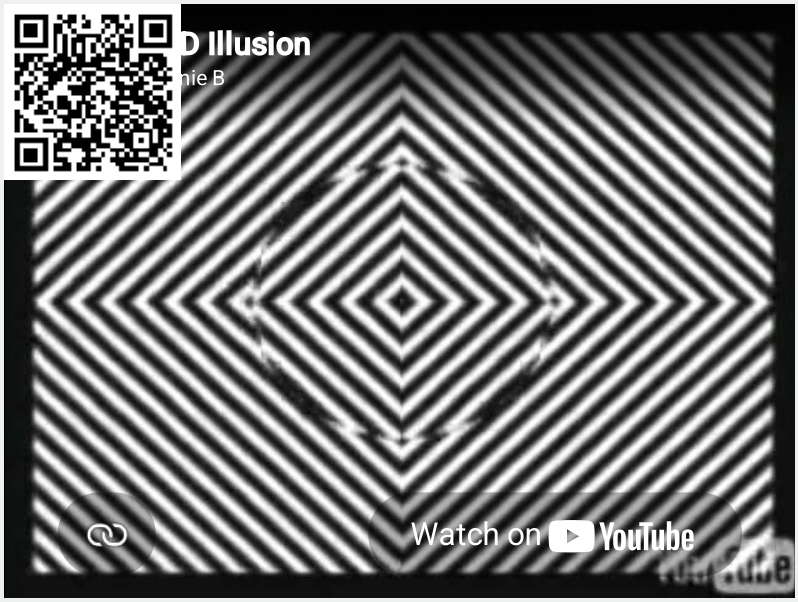
Book: Another wonderful book about free will—or its absence?: Wegner, D. M. (2002). *The illusion of conscious will*. Cambridge, MA: MIT Press. https://mitpress.mit.edu/books/illusion-conscious-will

Information on alcoholism, alcohol abuse, and treatment: http://www.niaaa.nih.gov/alcohol-health/support-treatment

The American Psychological Association has information on getting a good night's sleep as well as on sleep disorders http://www.apa.org/helpcenter/sleep-disorders.aspx

The LSD simulator: This simulator uses optical illusions to simulate the halluginogenic experience of LSD. Simply follow the instructions in this two minute video. After looking away you may see the world around you in a warped or pulsating way similar to the effects of LSD. The effect is temporary and will disappear in about a minute.

A YouTube element has been excluded from this version of the text. You can view it online here: https://openpress.usask.ca/introductiontopsychology/?p=950



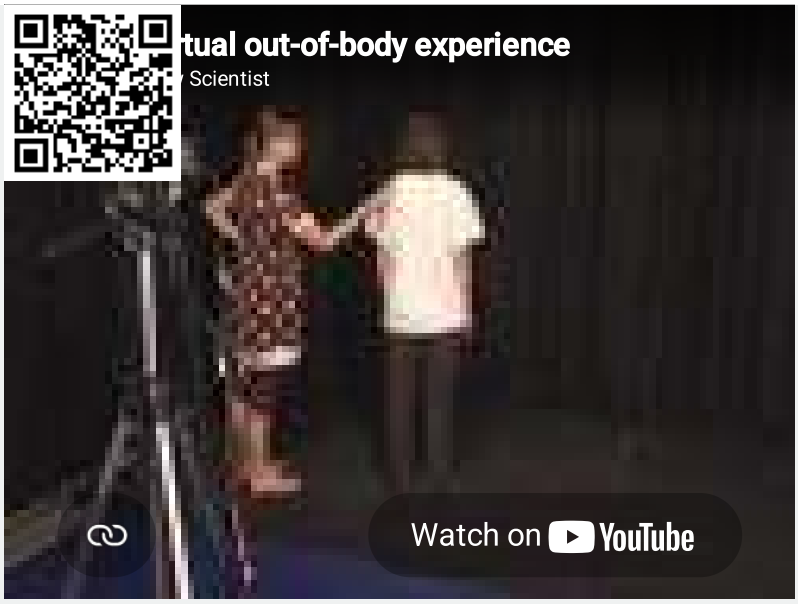
The National Sleep Foundation is a non-profit with videos on insomnia, sleep training in children, and other topics https://sleepfoundation.org/video-library

Video: An artist who periodically took LSD and drew self-portraits: http://www.openculture.com/2013/10/artist-draws-nine-portraits-on-lsd-during-1950s-research-experiment.html

Video: An interesting video on attention: http://www.dansimons.com/videos.html

Video: Clip on out-of-body experiences induced using virtual reality.

A YouTube element has been excluded from this version of the text. You can view it online here: https://openpress.usask.ca/introductiontopsychology/?p=950



Video: Clip on the rubber hand illusion, from the BBC science series “Horizon.”

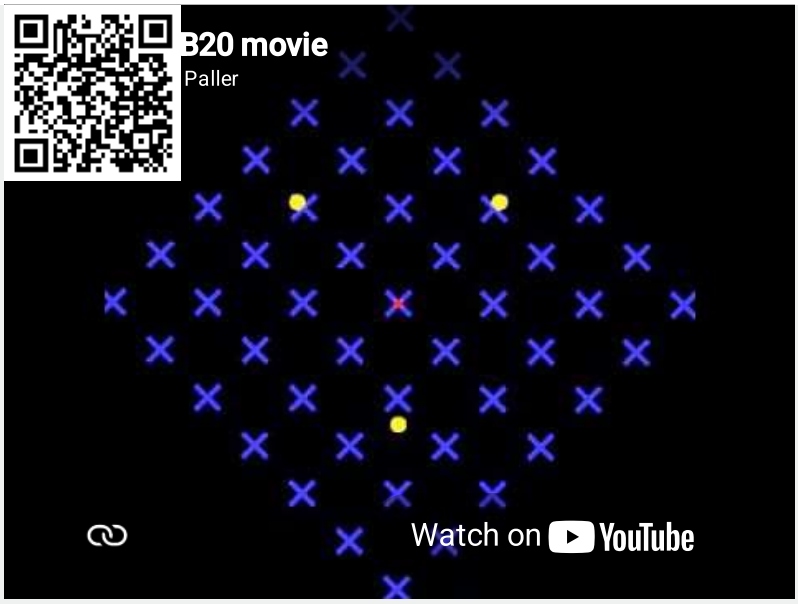
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Video: Clip showing a patient with blindsight, from the documentary “Phantoms in the Brain.” https://youtu.be/Cy8FSffrNDI

Video: Demonstration of motion-induced blindness – Look steadily at the blue moving pattern. One or more of the yellow spots may disappear:

A YouTube element has been excluded from this version of the text. You can view it online here: https://openpress.usask.ca/introductiontopsychology/?p=950



Video: Howie Mandel from America's Got Talent being hypnotized into shaking hands with people:

A YouTube element has been excluded from this version of the text. You can view it online here: https://openpress.usask.ca/introductiontopsychology/?p=950



Video: Imaging the Brain, Reading the Mind – A talk by Marsel Mesulam. http://video.at.northwestern.edu/lores/SO_marsel.m4v

Video: Lucas Handwerker – a stage hypnotist discusses the therapeutic aspects of hypnosis:

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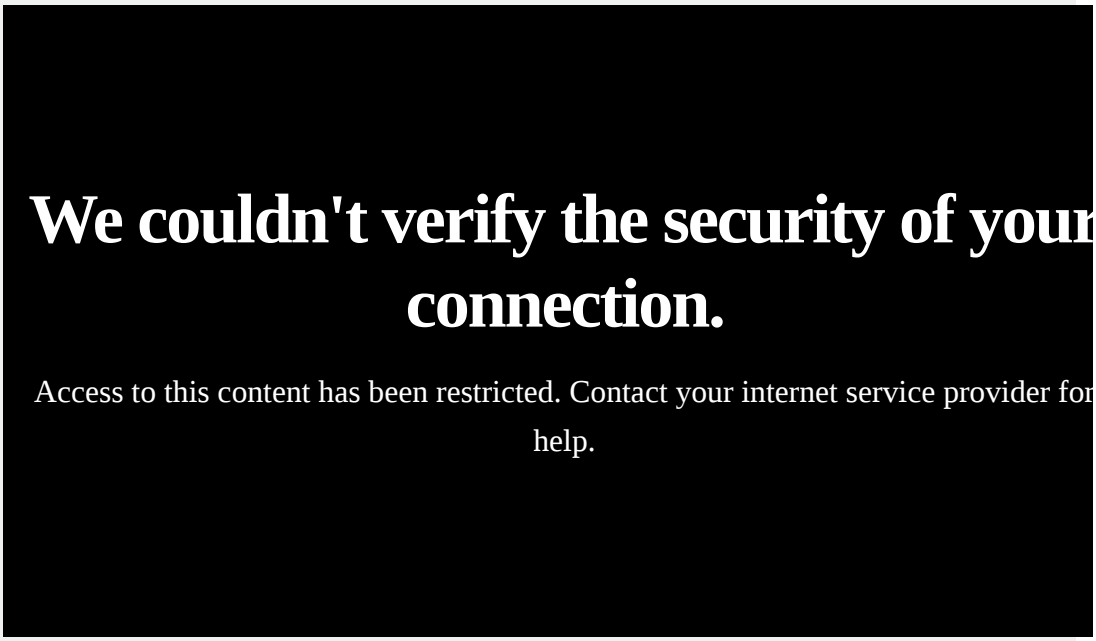


Video: Ted Talk – Simon Lewis: Don't take consciousness for granted
http://www.ted.com/talks/simon_lewis_don_t_take_consciousness_for_granted.html

Video: TED Talk on Dream Research:



Video: The mind-body problem – An interview with Ned Block:



Want a quick demonstration of priming? (Want a quick demonstration of how powerful these effects can be? Check out:



Web: A good overview of pri

Web: Definitions of Consciou



Web: Learn more about motion-induced blindness on Michael Bach's website: http://www.michaelbach.de/ot/mot-mib/index.html

Discussion Questions

1. If someone were in a coma after an accident, and you wanted to better understand how "conscious" or aware s/he were, how might you go about it?
2. What are some of the factors in daily life that interfere with people's ability to get adequate sleep? What interferes with your sleep?
3. How frequently do you remember your dreams? Do you have recurring images or themes in your dreams? Why do you think that is?
4. Consider times when you fantasize or let your mind wander? Describe these times: are you more likely to be alone or with others? Are there certain activities you engage in that seem particularly prone to daydreaming?
5. A number of traditional societies use consciousness altering substances in ceremonies. Why do you think they do this?
6. Do you think attitudes toward drug use are changing over time? If so, how? Why do you think these changes occur?
7. Students in high school and college are increasingly using stimulants such as Adderol as study aids and "performance enhancers." What is your opinion of this trend?

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Figure 7.9: Personeelsnet, https://goo.gl/h0GQ3R, CC BY-SA 2.0, https://goo.gl/iZlxAE

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7.3: Attention

Frances Friedrich

We use the term “attention“ all the time, but what processes or abilities does that concept really refer to? This module will focus on how attention allows us to select certain parts of our environment and ignore other parts, and what happens to the ignored information. A key concept is the idea that we are limited in how much we can do at any one time. So we will also consider what happens when someone tries to do several things at once, such as driving while using electronic devices.

Learning Objectives

- Understand why selective attention is important and how it can be studied.
- Learn about different models of when and how selection can occur.
- Understand how divided attention or multitasking is studied, and implications of multitasking in situations such as distracted driving.

What is Attention?

Before we begin exploring attention in its various forms, take a moment to consider how you think about the concept. How would you define attention, or how do you use the term? We certainly use the word very frequently in our everyday language: “ATTENTION! USE ONLY AS DIRECTED!” warns the label on the medicine bottle, meaning be alert to possible danger. “Pay attention!” pleads the weary seventh-grade teacher, not warning about danger (with possible exceptions, depending on the teacher) but urging the students to focus on the task at hand. We may refer to a child who is easily distracted as having an attention disorder, although we also are told that Americans have an attention span of about 8 seconds, down from 12 seconds in 2000, suggesting that we *all* have trouble sustaining concentration for any amount of time (from www.Statisticbrain.com). How that number was determined is not clear from the Web site, nor is it clear how attention span in the goldfish—9 seconds!—was measured, but the fact that our average span reportedly is less than that of a goldfish is intriguing, to say the least.

William James wrote extensively about attention in the late 1800s. An often quoted passage (James, 1890/1983) beautifully captures how intuitively obvious the concept of attention is, while it remains very difficult to define in measurable, concrete terms:

> *Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others. (pp. 381–382)*



Figure 7.10 Are you reading these words right here right now? If so, it’s only because you directed your attention toward them.

Notice that this description touches on the conscious nature of attention, as well as the notion that what is in consciousness is often controlled voluntarily but can also be determined by events that capture our attention. Implied in this description is the idea that we seem to have a **limited capacity** for information processing, and that we can only attend to or be consciously aware of a small amount of information at any given time.

Many aspects of attention have been studied in the field of psychology. In some respects, we define different types of attention by the nature of the task used to study it. For example, a crucial issue in World War II was how long an individual could remain highly alert and accurate while watching a radar screen for enemy planes, and this problem led psychologists to study how attention works under such conditions. When watching for a rare event, it is easy to allow concentration to lag. (This a continues to be a challenge today for TSA agents, charged with looking at images of the contents of your carry-on items in search of knives, guns, or shampoo bottles larger than 3 oz.) Attention in the context of this type of search task refers to the level of *sustained attention* or *vigilance* one can maintain. In contrast, **divided attention** tasks allow us to determine how well individuals can attend to many sources of information at once. *Spatial attention* refers specifically to how we focus on one part of our environment and how we move attention to other locations in the environment. These are all examples of different aspects of attention, but an implied element of most of these ideas is the concept of **selective attention**; some information is attended to while other information is intentionally blocked out. This module will focus on important issues in selective and divided attention, addressing these questions:

- Can we pay attention to several sources of information at once, or do we have a limited capacity for information?
- How do we select what to pay attention to?
- What happens to information that we try to ignore?
- Can we learn to divide attention between multiple tasks?

Selective Attention

The Cocktail Party



Figure 7.11 Beyond just hearing your name from the clamor at a party, other words or concepts, particularly unusual or significant ones to you, can also snag your attention.

Selective attention is *the ability to select certain stimuli in the environment to process, while ignoring distracting information*. One way to get an intuitive sense of how attention works is to consider situations in which attention is used. A party provides an excellent example for our purposes. Many people may be milling around, there is a dazzling variety of colors and sounds and smells, the buzz of many conversations is striking. There are so many conversations going on; how is it possible to select just one and follow it? You don't have to be looking at the person talking; you may be listening with great interest to some gossip while pretending not to hear. However, once you are engaged in conversation with someone, you quickly become aware that you cannot also listen to other conversations at the same time. You also are probably *not* aware of how tight your shoes feel or of the smell of a nearby flower arrangement. On the other hand, if someone behind you mentions your name, you typically notice it immediately and may start attending to that (much more interesting) conversation. This situation highlights an interesting set of observations. We have an amazing ability to select and track one voice, visual object, etc., even when a million things are competing for our attention, but at the same time, we seem to be limited in how much we can attend to at one time, which in turn suggests that attention is crucial in selecting what is important. How does it all work?

Dichotic Listening Studies

This cocktail party scenario is the quintessential example of selective attention, and it is essentially what some early researchers tried to replicate under controlled laboratory conditions as a starting point for understanding the role of attention in perception (e.g., Cherry, 1953; Moray, 1959). In particular, they used **dichotic listening** and **shadowing** tasks to evaluate the selection

process. Dichotic listening simply refers to the situation when two messages are presented simultaneously to an individual, with one message in each ear. In order to control which message the person attends to, the individual is asked to repeat back or "shadow" one of the messages as he hears it. For example, let's say that a story about a camping trip is presented to John's left ear, and a story about Abe Lincoln is presented to his right ear. The typical dichotic listening task would have John repeat the story presented to one ear as he hears it. Can he do that without being distracted by the information in the other ear?

People can become pretty good at the shadowing task, and they can easily report the content of the message that they attend to. But what happens to the ignored message? Typically, people can tell you if the ignored message was a man's or a woman's voice, or other physical characteristics of the speech, but they cannot tell you what the message was about. In fact, many studies have shown that people in a shadowing task were not aware of a change in the language of the message (e.g., from English to German; Cherry, 1953), and they didn't even notice when the same word was repeated in the unattended ear more than 35 times (Moray, 1959)! Only the basic physical characteristics, such as the pitch of the unattended message, could be reported.

On the basis of these types of experiments, it seems that we can answer the first question about how much information we can attend to very easily: not very much. We clearly have a limited capacity for processing information for meaning, making the selection process all the more important. The question becomes: How does this selection process work?

Models of Selective Attention

Broadbent's Filter Model. Many researchers have investigated how selection occurs and what happens to ignored information. Donald Broadbent was one of the first to try to characterize the selection process. His Filter Model was based on the dichotic listening tasks described above as well as other types of experiments (Broadbent, 1958). He found that people select information on the basis of *physical features*: the sensory channel (or ear) that a message was coming in, the pitch of the voice, the color or font of a visual message. People seemed vaguely aware of the physical features of the unattended information, but had no knowledge of the meaning. As a result, Broadbent argued that selection occurs *very early*, with no additional processing for the unselected information. A flowchart of the model might look like this:

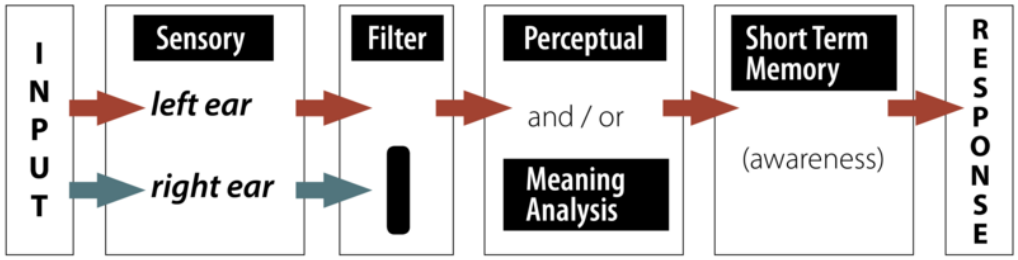


Figure 7.12 This figure shows information going in both the left and right ears. Some basic sensory information, such as pitch, is processed, but the filter only allows the information from one ear to be processed further. Only the information from the left ear is transferred to short-term memory (STM) and conscious awareness, and then further processed for meaning. That means that the ignored information never makes it beyond a basic physical analysis.

Treisman's Attenuation Model

Broadbent's model makes sense, but if you think about it you already know that it cannot account for all aspects of the Cocktail Party Effect. What doesn't fit? The fact is that you tend to hear your own name when it is spoken by someone, even if you are deeply engaged in a conversation. We mentioned earlier that people in a shadowing experiment were unaware of a word in the unattended ear that was repeated many times—and yet many people noticed their own name in the unattended ear even it occurred only once.

Anne Treisman (1960) carried out a number of dichotic listening experiments in which she presented two different stories to the two ears. As usual, she asked people to shadowthe message in one ear. As the stories progressed, however, she switched the stories to the opposite ears. Treisman found that individuals spontaneously followed the story, or the content of the message, when it shifted from the left ear to the right ear. Then they realized they were shadowing the wrong ear and switched back.

Results like this, and the fact that you tend to hear meaningful information even when you aren't paying attention to it, suggest that we *do* monitor the unattended information to some degree on the basis of its meaning. Therefore, the filter theory can't be right to suggest that unattended information is completely blocked at the sensory analysis level. Instead, Treisman suggested that selection *starts* at the physical or perceptual level, but that the unattended information is not blocked completely, it is just weakened or *attenuated*. As a result, highly meaningful or pertinent information in the unattended ear will get through the filter for further processing at the level of meaning. The figure below shows information going in both ears, and in this case there is no filter that completely blocks nonselected information. Instead, selection of the left ear information strengthens that material, while the nonselected information in the right ear is weakened. However, if the preliminary analysis shows that the nonselected information is especially pertinent or meaningful (such as your own name), then the Attenuation Control will instead strengthen the more meaningful information.

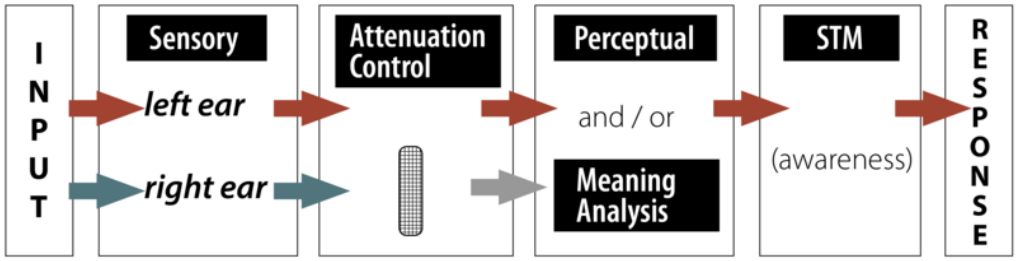


Figure 7.13

Late Selection Models

Other selective attention models have been proposed as well. A*late selection* or *response selection* model proposed by Deutsch and Deutsch (1963) suggests that all information in the unattended ear is processed on the basis of meaning, not just the selected or highly pertinent information. However, only the information that is relevant for the task response gets into conscious awareness. This model is consistent with ideas of subliminal perception; in other words, that you don't have to be aware of or attending a message for it to be fully processed for meaning.

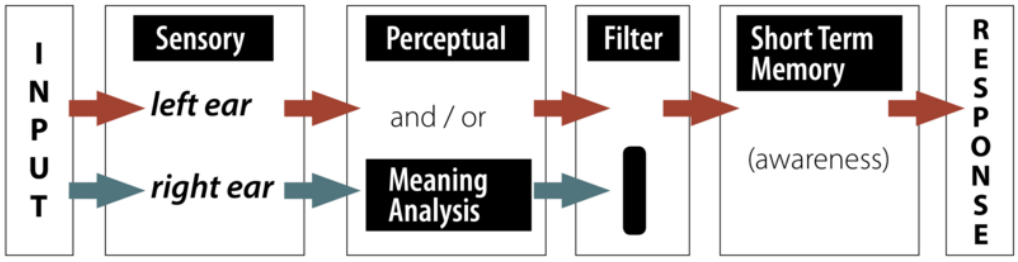


Figure 7.14

You might notice that this figure looks a lot like that of the Early Selection model—only the location of the selective filter has changed, with the assumption that analysis of meaning occurs *before* selection occurs, but only the selected information becomes conscious.

Multimode Model

Why did researchers keep coming up with different models? Because no model really seemed to account for all the data, some of which indicates that nonselected information is blocked completely, whereas other studies suggest that it can be processed for meaning. The multimode model addresses this apparent inconsistency, suggesting that the stage at which selection occurs can change depending on the task. Johnston and Heinz (1978) demonstrated that under some conditions, we can select what to attend to at a very early stage and we do not process the content of the unattended message very much at all. Analyzing physical information, such as attending to information based on whether it is a male or female voice, is relatively easy; it occurs automatically, rapidly, and doesn't take much effort. Under the right conditions, we can select what to attend to on the basis of the meaning of the

messages. However, the late selection option—processing the content of all messages before selection—is more difficult and requires more effort. The benefit, though, is that we have the flexibility to change how we deploy our attention depending upon what we are trying to accomplish, which is one of the greatest strengths of our cognitive system.

This discussion of selective attention has focused on experiments using auditory material, but the same principles hold for other perceptual systems as well. Neisser (1979) investigated some of the same questions with visual materials by superimposing two semi-transparent video clips and asking viewers to attend to just one series of actions. As with the auditory materials, viewers often were unaware of what went on in the other clearly visible video. Twenty years later, Simons and Chabris (1999) explored and expanded these findings using similar techniques, and triggered a flood of new work in an area referred to as inattentional blindness. We touch on those ideas below, and you can also refer to Failures of Awareness: The Case of Inattentional Blindness for a more complete discussion.

Focus Topic 1: Subliminal Perception

The idea of subliminal perception—that stimuli presented below the threshold for awareness can influence thoughts, feelings, or actions—is a fascinating and kind of creepy one. Can messages you are unaware of, embedded in movies or ads or the music playing in the grocery store, really influence what you buy? Many such claims of the power of subliminal perception have been made. One of the most famous came from a market researcher who claimed that the message "Eat Popcorn" briefly flashed throughout a movie increased popcorn sales by more than 50%, although he later admitted that the study was made up (Merikle, 2000). Psychologists have worked hard to investigate whether this is a valid phenomenon. Studying subliminal perception is more difficult than it might seem, because of the difficulty of establishing what the threshold for consciousness is or of even determining what type of threshold is important; for example, Cheesman and Merikle (1984, 1986) make an important distinction between objective and subjective thresholds. The bottom line is that there is some evidence that individuals can be influenced by stimuli they are not aware of, but how complex the stimuli can be or the extent to which unconscious material can affect behavior is not settled (e.g., Bargh & Morsella, 2008; Greenwald, 1992; Merikle, 2000).

Divided Attention and Multitasking

In spite of the evidence of our limited capacity, we all like to think that we can do several things at once. Some people claim to be able to multitask without any problem: reading a textbook while watching television and talking with friends; talking on the phone while playing computer games; texting while driving. The fact is that we sometimes can *seem* to juggle several things at once, but the question remains whether dividing attention in this way impairs performance.

Is it possible to overcome the limited capacity that we experience when engaging in cognitive tasks? We know that with extensive practice, we can acquire skills that do not appear to require conscious attention. As we walk down the street, we don't need to think consciously about what muscle to contract in order to take the next step. Indeed, paying attention to automated skills can lead to a breakdown in performance, or "choking" (e.g., Beilock & Carr, 2001). But what about higher level, more mentally demanding tasks: Is it possible to learn to perform two complex tasks at the same time?

Figure 7.15 Unless a task is fully automated, some researchers suggest that “multi-tasking” doesn’t really exist; you are just rapidly switching your attention back and forth between tasks.

In a classic study that examined this type of divided attention task, two participants were trained to take dictation for spoken words while reading unrelated material for comprehension (Spelke, Hirst, & Neisser, 1976). In divided attention tasks such as these, each task is evaluated separately, in order to determine baseline performance when the individual can allocate as many cognitive resources as necessary to one task at a time. Then performance is evaluated when the two tasks are performed simultaneously. A decrease in performance for either task would suggest that even if attention can be divided or switched between the tasks, the cognitive demands are too great to avoid disruption of performance. (We should note here that divided attention tasks are designed, in principle, to see if two tasks can be carried out simultaneously. A related research area looks at *task switching* and how well we can switch back and forth among different tasks [e.g., Monsell, 2003]. It turns out that switching itself is cognitively demanding and can impair performance.)

The focus of the Spelke et al. (1976) study was whether individuals could learn to perform two relatively complex tasks concurrently, without impairing performance. The participants received plenty of practice—the study lasted 17 weeks and they had a 1-hour session each day, 5 days a week. These participants were able to learn to take dictation for lists of words and read for comprehension without affecting performance in either task, and the authors suggested that perhaps there are not fixed limits on our attentional capacity. However, changing the tasks somewhat, such as reading aloud rather than silently, impaired performance initially, so this multitasking ability may be specific to these well-learned tasks. Indeed, not everyone could learn to perform two complex tasks without performance costs (Hirst, Neisser, & Spelke, 1978), although the fact that some can is impressive.

Distracted Driving

More relevant to our current lifestyles are questions about multitasking while texting or having cell phone conversations. Research designed to investigate, under controlled conditions, multitasking while driving has revealed some surprising results. Certainly there are many possible types of distractions that could impair driving performance, such as applying makeup using the rearview mirror, attempting (usually in vain) to stop the kids in the backseat from fighting, fiddling with the CD player, trying to negotiate a handheld cell phone, a cigarette, and a soda all at once, eating a bowl of cereal while driving (!). But we tend to have a strong sense that we CAN multitask while driving, and cars are being built with more and more technological capabilities that encourage multitasking. How good are we at dividing attention in these cases?

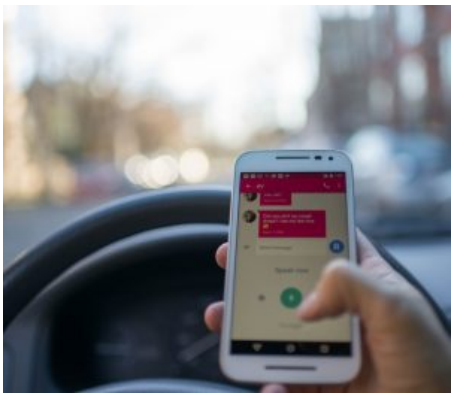


Figure 7.16 If you look at your phone for just 5 seconds while driving at 55mph, that means you have driven the length of a football field without looking at the road.

Most people acknowledge the distraction caused by texting while driving and the reason seems obvious: Your eyes are off the road and your hands and at least one hand (often both) are engaged while texting. However, the problem is not simply one of occupied hands or eyes, but rather that the *cognitive*demands on our limited capacity systems can seriously impair driving performance (Strayer, Watson, & Drews, 2011). The effect of a cell phone conversation on performance (such as not noticing someone's brake lights or responding more slowly to them) is just as significant when the individual is having a conversation with a hands-free device as with a handheld phone; the same impairments do not occur when listening to the radio or a book on tape (Strayer & Johnston, 2001). Moreover, studies using eye-tracking devices have shown that drivers are less likely to later recognize objects that they *did* look at when using a cell phone while driving (Strayer & Drews, 2007). These findings demonstrate that cognitive distractions such as cell phone conversations can produce inattentional blindness, or a lack of awareness of what is right before your eyes (see also, Simons & Chabris, 1999). Sadly, although we all like to think that we can multitask while driving, in fact the percentage of people who can truly perform cognitive tasks without impairing their driving performance is estimated to be about 2% (Watson & Strayer, 2010).

Summary

It may be useful to think of attention as a mental resource, one that is needed to focus on and fully process important information, especially when there is a lot of distracting "noise" threatening to obscure the message. Our selective attention system allows us to find or track an object or conversation in the midst of distractions. Whether the selection process occurs early or late in the analysis of those events has been the focus of considerable research, and in fact how selection occurs may very well depend on the specific conditions. With respect to divided attention, in general we can only perform one cognitively demanding task at a time, and we may not even be aware of unattended events even though they might seem too obvious to miss (check out some examples in the Outside Resources below). This type of inattention blindness can occur even in well-learned tasks, such as driving while talking on a cell phone. Understanding how attention works is clearly important, even for our everyday lives.

Outside Resources

Video: Here's a wild example of how much we fail to notice when our attention is captured by one element of a scene.



Video: Try this test to see



Discussion Questions

1. Discuss the implications of the different models of selective attention for everyday life. For instance, what advantages and disadvantages would be associated with being able to filter out all unwanted information at a very early stage in processing? What are the implications of processing all ignored information fully, even if you aren't consciously aware of that information?
2. Think of examples of when you feel you can successfully multitask and when you can't. Discuss what aspects of the tasks or the situation seem to influence divided attention performance. How accurate do you think you are in judging your own multitasking ability?
3. What are the public policy implications of current evidence of inattentional blindness as a result of distracted driving? Should this evidence influence traffic safety laws? What additional studies of distracted driving would you propose?

Image Attributions

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7.4: Sleeping and Dreaming Revitalize Us for Action

Charles Stangor and Jennifer Walinga

Learning Objectives

- Draw a graphic showing the usual phases of sleep during a normal night and notate the characteristics of each phase.
- Review the disorders that affect sleep and the costs of sleep deprivation.
- Outline and explain the similarities and differences among the different theories of dreaming.

The lives of all organisms, including humans, are influenced by *regularly occurring cycles of behaviours* known as **biological rhythms**. One important biological rhythm is the annual cycle that guides the migration of birds and the hibernation of bears. Women also experience a 28-day cycle that guides their fertility and menstruation. But perhaps the strongest and most important biorhythm is the daily **circadian rhythm** (from the Latin *circa*, meaning "about" or "approximately," and *dian*, meaning "daily") *that guides the daily waking and sleeping cycle in many animals.*Many biological rhythms are coordinated by changes in the level and duration of ambient light — for instance, as winter turns into summer and as night turns into day. In some animals, such as birds, the pineal gland in the brain is directly sensitive to light, and its activation influences behaviour, such as mating and annual migrations. Light also has a profound effect on humans. We are more likely to experience *depression during the dark winter months than during the lighter summer months, an experience* known as **seasonal affective disorder** (SAD), and exposure to bright lights can help reduce this depression (McGinnis, 2007).

Sleep is also influenced by ambient light. The ganglion cells in the retina send signals to a *brain area above the thalamus* called the **suprachiasmatic nucleus**, *which is the body's primary circadian pacemaker.* The suprachiasmatic nucleus analyzes the strength and duration of the light stimulus and sends signals to the pineal gland when the ambient light level is low or its duration is short. In response, the pineal gland secretes **melatonin**, a *powerful hormone that facilitates the onset of sleep.*

Research Focus: Circadian Rhythms Influence the Use of Stereotypes in Social Judgments

The circadian rhythm influences our energy levels such that we have more energy at some times of day than others. Galen Bodenhausen (1990) argued that people may be more likely to rely on their stereotypes (i.e., their beliefs about the characteristics of social groups) as a shortcut to making social judgments when they are tired than when they have more energy. To test this hypothesis, he asked 189 research participants to consider cases of alleged misbehaviour by other college or university students and to judge the probability of the accused students' guilt. The accused students were identified as members of particular social groups, and they were accused of committing offences that were consistent with stereotypes of these groups.

One case involved a student athlete accused of cheating on an exam, one case involved a Hispanic student who allegedly physically attacked his roommate, and a third case involved an African American student who had been accused of selling illegal drugs. Each of these offences had been judged via pretesting in the same student population to be stereotypically (although, of course, unfairly) associated with each social group. The research participants were also provided with some specific evidence about the case that made it ambiguous whether the person had actually committed the crime, and then asked to indicate the likelihood of the student's guilt on a 10-point scale (0 = extremely unlikely to 10 = extremely likely).

Participants also completed a measure designed to assess their circadian rhythms — whether they were more active and alert in the morning (morning types) or in the evening (evening types). The participants were then tested at experimental sessions held either in the morning (9 a.m.) or in the evening (8 p.m.). As you can see in Figure 7.17, "Circadian Rhythms and Stereotyping," the participants were more likely to rely on their negative stereotypes of the person they were judging at the time of day in which they reported being less active and alert. Morning people used their stereotypes more when they were tested in the evening, and evening people used their stereotypes more when they were tested in the morning.

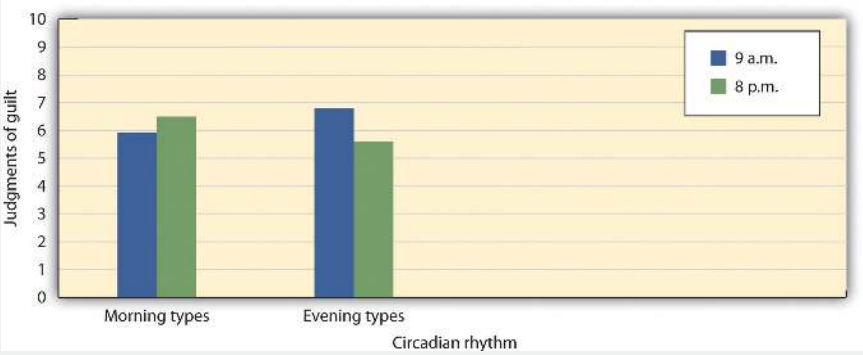


Figure 7.17 Circadian Rhythms and Stereotyping. Students who indicated that they had more energy in the morning relied on their stereotypes more at night, and students who indicated that they had more energy in the night relied on their stereotypes more in the morning. [Long Description]

Sleep Stages: Moving through the Night

Although we lose consciousness as we sleep, the brain nevertheless remains active. The patterns of sleep have been tracked in thousands of research participants who have spent nights sleeping in research labs (Figure 7.18) while their brainwaves were recorded by monitors, such as an *electroencephalogram*, or *EEG*.



Figure 7.18 Sleep Lab. Sleep researchers measure the activity of the brain, eyes, face, and other parts of the body while the participant sleeps.

Sleep researchers have found that sleeping people undergo a fairly consistent pattern of sleep stages, each lasting about 90 minutes. As you can see in Figure 7.19, "Stages of Sleep," these stages are of two major types: rapid eye movement and non-rapid eye movement. **Rapid eye movement** (REM) sleep is *a sleep stage characterized by the presence of quick eye movements and dreaming.* REM sleep accounts for about 25% of our total sleep time. During REM sleep, our awareness of external events is dramatically reduced, and consciousness is dominated primarily by internally generated images and a lack of overt thinking (Hobson, 2004). During this sleep stage our muscles shut down, and this is probably a good thing as it protects us from hurting ourselves or trying to act out the scenes that are playing in our dreams. The second major sleep type, **non-rapid eye movement** (non-REM) sleep is *a deep sleep, characterized by very slow brainwaves, that is further subdivided into three stages: N1, N2, and N3.* Each of the sleep stages has its own distinct pattern of brain activity (Dement & Kleitman, 1957).

Figure 7.19 Stages of Sleep. During a typical night, our sleep cycles move between REM and non-REM sleep, with each cycle repeating at about 90-minute intervals. The deeper non-REM sleep stages usually occur earlier in the night.

As you can see in Figure 7.20, “EEG Recordings of Brain Patterns During Sleep,” the brainwaves that are recorded by an EEG as we sleep show that the brain’s activity changes during each stage of sleeping. When we are awake, our brain activity is characterized by the presence of very fast *beta waves*. When we first begin to fall asleep, the waves get longer (*alpha waves*), and as we move into stage N1 sleep, which is characterized by the experience of drowsiness, the brain begins to produce even slower *theta waves*. During stage N1 sleep, some muscle tone is lost, as well as most awareness of the environment. Some people may experience sudden jerks or twitches and even vivid hallucinations during this initial stage of sleep.

Figure 7.20 EEG Recordings of Brain Patterns During Sleep. Each stage of sleep has its own distinct pattern of brain activity.

Normally, if we are allowed to keep sleeping, we will move from stage N1 to stage N2 sleep. During stage N2, muscular activity is further decreased and conscious awareness of the environment is lost. This stage typically represents about half of the total sleep time in normal adults. Stage N2 sleep is characterized by *theta waves interspersed with bursts of rapid brain activity* known as **sleep spindles**.

Stage N3, also known as **slow wave sleep**, is *the deepest level of sleep*, characterized by an increased proportion of very slow *delta waves*. This is the stage in which most sleep abnormalities, such as sleepwalking, sleeptalking, nightmares, and bedwetting occur. The sleepwalking murders committed by Mr. Parks would have occurred in this stage. Some skeletal muscle tone remains, making it possible for affected individuals to rise from their beds and engage in sometimes very complex behaviours, but consciousness is distant. Even in the deepest sleep, however, we are still aware of the external world. If smoke enters the room or if we hear the cry of a baby we are likely to react, even though we are sound asleep. These occurrences again demonstrate the extent to which we process information outside consciousness.

After falling initially into a very deep sleep, the brain begins to become more active again, and we normally move into the first period of REM sleep about 90 minutes after falling asleep. REM sleep is accompanied by an increase in heart rate, facial twitches, and the repeated rapid eye movements that give this stage its name. People who are awakened during REM sleep almost always report that they were dreaming, while those awakened in other stages of sleep report dreams much less often. REM sleep is also emotional sleep. Activity in the limbic system, including the amygdala, is increased during REM sleep, and the genitals become aroused, even if the content of the dreams we are having is not sexual. A typical 25-year-old man may have an erection nearly half the night, and the common “morning erection” is left over from the last REM period before waking.

Normally we will go through several cycles of REM and non-REM sleep each night (Figure 7.20, “EEG Recordings of Brain Patterns During Sleep”). The length of the REM portion of the cycle tends to increase through the night, from about five to 10 minutes early in the night to 15 to 20 minutes shortly before awakening in the morning. Dreams also tend to become more elaborate and vivid as the night goes on. Eventually, as the sleep cycle finishes, the brain resumes its faster alpha and beta waves and we awake, normally refreshed.

Sleep Disorders: Problems in Sleeping

According to a recent poll (Statistics Canada, 2011), six in 10 Canadian adults say they feel tired most of the time. These people are suffering from a sleep disorder known as **insomnia**, defined as *persistent difficulty falling or staying asleep*. Most cases of insomnia are temporary, lasting from a few days to several weeks, but in some cases insomnia can last for years.

Insomnia can result from physical disorders such as pain due to injury or illness, or from psychological problems such as stress, financial worries, or relationship difficulties. Changes in sleep patterns, such as jet lag, changes in work shift, or even the movement to or from daylight saving time can produce insomnia. Sometimes the sleep that the insomniac does get is disturbed and nonrestorative, and the lack of quality sleep produces impairment of functioning during the day. Ironically, the problem may be compounded by people’s anxiety over insomnia itself: their fear of being unable to sleep may wind up keeping them awake. Some people may also develop a conditioned anxiety to the bedroom or the bed.

People who have difficulty sleeping may turn to drugs to help them sleep. Barbiturates, benzodiazepines, and other sedatives (Figure 7.21) are frequently marketed and prescribed as sleep aids, but they may interrupt the natural stages of the sleep cycle, and in the end are likely to do more harm than good. In some cases they may also promote dependence. Most practitioners of sleep medicine today recommend making environmental and scheduling changes first, followed by therapy for underlying problems, with pharmacological remedies used only as a last resort.

Figure 7.21 Sleeping Pills. Taking pills to sleep is not recommended unless all other methods of improving sleep have been tried.

According to the Canadian Sleep Society, some steps that can be used to combat insomnia include the following:

- Use the bed and bedroom for sleep and sex only. Do not spend time in bed during the day.
- Establish a regular bedtime routine and a regular sleep-wake schedule.
- Do not eat or drink too much close to bedtime.
- Create a sleep-promoting environment that is dark, cool, and comfortable.
- Avoid disturbing noises — consider a bedside fan or white-noise machine to block out disturbing sounds.
- Consume less or no caffeine, particularly late in the day.
- Avoid alcohol and nicotine, especially close to bedtime.
- Exercise, but not within three hours before bedtime.
- Avoid naps, particularly in the late afternoon or evening.

Another common sleep problem is **sleep apnea**, *a sleep disorder characterized by pauses in breathing that last at least 10 seconds during sleep* (Morgenthaler, Kagramanov, Hanak, & Decker, 2006). In addition to preventing restorative sleep, sleep apnea can also cause high blood pressure and may increase the risk of stroke and heart attack (Yaggi et al., 2005).

Most sleep apnea is caused by an obstruction of the walls of the throat that occurs when we fall asleep. It is most common in obese or older individuals who have lost muscle tone and is particularly common in men. Sleep apnea caused by obstructions is usually

treated with an air machine that uses a mask to create a continuous pressure that prevents the airway from collapsing, or with mouthpieces that keep the airway open. If all other treatments have failed, sleep apnea may be treated with surgery to open the airway.

Narcolepsy is *a disorder characterized by extreme daytime sleepiness with frequent episodes of nodding off*. The syndrome may also be accompanied by attacks of **cataplexy**, in which *the individual loses muscle tone, resulting in a partial or complete collapse*. It is estimated that one in 2,000 people suffer from narcolepsy.

Narcolepsy is in part the result of genetics — people who suffer from the disease lack neurotransmitters that are important in keeping us alert (Taheri, Zeitzer, & Mignot, 2002) — and is also the result of a lack of deep sleep. While most people descend through the sequence of sleep stages, then move back up to REM sleep soon after falling asleep, narcolepsy sufferers move directly into REM and undergo numerous awakenings during the night, often preventing them from getting good sleep.

Narcolepsy can be treated with stimulants, such as amphetamines, to counteract the daytime sleepiness, or with antidepressants to treat a presumed underlying depression. However, since these drugs further disrupt already abnormal sleep cycles, these approaches may, in the long run, make the problem worse. Many sufferers find relief by taking a number of planned short naps during the day, and some individuals may find it easier to work in jobs that allow them to sleep during the day and work at night.

Other sleep disorders occur when cognitive or motor processes that should be turned off or reduced in magnitude during sleep operate at higher than normal levels (Mahowald & Schenck, 2000). One example is **somnambulism** (sleepwalking), *in which the person leaves the bed and moves around while still asleep*. Sleepwalking is more common in childhood, with the most frequent occurrences around the age of 12 years. About 4% of adults experience somnambulism (Mahowald & Schenck, 2000).

Sleep terrors is *a disruptive sleep disorder, most frequently experienced in childhood, that may involve loud screams and intense panic*. The sufferer cannot wake from sleep even though he or she is trying to. In extreme cases, sleep terrors may result in bodily harm or property damage as the sufferer moves about abruptly. Up to 3% of adults suffer from sleep terrors, which typically occur in sleep stage N3 (Mahowald & Schenck, 2000).

Other sleep disorders include **bruxism**, in which *the sufferer grinds his teeth during sleep*; **restless legs syndrome**, in which *the sufferer reports an itching, burning, or otherwise uncomfortable feeling in his legs, usually exacerbated when resting or asleep*; and **periodic limb movement disorder**, which involves *sudden involuntary movement of limbs*. The last of these, periodic limb movement disorder, can cause sleep disruption and injury for both the sufferer and bed partner.

Although many sleep disorders occur during non-REM sleep, some occur during REM sleep. **REM sleep behaviour disorder** (Mahowald & Schenck, 2005) is *a condition in which people (usually middle-aged or older men) engage in vigorous and bizarre physical activities during REM sleep in response to intense, violent dreams*. As their actions may injure themselves or their sleeping partners, this disorder, thought to be neurological in nature, is normally treated with hypnosis and medications.

The Heavy Costs of Not Sleeping

Our preferred sleep times and our sleep requirements vary throughout our life cycle. Newborns tend to sleep between 16 and 18 hours per day, preschoolers tend to sleep between 10 and 12 hours per day, school-aged children and teenagers usually prefer at least nine hours of sleep per night, and most adults say that they require seven to eight hours per night (Mercer, Merritt, & Cowell, 1998; Statistics Canada, 2011). There are also individual differences in need for sleep. Some adults do quite well with fewer than six hours of sleep per night, whereas others need nine hours or more. The most recent study by Mental Health Canada (2014) suggests that adults should get between seven and nine hours of sleep per night (Figure 7.22, “Average Hours of Required Sleep per Night”), and yet 15% of Canadians average fewer than 6.5 hours and 47% of Canadians stated that they cut down on sleep in an attempt to squeeze more time out of the day.

Figure 7.22 Average Hours of Required Sleep per Night. The average Canadian adult reported getting only 6.5 hours of sleep per night, which is less than the recommended range proposes. [Long Description]

Getting needed rest is difficult in part because school and work schedules still follow the early-to-rise timetable that was set years ago. We tend to stay up late to enjoy activities in the evening but then are forced to get up early to go to work or school. The situation is particularly bad for university students, who are likely to combine a heavy academic schedule with an active social life and who may, in some cases, also work. Getting enough sleep is a luxury that many of us seem to be unable or unwilling to afford, and yet sleeping is one of the most important things we can do for ourselves. Continued over time, a nightly deficit of even only one or two hours can have a substantial impact on mood and performance (Figure 7.23).

Sleep has a vital restorative function, and a prolonged lack of sleep results in increased anxiety, diminished performance, and, if severe and extended, even death. Many road accidents involve sleep deprivation, and people who are sleep deprived show decrements in driving performance similar to those who have ingested alcohol (Hack, Choi, Vijayapalan, Davies, & Stradling, 2001; Williamson & Feyer, 2000). Poor treatment by doctors (Smith-Coggins, Rosekind, Hurd, & Buccino, 1994) and a variety of industrial accidents have also been traced in part to the effects of sleep deprivation.

Good sleep is also important to our health and longevity. It is no surprise that we sleep more when we are sick, because sleep works to fight infection. Sleep deprivation suppresses immune responses that fight off infection, and can lead to obesity, hypertension, and memory impairment (Ferrie et al., 2007; Kushida, 2005). Sleeping well can even save our lives. Dew and colleagues (2003) found that older adults who had better sleep patterns also lived longer.

Figure 7.23 The Effects of Sleep Deprivation. In 1964, 17-year-old high school student Randy Gardner remained awake for 264 hours (11 days) in order to set a new Guinness World Record. At the request of his worried parents, he was monitored by a U.S. Navy psychiatrist, Lt. Cmdr. John J. Ross. This chart maps the progression of his behavioural changes over the 11 days. [Long Description]

Dreams and Dreaming

Dreams are *the succession of images, thoughts, sounds, and emotions that passes through our minds while sleeping*. When people are awakened from REM sleep, they normally report that they have been dreaming, suggesting that people normally dream several times a night but that most dreams are forgotten on awakening (Dement, 1997). The content of our dreams generally relates to our everyday experiences and concerns, and frequently our fears and failures (Cartwright, Agargun, Kirkby, & Friedman, 2006; Domhoff, Meyer-Gomes, & Schredl, 2005).

Many cultures regard dreams as having great significance for the dreamer, either by revealing something important about the dreamer's present circumstances or predicting his or her future. The Austrian psychologist Sigmund Freud (1913/1988) analyzed the dreams of his patients to help him understand their unconscious needs and desires, and psychotherapists still make use of this technique today. Freud believed that the primary function of dreams was **wish fulfilment**, or *the idea that dreaming allows us to act out the desires that we must repress during the day*. He differentiated between the **manifest content** of the dream (i.e., *its literal actions*) and its **latent content** (i.e., *the hidden psychological meaning of the dream*). Freud believed that the real meaning of dreams is often suppressed by the unconscious mind in order to protect the individual from thoughts and feelings that are hard to cope with. By uncovering the real meaning of dreams through *psychoanalysis*, Freud believed that people could better understand their problems and resolve the issues that create difficulties in their lives.

Although Freud and others have focused on the meaning of dreams, other theories about the causes of dreams are less concerned with their content. One possibility is that we dream primarily to help with consolidation, or the moving of information into long-term memory (Alvarenga et al., 2008; Zhang (2004). Rauchs, Desgranges, Foret, and Eustache (2005) found that rats that had been deprived of REM sleep after learning a new task were less able to perform the task again later than were rats that had been allowed to dream, and these differences were greater on tasks that involved learning unusual information or developing new behaviours. Payne and Nadel (2004) argued that the content of dreams is the result of consolidation — we dream about the things that are being moved into long-term memory. Thus dreaming may be an important part of the learning that we do while sleeping (Hobson, Pace-Schott, and Stickgold, 2000).

The **activation-synthesis theory of dreaming** (Hobson & McCarley, 1977; Hobson, 2004) *proposes still another explanation for dreaming — namely, that dreams are our brain's interpretation of the random firing of neurons in the brain stem*. According to this approach, the signals from the brain stem are sent to the cortex, just as they are when we are awake, but because the pathways from the cortex to skeletal muscles are disconnected during REM sleep, the cortex does not know how to interpret the signals. As a result, the cortex strings the messages together into the coherent stories we experience as dreams.

Although researchers are still trying to determine the exact causes of dreaming, one thing remains clear — we need to dream. If we are deprived of REM sleep, we quickly become less able to engage in the important tasks of everyday life, until we are finally able to dream again.

Key Takeaways

- Consciousness, our subjective awareness of ourselves and our environment, is functional because it allows us to plan activities and monitor our goals.
- Psychologists believe that consciousness is the result of neural activity in the brain.
- Human and animal behaviour is influenced by biological rhythms, including annual, monthly, and circadian rhythms.
- Sleep consists of two major stages: REM and non-REM sleep. Non-REM sleep has three substages, N1, N2, and N3.
- Each sleep stage is marked by a specific pattern of biological responses and brainwaves.
- Sleep is essential for adequate functioning during the day. Sleep disorders, including insomnia, sleep apnea, and narcolepsy, may make it hard for us to sleep well.
- Dreams occur primarily during REM sleep. Some theories of dreaming, such as Freud's, are based on the content of the dreams. Other theories of dreaming propose that dreaming is related to memory consolidation. The activation-synthesis theory of

dreaming is based only on neural activity.

Exercises and Critical Thinking

1. If you happen to be home alone one night, try this exercise: at nightfall, leave the lights and any other powered equipment off. Does this influence what time you go to sleep as opposed to your normal sleep time?
2. Review your own sleep patterns. Are you getting enough sleep? What makes you think so?
3. Review some of the dreams that you have had recently. Consider how each of the theories of dreaming we have discussed would explain your dreams.

Image Attributions

Figure 7.17: Adapted from Bodenhausen (1990).

Figure 7.18: 140307_jwl_sleep-1 by JBLM PAO (https://www.flickr.com/photos/jblmpa...t-bLybHR-xSqVE) used under CC-BY-NC-SA 2.0 (https://creativecommons.org/licenses/by-nc-sa/2.0/).

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Figure 7.22: Adapted by J. Walinga (Mental Health Canada, 2014).

Figure 7.23: Adapted from Ross (1965).

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Long Descriptions

Figure 7.17 long description: Guilty judgements based on stereotypes for morning and evening types depending on the time of day.

	Morning Types		Evening Types	
	9 am	8 pm	9 am	8 pm
Judgements of guilt	5.9	6.5	6.8	5.6

Figure 7.22 long description:

Age	Sleep needs
Newborns (0 to 2 months)	12 to 18 hours
Infants (3 to 11 months)	14 to 15 hours
Toddlers (1 to 3 years)	12 to 14 hours
Preschoolers (3 to 5 years)	11 to 13 hours
School-age children (5 to 10 years)	10 to 11 hours
Teens (10 to 17 years)	8.5 to 9.25 hours
Adults	7 to 9 hours

Figure 7.23 long description: : Effects of Sleep deprivation. Day 1: Difficulty focusing eyes. Day 2: Moodiness, difficulty focusing eyes. Day 3: Irritability, memory lapses, first hallucination. Day 4: Hallucinations, with recognition that they were not real. Day 5 and onward: paranoia.

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7.5: Altering Consciousness with Psychoactive Drugs

Charles Stangor, Jennifer Walinga, and Lee Sanders

Learning Objectives

- Summarize the major psychoactive drugs and their influences on consciousness and behaviour.
- Review the evidence regarding the dangers of recreational drugs.

A **psychoactive drug** is *a chemical that changes our states of consciousness, and particularly our perceptions and moods.* These drugs are commonly found in everyday foods and beverages, including chocolate, coffee, and soft drinks, as well as in alcohol and in over-the-counter drugs, such as aspirin, Tylenol, and cold and cough medication. Psychoactive drugs are also frequently prescribed as sleeping pills, tranquilizers, and antianxiety medications, and they may be taken illegally for recreational purposes. As you can see in Table 7.2, "Psychoactive Drugs by Class," the four primary classes of psychoactive drugs are *stimulants*, *depressants*, *opioids*, and *hallucinogens*.

Psychoactive drugs affect consciousness by influencing how neurotransmitters operate at the synapses of the central nervous system (CNS). Some psychoactive drugs are agonists, which mimic the operation of a neurotransmitter; some are antagonists, which block the action of a neurotransmitter; and some work by blocking the reuptake of neurotransmitters at the synapse.

Table 7.2 Psychoactive Drugs by Class.

Mechanism	Symptoms	Drug	Dangers and Side Effects	Psychological Dependence	Physical Dependence	Addiction Potential
Stimulants: Stimulants block the reuptake of dopamine, norepinephrine, and serotonin in the synapses of the CNS.	Enhanced mood and increased energy	Caffeine	May create dependence	Low	Low	Low
		Nicotine	Has major negative health effects if smoked or chewed	High	High	High
		Cocaine	Decreased appetite, headache	Low	Low	Moderate
		Amphetamines	Possible dependence, accompanied by severe "crash" with depression as drug effects wear off, particularly if smoked or injected	Moderate	Low	Moderate to High
Depressants: Depressants change consciousness by increasing the production of the neurotransmitter GABA and decreasing the production of the neurotransmitter acetylcholine, usually at the level of the thalamus and the reticular formation.	Calming effects, sleep, pain relief, slowed heart rate and respiration	Alcohol	Impaired judgment, loss of coordination, dizziness, nausea, and eventually a loss of consciousness	Moderate	Moderate	Moderate
		Barbiturates and benzodiazepines	Sluggishness, slowed speech, drowsiness, in severe cases, coma or death	Moderate	Moderate	Moderate
		Toxic inhalants	Brain damage and death	High	High	High
Opioids: The chemical makeup of opioids is similar to the endorphins, the neurotransmitters that serve as the body's "natural pain reducers."	Slowing of many body functions, constipation, respiratory and cardiac depression, and the rapid development of tolerance	Opium	Side effects include nausea, vomiting, tolerance, and addiction.	Moderate	Moderate	Moderate
		Morphine	Restlessness, irritability, headache and body aches, tremors, nausea,	High	Moderate	Moderate

Mechanism	Symptoms	Drug	Dangers and Side Effects	Psychological Dependence	Physical Dependence	Addiction Potential
			vomiting, and severe abdominal pain			
		Heroin	All side effects of morphine but about twice as addictive as morphine	High	Moderate	High
Hallucinogens: The chemical compositions of the hallucinogens are similar to the neurotransmitters serotonin and epinephrine, and they act primarily by mimicking them.	Altered consciousness; hallucinations	Marijuana	Mild intoxication; enhanced perception	Low	Low	Low
		LSD, mescaline, PCP, and peyote	Hallucinations; enhanced perception	Low	Low	Low

In some cases the effects of psychoactive drugs mimic other naturally occurring states of consciousness. For instance, sleeping pills are prescribed to create drowsiness, and benzodiazepines are prescribed to create a state of relaxation. In other cases psychoactive drugs are taken for recreational purposes with the goal of creating states of consciousness that are pleasurable or that help us escape our normal consciousness.

The use of psychoactive drugs, especially those that are used illegally, has the potential to create very negative side effects. This does not mean that all drugs are dangerous, but rather that all drugs can be dangerous, particularly if they are used regularly over long periods of time. Psychoactive drugs create negative effects not so much through their initial use but through the continued use, accompanied by increasing doses, that ultimately may lead to drug abuse.

The problem is that many drugs create **tolerance**: *an increase in the dose required to produce the same effect*, which makes it necessary for the user to increase the dosage or the number of times per day that the drug is taken. As the use of the drug increases, the user may develop a **dependence**, defined as a *need to use a drug or other substance regularly*. Dependence can be psychological, in which case the drug is desired and has become part of the everyday life of the user, but no serious physical effects result if the drug is not obtained; or physical, in which case serious physical and mental effects appear when the drug is withdrawn. Cigarette smokers who try to quit, for example, experience physical withdrawal symptoms, such as becoming tired and irritable, as well as extreme psychological cravings to enjoy a cigarette in particular situations, such as after a meal or when they are with friends.

Users may wish to stop using the drug, but when they reduce their dosage they experience **withdrawal** — *negative experiences that accompany reducing or stopping drug use, including physical pain and other symptoms. When the user powerfully craves the drug and is driven to seek it out, over and over again, no matter what the physical, social, financial, and legal cost*, we say that he or she has developed an **addiction** to the drug.

It is a common belief that addiction is an overwhelming, irresistibly powerful force, and that withdrawal from drugs is always an unbearably painful experience. But the reality is more complicated and in many cases less extreme. For one, even drugs that we do not generally think of as being addictive, such as caffeine, nicotine, and alcohol, can be very difficult to quit using, at least for some people. On the other hand, drugs that are normally associated with addiction, including amphetamines, cocaine, and heroin, do not immediately create addiction in their users. Even for a highly addictive drug like cocaine, only about 15% of users become addicted

(Robinson & Berridge, 2003; Wagner & Anthony, 2002). Furthermore, the rate of addiction is lower for those who are taking drugs for medical reasons than for those who are using drugs recreationally. Patients who have become physically dependent on morphine administered during the course of medical treatment for a painful injury or disease are able to be rapidly weaned off the drug afterward, without becoming addicts. Robins, Davis, and Goodwin (1974) found that the majority of soldiers who had become addicted to morphine while overseas were quickly able to stop using after returning home.

This does not mean that using recreational drugs is not dangerous. For people who do become addicted to drugs, the success rate of recovery is low. These drugs are generally illegal and carry with them potential criminal consequences if one is caught in possession of them and arrested. Drugs that are smoked may produce throat and lung cancers and other problems. Snorting ("sniffing") drugs can lead to a loss of the sense of smell, nosebleeds, difficulty in swallowing, hoarseness, and chronic runny nose. Injecting drugs intravenously carries with it the risk of contracting infections such as hepatitis and HIV. Furthermore, the quality and contents of illegal drugs are generally unknown, and the doses can vary substantially from purchase to purchase. The drugs may also contain toxic chemicals.

Another problem is the unintended consequences of combining drugs, which can produce serious side effects. Combining drugs is dangerous because their combined effects on the CNS can increase dramatically and can lead to accidental or even deliberate overdoses. For instance, ingesting alcohol or benzodiazepines along with the usual dose of heroin is a frequent cause of overdose deaths in opiate addicts, and combining alcohol and cocaine can have a dangerous impact on the cardiovascular system (McCance-Katz, Kosten, & Jatlow, 1998).

Although all recreational drugs are dangerous, some can be more deadly than others. One way to determine how dangerous recreational drugs are is to calculate a **safety ratio**, *based on the dose that is likely to be fatal divided by the normal dose needed to feel the effects of the drug*. Drugs with lower ratios are more dangerous because the difference between the normal and the lethal dose is small. For instance, heroin has a safety ratio of 6 because the average fatal dose is only six times greater than the average effective dose. On the other hand, marijuana has a safety ratio of 1,000. This is not to say that smoking marijuana cannot be deadly, but it is much less likely to be deadly than is heroin. The safety ratios of common recreational drugs are shown in Table 7.3, "Popular Recreational Drugs and Their Safety Ratios."

Table 7.3 Popular Recreational Drugs and Their Safety Ratios.

Drug	Description	Street or brand names	Safety ratio
Heroin	Strong depressant	Smack, junk, H	6
GHB (Gamma hydroxy butyrate)	“Rave” drug (not Ecstacy), also used as a “date rape” drug	Georgia home boy, liquid ecstasy, liquid X, liquid G, fantasy	8
Isobutyl nitrite	Depressant and toxic inhalant	Poppers, rush, locker room	8
Alcohol	Active compound is ethanol		10
DXM (Dextromethorphan)	Active ingredient in over-the-counter cold and cough medicines		10
Methamphetamine	May be injected or smoked	Meth, crank	10
Cocaine	May be inhaled or smoked	Crack, coke, rock, blue	15
MDMA (methylene-dioxymethamphetamine)	Very powerful stimulant	Ecstasy	16
Codeine	Depressant		20
Methadone	Opioid		20
Mescaline	Hallucinogen		24
Benzodiazepine	Prescription tranquilizer	Centrax, Dalmane, Doral, Halcion, Librium, ProSom, Restoril, Xanax, Valium	30
Ketamine	Prescription anesthetic	Ketanest, Ketaset, Ketalar	40
DMT (Dimethyltryptamine)	Hallucinogen		50
Phenobarbital	Usually prescribed as a sleeping pill	Luminal (Phenobarbital), Mebaraland, Nembutal, Seconal, Sombulex	50
Prozac	Antidepressant		100
Nitrous oxide	Often inhaled from whipped-cream dispensers	Laughing gas	150
Lysergic acid diethylamide (LSD)		Acid	1,000
Marijuana (Cannabis)	Active ingredient is THC	Pot, spliff, weed	1,000

Drugs with lower safety ratios have a greater risk of brain damage and death.
Adapted from Gable (2004).

Speeding Up the Brain With Stimulants: Caffeine, Nicotine, Cocaine, and Amphetamines

A **stimulant** is *a psychoactive drug that operates by blocking the reuptake of dopamine, norepinephrine, and serotonin in the synapses of the CNS*. Because more of these neurotransmitters remain active in the brain, the result is an increase in the activity of the sympathetic division of the autonomic nervous system (ANS). Effects of stimulants include increased heart and breathing rates, pupil dilation, and increases in blood sugar accompanied by decreases in appetite. For these reasons, stimulants are frequently used to help people stay awake and to control weight.

Used in moderation, some stimulants may increase alertness, but used in an irresponsible fashion they can quickly create dependency. A major problem is the “crash” that results when the drug loses its effectiveness and the activity of the neurotransmitters returns to normal. The withdrawal from stimulants can create profound depression and lead to an intense desire to repeat the high.

Caffeine is *a bitter psychoactive drug found in the beans, leaves, and fruits of plants*, where it acts as a natural pesticide. It is found in a wide variety of products, including coffee, tea, soft drinks, candy, and desserts. In North America, more than 80% of adults consume caffeine daily (Lovett, 2005). Caffeine acts as a mood enhancer and provides energy. Although Health Canada lists caffeine as a safe food substance, it has at least some characteristics of dependence. People who reduce their caffeine intake often report being irritable, restless, and drowsy, as well as experiencing strong headaches, and these withdrawal symptoms may last up to a week. Most experts feel that using small amounts of caffeine during pregnancy is safe, but larger amounts of caffeine can be harmful to the fetus (Health Canada, 2014).

Nicotine is *a psychoactive drug found in tobacco and other members of the nightshade family of plants, where it acts as a natural pesticide*. Nicotine is the main cause for the dependence-forming properties of tobacco use, and tobacco use is a major health threat. Nicotine creates both psychological and physical addiction, and it is one of the hardest addictions to break. Nicotine content in cigarettes has slowly increased over the years, making quitting smoking more and more difficult. Nicotine is also found in smokeless (chewing) tobacco.

People who want to quit smoking sometimes use other drugs to help them. For instance, the prescription drug Chantix acts as an antagonist, binding to nicotine receptors in the synapse, which prevents users from receiving the normal stimulant effect when they smoke. At the same time, the drug also releases dopamine, the reward neurotransmitter. In this way Chantix dampens nicotine withdrawal symptoms and cravings. In many cases, people are able to get past the physical dependence, allowing them to quit smoking at least temporarily. In the long run, however, the psychological enjoyment of smoking may lead to relapse.

Cocaine is *an addictive drug obtained from the leaves of the coca plant* (Figure 7.24). In the late 19th and early 20th centuries, it was a primary constituent in many popular tonics and elixirs and, although it was removed in 1905, was one of the original ingredients in Coca-Cola. Today cocaine is taken illegally as a recreational drug.

Figure 7.24 Cocaine. Snorting cocaine tends to cause a high that averages about 15 to 30 minutes.

Cocaine has a variety of adverse effects on the body. It constricts blood vessels, dilates pupils, and increases body temperature, heart rate, and blood pressure. It can cause headaches, abdominal pain, and nausea. Since cocaine also tends to decrease appetite, chronic users may become malnourished. The intensity and duration of cocaine’s effects, which include increased energy and reduced fatigue, depend on how the drug is taken. The faster the drug is absorbed into the bloodstream and delivered to the brain, the more intense the high. Injecting or smoking cocaine produces a faster, stronger high than snorting it. However, the faster the drug is absorbed, the faster the effects subside. The high from snorting cocaine may last 30 minutes, whereas the high from smoking “crack” cocaine may last only 10 minutes. In order to sustain the high, the user must administer the drug again, which may lead to frequent use, often in higher doses, over a short period of time (National Institute on Drug Abuse, 2009a). Cocaine has a safety ratio of 15, making it a very dangerous recreational drug.

An **amphetamine** is *a stimulant that produces increased wakefulness and focus, along with decreased fatigue and appetite*. Amphetamines are used in prescription medications to treat attention deficit disorder (ADD) and narcolepsy, and to control appetite. Some brand names of amphetamines are Adderall, Benzedrine, Dexedrine, and Vyvanse. But amphetamine (“speed”) is also used illegally as a recreational drug. The methylated version of amphetamine, *methamphetamine* (“meth” or “crank”), is

currently favoured by users, partly because it is available in ampoules ready for use by injection (Csaky & Barnes, 1984). Meth is a highly dangerous drug with a safety ratio of only 10.

Amphetamines may produce a very high level of tolerance, leading users to increase their intake, often in "jolts" taken every half hour or so. Although the level of physical dependency is small, amphetamines may produce very strong psychological dependence, effectively amounting to addiction. Continued use of stimulants may result in severe psychological depression. The effects of the stimulant methylenedioxymethamphetamine (MDMA), also known as "Ecstasy," provide a good example. MDMA is a very strong stimulant that very successfully prevents the reuptake of serotonin, dopamine, and norepinephrine. It is so effective that when used repeatedly it can seriously deplete the amount of neurotransmitters available in the brain, producing a catastrophic mental and physical "crash" resulting in serious, long-lasting depression. MDMA also affects the temperature-regulating mechanisms of the brain, so in high doses, and especially when combined with vigorous physical activity like dancing, it can cause the body to become so drastically overheated that users can literally "burn up" and die from hyperthermia and dehydration.

Slowing Down the Brain with Depressants: Alcohol, Barbiturates and Benzodiazepines, and Toxic Inhalants

In contrast to stimulants, which work to increase neural activity, a *depressant* acts to slow down consciousness. A **depressant** is *a psychoactive drug that reduces the activity of the CNS*. Depressants are widely used as prescription medicines to relieve pain, to lower heart rate and respiration, and as anticonvulsants. Depressants change consciousness by increasing the production of the neurotransmitter GABA and decreasing the production of the neurotransmitter acetylcholine, usually at the level of the thalamus and the reticular formation. The outcome of depressant use (similar to the effects of sleep) is a reduction in the transmission of impulses from the lower brain to the cortex (Csaky & Barnes, 1984).

The most commonly used of the depressants is **alcohol**, *a colorless liquid, produced by the fermentation of sugar or starch, that is the intoxicating agent in fermented drinks* (Figure 7.25). Alcohol is the oldest and most widely used drug of abuse in the world. In low to moderate doses, alcohol first acts to remove social inhibitions by slowing activity in the sympathetic nervous system. In higher doses, alcohol acts on the cerebellum to interfere with coordination and balance, producing the staggering gait of drunkenness. At high blood levels, further CNS depression leads to dizziness, nausea, and eventually a loss of consciousness. High enough blood levels, such as those produced by "guzzling" large amounts of hard liquor at parties, can be fatal. Alcohol is not a "safe" drug by any means — its safety ratio is only 10.

Alcohol use is highly costly to societies because so many people abuse alcohol and because judgment after drinking can be substantially impaired. It is estimated that almost half of automobile fatalities are caused by alcohol use, and excessive alcohol consumption is involved in a majority of violent crimes, including rape and murder (Abbey, Ross, McDuffie, & McAuslan, 1996). Alcohol increases the likelihood that people will respond aggressively to provocations (Bushman, 1993, 1997; Graham, Osgood, Wells, & Stockwell, 2006). Even people who are not normally aggressive may react with aggression when they are intoxicated. Alcohol use also leads to rioting, unprotected sex, and other negative outcomes.

Figure 7.25 Liquor Bottles. Alcohol is the most widely used drug of abuse in the world. Alcohol acts as a general depressant in the central nervous system, where its actions are similar to those of general anesthetics.

Alcohol increases aggression in part because it reduces the ability of the person who has consumed it to inhibit his or her aggression (Steele & Southwick, 1985). When people are intoxicated, they become more self-focused and less aware of the social

situation. As a result, they become less likely to notice the social constraints that normally prevent them from engaging aggressively, and are less likely to use those social constraints to guide them. For instance, we might normally notice the presence of a police officer or other people around us, which would remind us that being aggressive is not appropriate. But when we are drunk, we are less likely to be so aware. The narrowing of attention that occurs when we are intoxicated also prevents us from being cognizant of the negative outcomes of our aggression. When we are sober, we realize that being aggressive may produce retaliation, as well as cause a host of other problems, but we are less likely to realize these potential consequences when we have been drinking (Bushman & Cooper, 1990). Alcohol also influences aggression through expectations. If we expect that alcohol will make us more aggressive, then we tend to become more aggressive when we drink.

Barbiturates are *depressants that are commonly prescribed as sleeping pills and painkillers*. Brand names include Luminal (Phenobarbital), Mebaraland, Nembutal, Seconal, and Sombulex. In small to moderate doses, barbiturates produce relaxation and sleepiness, but in higher doses symptoms may include sluggishness, difficulty in thinking, slowness of speech, drowsiness, faulty judgment, and eventually coma or even death (Medline Plus, 2008).

Related to barbiturates, **benzodiazepines** are *a family of depressants used to treat anxiety, insomnia, seizures, and muscle spasms*. In low doses, they produce mild sedation and relieve anxiety; in high doses, they induce sleep. In the United States, benzodiazepines are among the most widely prescribed medications that affect the CNS. Brand names include Centrax, Dalmane, Doral, Halcion, Librium, ProSom, Restoril, Xanax, and Valium.

Toxic inhalants are also frequently abused as depressants. These drugs are easily accessible as the *vapours of glue, gasoline, propane, hairspray, and spray paint, and are inhaled to create a change in consciousness*. Related drugs are the nitrites (amyl and butyl nitrite; “poppers,” “rush,” “locker room”) and anesthetics such as nitrous oxide (laughing gas) and ether. Inhalants are some of the most dangerous recreational drugs, with a safety index below 10, and their continued use may lead to permanent brain damage.

Opioids: Opium, Morphine, Heroin, and Codeine

Opioids are *chemicals that increase activity in opioid receptor neurons in the brain and in the digestive system, producing euphoria, analgesia, slower breathing, and constipation*. Their chemical makeup is similar to the endorphins, the neurotransmitters that serve as the body’s “natural pain reducers.” Natural opioids are derived from the opium poppy, which is widespread in Eurasia, but they can also be created synthetically.

Opium is *the dried juice of the unripe seed capsule of the opium poppy*. It may be the oldest drug on record, known to the Sumerians before 4000 BC. **Morphine** and **heroin** (Figure 7.26) are *stronger, more addictive drugs derived from opium*, while **codeine** is a *weaker analgesic and less addictive member of the opiate family*. When morphine was first refined from opium in the early 19th century, it was touted as a cure for opium addiction, but it didn’t take long to discover that it was actually more addicting than raw opium. When heroin was produced a few decades later, it was also initially thought to be a more potent, less addictive painkiller but was soon found to be much more addictive than morphine. Heroin is about twice as addictive as morphine, and creates severe tolerance, moderate physical dependence, and severe psychological dependence. The danger of heroin is demonstrated in the fact that it has the lowest safety ratio (6) of all the drugs listed in Table 6.1, “Psychoactive Drugs by Class.”

The opioids activate the sympathetic division of the ANS, causing blood pressure and heart rate to increase, often to dangerous levels that can lead to heart attack or stroke. At the same time the drugs also influence the parasympathetic division, leading to constipation and other negative side effects. Symptoms of opioid withdrawal include diarrhea, insomnia, restlessness, irritability, and vomiting, all accompanied by a strong craving for the drug. The powerful psychological dependence of the opioids and the severe effects of withdrawal make it very difficult for morphine and heroin abusers to quit using. In addition, because many users take these drugs intravenously and share contaminated needles, they run a very high risk of being infected with diseases. Opioid addicts suffer a high rate of infections such as HIV, pericarditis (an infection of the membrane around the heart), and hepatitis B, any of which can be fatal.

Figure 7.26 Injecting Heroin. Intravenous injection of heroin typically causes a rush within seven to eight seconds. This method of drug use provides the highest intensity and quickest onset of the initial rush but is also the most dangerous.

Hallucinogens: Cannabis, Mescaline, and LSD

The drugs that produce the most extreme alteration of consciousness are the **hallucinogens**, *psychoactive drugs that alter sensation and perception and that may create hallucinations*. The hallucinogens are frequently known as "psychedelics." Drugs in this class include lysergic acid diethylamide (LSD, or "acid"), mescaline, and phencyclidine (PCP), as well as a number of natural plants including cannabis (marijuana), peyote, and psilocybin. The chemical compositions of the hallucinogens are similar to the neurotransmitters serotonin and epinephrine, and they act primarily as agonists by mimicking the action of serotonin at the synapses. The hallucinogens may produce striking changes in perception through one or more of the senses. The precise effects a user experiences are a function not only of the drug itself, but also of the user's pre-existing mental state and expectations of the drug experience. In large part, the user tends to get out of the experience what he or she brings to it. The hallucinations that may be experienced when taking these drugs are strikingly different from everyday experience and frequently are more similar to dreams than to everyday consciousness.

Cannabis (marijuana) is the most widely used hallucinogen. Marijuana also acts as a stimulant, producing giggling, laughing, and mild intoxication. It acts to enhance perception of sights, sounds, and smells, and may produce a sensation of time slowing down. It is much less likely to lead to antisocial acts than that other popular intoxicant, alcohol, and it is also the one psychedelic drug whose use has not declined in recent years (National Institute on Drug Abuse, 2009b).

In recent years, cannabis has again been frequently prescribed for the treatment of pain and nausea, particularly in cancer sufferers, as well as for a wide variety of other physical and psychological disorders (Ben Amar, 2006). The recreational and medicinal use of cannabis has been legal in Canada since October 17, 2018. The *Cannabis Act* outlines the legal framework for controlling production, distribution, sale, and possession (for personal use) across the country, with regulation and sanction for violation determined by each province and territory. For instance, access to legal cannabis for personal use is restricted to persons over the age of 19 in most provinces and territories, but that has been lowered to 18 in Alberta and Manitoba, to coincide with provincial liquor and tobacco laws (Government of Canada, 2018).

Although the hallucinogens are powerful drugs that produce striking "mind-altering" effects, they do not produce physiological or psychological tolerance or dependence. While they are not addictive and pose little physical threat to the body, their use is not advisable in any situation in which the user needs to be alert and attentive, exercise focused awareness or good judgment, or demonstrate normal mental functioning, such as driving a car, studying, or operating machinery.

Why We Use Psychoactive Drugs

People have used, and often abused, psychoactive drugs for thousands of years. Perhaps this should not be surprising, because many people find using drugs to be fun and enjoyable. Even when we know the potential costs of using drugs, we may engage in them anyway because the pleasures of using the drugs are occurring right now, whereas the potential costs are abstract and occur in the future.

Research Focus: Risk Tolerance Predicts Cigarette Use

Because drug and alcohol abuse is a behaviour that has such important negative consequences for so many people, researchers have tried to understand what leads people to use drugs. Carl Lejuez and his colleagues (Lejuez, Aklin, Bornovalova, & Moolchan, 2005) tested the hypothesis that cigarette smoking was related to a desire to take risks. In their research they compared risk-taking behaviour in adolescents who reported having tried a cigarette at least once with those who reported that they had never tried smoking.

Participants in the research were 125 students from Grades 5 through 12 who attended after-school programs throughout inner-city neighbourhoods. Eighty percent of the adolescents indicated that they had never tried even a puff of a cigarette, and 20% indicated that they had had at least one puff of a cigarette.

The participants were tested in a laboratory where they completed the Balloon Analogue Risk Task (BART), a measure of risk taking (Lejuez et al., 2002). The BART is a computer task in which the participant pumps up a series of simulated balloons by pressing on a computer key. With each pump the balloon appears bigger on the screen, and more money accumulates in a temporary "bank account." However, when a balloon is pumped up too far, the computer generates a popping sound, the balloon disappears from the screen, and all the money in the temporary bank is lost. At any point during each balloon trial, the participant can stop pumping up the balloon, click on a button, transfer all money from the temporary bank to the permanent bank, and begin with a new balloon.

Because the participants do not have precise information about the probability of each balloon exploding, and because each balloon is programmed to explode after a different number of pumps, the participants have to determine how much to pump up the balloon. The number of pumps that participants take is used as a measure of their tolerance for risk. Low-tolerance people tend to make a few pumps and then collect the money, whereas more risky people pump more times into each balloon.

Supporting the hypothesis that risk tolerance is related to smoking, Lejuez and colleagues found that the tendency to take risks was indeed correlated with cigarette use: the participants who indicated that they had puffed on a cigarette had significantly higher risk-taking scores on the BART than did those who had never tried smoking.

Individual ambitions, expectations, and values also influence drug use. Vaughan, Corbin, and Fromme (2009) found that university students who expressed positive academic values and strong ambitions had less alcohol consumption and fewer alcohol-related problems, and cigarette smoking has declined more among youth from wealthier and more educated homes than among those from lower socioeconomic backgrounds (Johnston, O'Malley, Bachman, & Schulenberg, 2004).

Drug use is in part the result of socialization. Children try drugs when their friends convince them to do it, and these decisions are based on social norms about the risks and benefits of various drugs (Figure 7.27). In the period 1991 to 1997, the percentage of Grade 12 students who responded that they perceived "great harm in regular marijuana use" declined from 79% to 58%, while annual use of marijuana in this group rose from 24% to 39% (Johnston et al., 2004). And students binge drink in part when they see that many other people around them are also binging (Clapp, Reed, Holmes, Lange, & Voas, 2006).

Figure 7.27 Drug Use. Use of various drugs by grade 12 students in 2005. [Long Description]

Despite the fact that young people have experimented with cigarettes, alcohol, and other dangerous drugs for many generations, it would be better if they did not. All recreational drug use is associated with at least some risks, and those who begin using drugs earlier are also more likely to use more dangerous drugs later (Lynskey et al., 2003). Furthermore, as we will see in the next section, there are many other enjoyable ways to alter consciousness that are safer.

Key Takeaways

- Psychoactive drugs are chemicals that change our state of consciousness. They work by influencing neurotransmitters in the CNS.
- Using psychoactive drugs may create tolerance and, when they are no longer used, withdrawal. Addiction may result from tolerance and the difficulty of withdrawal.
- Stimulants, including caffeine, nicotine, and amphetamines, increase neural activity by blocking the reuptake of dopamine, norepinephrine, and serotonin in the CNS.
- Depressants, including, alcohol, barbiturates, and benzodiazepines, decrease consciousness by increasing the production of the neurotransmitter GABA and decreasing the production of the neurotransmitter acetylcholine.
- Opioids, including codeine, opium, morphine, and heroin, produce euphoria and analgesia by increasing activity in opioid receptor neurons.
- Hallucinogens, including cannabis, mescaline, and LSD, create an extreme alteration of consciousness as well as the possibility of hallucinations.
- Recreational drug use is influenced by social norms as well as by individual differences. People who are more likely to take risks are also more likely to use drugs.

Exercises and Critical Thinking

1. Do people you know use psychoactive drugs? Which ones? Based on what you have learned in this section, why do you think that they are used, and do you think that their side effects are harmful?
2. Consider the research reported in the research focus on risk and cigarette smoking. What are the potential implications of the research for drug use? Can you see any weaknesses in the study caused by the fact that the results are based on correlational analyses?

Image Attributions

Figure 7.24: “Cocaine” by perturbao (http://www.flickr.com/photos/33373325@N04/3144560302) is licensed under CC BY-SA 2.0 (http://creativecommons.org/licenses/...2.0/deed.en_CA).

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Figure 7.26: “Injecting heroin” (http://commons.wikimedia.org/wiki/Fi...ing_heroin.jpg) is licensed under CC BY 2.0

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Long Descriptions

Figure 7.27 long description: Use of drugs by grade 12 students in 2005

	Cocaine	Opioids	Hallucinogens	Amphetamines	Marijuana/hashish	Any illicit drug	Alcohol
Percentage who reported having used the drug	6%	10%	6%	10%	35%	39%	71%

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7.6: Altering Consciousness without Drugs

Charles Stangor and Jennifer Walinga

Learning Objectives

- Review the ways that people may alter consciousness without using drugs.

Although the use of psychoactive drugs can easily and profoundly change our experience of consciousness, we can also — and often more safely — alter our consciousness without drugs. These altered states of consciousness are sometimes the result of simple and safe activities, such as sleeping, watching television, exercising, or working on a task that intrigues us. In this section we consider the changes in consciousness that occur through *hypnosis*, *sensory deprivation*, and *meditation*, as well as through other non-drug-induced mechanisms.

Changing Behaviour through Suggestion: The Power of Hypnosis

Franz Anton Mesmer (1734-1815) was an Austrian doctor who believed that all living bodies were filled with magnetic energy (Figure 7.28). In his practice, Mesmer passed magnets over the bodies of his patients while telling them their physical and psychological problems would disappear. The patients frequently lapsed into a trancelike state (they were said to be “mesmerized”) and reported feeling better when they awoke (Hammond, 2008).



Figure 7.28 Portrait of Franz Anton Mesmer.

Although subsequent research testing the effectiveness of Mesmer’s techniques did not find any long-lasting improvements in his patients, the idea that people’s experiences and behaviours could be changed through the power of suggestion has remained important in psychology. James Braid, a Scottish physician, coined the term *hypnosis* in 1843, basing it on the Greek word for *sleep* (Callahan, 1997).

Hypnosis is *a trancelike state of consciousness, usually induced by a procedure known as hypnotic induction, which consists of heightened suggestibility, deep relaxation, and intense focus* (Nash & Barnier, 2008). Hypnosis became famous in part through its use by Sigmund Freud in an attempt to make unconscious desires and emotions conscious and thus able to be considered and confronted (Baker & Nash, 2008).

Because hypnosis is based on the power of suggestion, and because some people are more suggestible than others, these people are more easily hypnotized. Hilgard (1965) found that about 20% of the participants he tested were entirely unsusceptible to hypnosis, whereas about 15% were highly responsive to it. The best participants for hypnosis are people who are willing or eager to be hypnotized, who are able to focus their attention and block out peripheral awareness, who are open to new experiences, and who are capable of fantasy (Spiegel, Greenleaf, & Spiegel, 2005).

People who want to become hypnotized are motivated to be good subjects, to be open to suggestions by the hypnotist, and to fulfill the role of a hypnotized person as they perceive it (Spanos, 1991). The hypnotized state results from a combination of conformity, relaxation, obedience, and suggestion (Fassler, Lynn, & Knox, 2008). This does not necessarily indicate that hypnotized people are “faking” or lying about being hypnotized. Kinnunen, Zamansky, and Block (1994) used measures of skin conductance (which

indicates emotional response by measuring perspiration, and therefore renders it a reliable indicator of deception) to test whether hypnotized people were lying about having been hypnotized. Their results suggested that almost 90% of their supposedly hypnotized subjects truly believed that they had been hypnotized.

One common misconception about hypnosis is that the hypnotist is able to "take control" of hypnotized patients and thus can command them to engage in behaviours against their will. Although hypnotized people are suggestible (Jamieson & Hasegawa, 2007), they nevertheless retain awareness and control of their behaviour and are able to refuse to comply with the hypnotist's suggestions if they so choose (Kirsch & Braffman, 2001). In fact, people who have not been hypnotized are often just as suggestible as those who have been (Orne & Evans, 1965).

Another common belief is that hypnotists can lead people to forget the things that happened to them while they were hypnotized. Hilgard and Cooper (1965) investigated this question and found that they could lead people who were very highly susceptible to hypnosis to show at least some signs of post-hypnotic amnesia (i.e., forgetting where they had learned information that had been told to them while they were under hypnosis), but that this effect was not strong or common.

Some hypnotists have tried to use hypnosis to help people remember events, such as childhood experiences or details of crime scenes, that they have forgotten or repressed. The idea is that some memories have been stored but can no longer be retrieved, and that hypnosis can aid in the retrieval process. But research finds that this is not successful: people who are hypnotized and then asked to relive their childhood act like children, but they do not accurately recall the things that occurred to them in their own childhood (Silverman & Retzlaff, 1986). Furthermore, the suggestibility produced through hypnosis may lead people to erroneously recall experiences that they did not have (Newman & Baumeister, 1996). Many states and jurisdictions have therefore banned the use of hypnosis in criminal trials because the "evidence" recovered through hypnosis is likely to be fabricated and inaccurate.

Hypnosis is also frequently used to attempt to change unwanted behaviours, such as to reduce smoking, overeating, and alcohol abuse. The effectiveness of hypnosis in these areas is controversial, although at least some successes have been reported. Kirsch, Montgomery, and Sapirstein (1995) found that adding hypnosis to other forms of therapy increased the effectiveness of the treatment, and Elkins and Perfect (2008) reported that hypnosis was useful in helping people stop smoking. Hypnosis is also effective in improving the experiences of patients who are experiencing anxiety disorders, such as post-traumatic stress disorder (PTSD) (Cardena, 2000; Montgomery, David, Winkel, Silverstein, & Bovbjerg, 2002), and for reducing pain (Montgomery, DuHamel, & Redd, 2000; Patterson & Jensen, 2003).

Reducing Sensation to Alter Consciousness: Sensory Deprivation

Sensory deprivation is the *intentional reduction of stimuli affecting one or more of the senses, with the possibility of resulting changes in consciousness*. Sensory deprivation is used for relaxation or meditation purposes, and in physical and mental health-care programs to produce enjoyable changes in consciousness. But when deprivation is prolonged, it is unpleasant and can be used as a means of torture.

Although the simplest forms of sensory deprivation require nothing more than a blindfold to block the person's sense of sight or earmuffs to block the sense of sound, more complex devices have also been devised to temporarily cut off the senses of smell, taste, touch, heat, and gravity. In 1954, John Lilly, a neurophysiologist at the National Institute of Mental Health, developed the sensory deprivation tank. The tank is filled with water that is the same temperature as the human body, and salts are added to the water so that the body floats, thus reducing the sense of gravity. The tank is dark and soundproof, and the person's sense of smell is blocked by the use of chemicals in the water, such as chlorine.



Figure 7.29 Sensory Deprivation Tank.

The sensory deprivation tank has been used for therapy and relaxation (Figure 7.29). In a typical session for alternative healing and meditative purposes, a person may rest in an isolation tank for up to an hour. Treatment in isolation tanks has been shown to help with a variety of medical issues, including insomnia and muscle pain (Suedfeld, 1990b; Bood, Sundequist, Kjellgren, Nordström, & Norlander, 2007; Kjellgren, Sundequist, Norlander, & Archer, 2001), headaches (Wallbaum, Rzewnicki, Steele, & Suedfeld, 1991), and addictive behaviours such as smoking, alcoholism, and obesity (Suedfeld, 1990a).

Although relatively short sessions of sensory deprivation can be relaxing and both mentally and physically beneficial, prolonged sensory deprivation can lead to disorders of perception, including confusion and hallucinations (Yuksel, Kisa, Aydemir, & Goka, 2004). It is for this reason that sensory deprivation is sometimes used as an instrument of torture (Benjamin, 2006).

Meditation

Meditation refers to *techniques in which the individual focuses on something specific, such as an object, a word, or one's breathing, with the goal of ignoring external distractions, focusing on one's internal state, and achieving a state of relaxation and well-being*. Followers of various Eastern religions (Hinduism, Buddhism, and Taoism) use meditation to achieve a higher spiritual state, and popular forms of meditation in the West, such as yoga, Zen, and Transcendental Meditation, have originated from these practices. Many meditative techniques are very simple. You simply need to sit in a comfortable position with your eyes closed and practise deep breathing. You might want to try it out for yourself (see Video Clip: "Try Meditation").

Video: *Try Meditation* [https://youtu.be/qs_DuZigRzY]. Here is a simple meditation exercise you can do in your own home.



Brain imaging studies have indicated that meditation is not only relaxing but can also induce an altered state of consciousness (Figure 7.30). Cahn and Polich (2006) found that experienced meditators in a meditative state had more prominent alpha and theta waves, and other studies have shown declines in heart rate, skin conductance, oxygen consumption, and carbon dioxide elimination during meditation (Dillbeck, Cavanaugh, Glenn, & Orme-Johnson, 1987; Fenwick, 1987). These studies suggest that the action of the sympathetic division of the autonomic nervous system (ANS) is suppressed during meditation, creating a more relaxed physiological state as the meditator moves into deeper states of relaxation and consciousness.



Figure 7.30 Meditation Exercise. Research has found that regular meditation has positive physiological and psychological effects.

Research has found that regular meditation can mediate the effects of stress and depression, and promote well-being (Grossman, Niemann, Schmidt, & Walach, 2004; Reibel, Greeson, Brainard, & Rosenzweig, 2001; Salmon et al., 2004). Meditation has also been shown to assist in controlling blood pressure (Barnes, Treiber, & Davis, 2001; Walton et al., 2004). A study by Lyubimov (1992) showed that during meditation, a larger area of the brain was responsive to sensory stimuli, suggesting that there is greater coordination between the two brain hemispheres as a result of meditation. Lutz, Greischar, Rawlings, Ricard,and Davidson (2004) demonstrated that those who meditate regularly (as opposed to those who do not) tend to utilize a greater part of their brain and that their gamma waves are faster and more powerful. And a study of Tibetan Buddhist monks who meditate daily found that several areas of the brain can be permanently altered by the long-term practice of meditation (Lutz et al. 2004).

It is possible that the positive effects of meditation could also be found by using other methods of relaxation. Although advocates of meditation claim that meditation enables people to attain a higher and purer consciousness, perhaps any kind of activity that calms and relaxes the mind, such as working on crossword puzzles, watching television or movies, or engaging in other enjoyed behaviours, might be equally effective in creating positive outcomes. Regardless of the debate, the fact remains that meditation is, at the very least, a worthwhile relaxation strategy.

Psychology in Everyday Life: The Need to Escape Everyday Consciousness

We may use recreational drugs, drink alcohol, overeat, have sex, and gamble for fun, but in some cases these normally pleasurable behaviours are abused, leading to exceedingly negative consequences for us. We frequently refer to the abuse of any type of pleasurable behaviour as an "addiction," just as we refer to drug or alcohol addiction.

Roy Baumeister (Baumeister, 1991) has argued that the desire to avoid thinking about the self (what he calls the "escape from consciousness") is an essential component of a variety of self-defeating behaviours. Their approach is based on the idea that consciousness involves *self-awareness*, the process of thinking about and examining the self. Normally we enjoy being self-aware, as we reflect on our relationships with others, our goals, and our achievements. But if we have a setback or a problem, or if we behave in a way that we determine is inappropriate or immoral, we may feel stupid, embarrassed, or unlovable. In these cases self-awareness may become burdensome. And even if nothing particularly bad is happening at the moment, self-awareness may still feel unpleasant because we have fears about what might happen to us or about mistakes that we might make in the future.

Baumeister argues that when self-awareness becomes unpleasant, the need to forget about the negative aspects of the self may become so strong that we turn to altered states of consciousness. Baumeister believes that in these cases we escape the self by narrowing our focus of attention to a particular action or activity, which prevents us from having to think about ourselves and the implications of various events for our self-concept.

Baumeister has analyzed a variety of self-defeating behaviours in terms of the desire to escape consciousness. Perhaps most obvious is suicide — the ultimate self-defeating behaviour and the ultimate solution for escaping the negative aspects of self-consciousness. People who commit suicide are normally depressed and isolated. They feel bad about themselves, and suicide is a relief from the negative aspects of self-reflection. Suicidal behaviour is often preceded by a period of narrow and rigid cognitive functioning that serves as an escape from the very negative view of the self brought on by recent setbacks or traumas (Baumeister, 1990).

Alcohol abuse may also accomplish an escape from self-awareness by physically interfering with cognitive functioning, making it more difficult to recall the aspects of our self-consciousness (Steele & Josephs, 1990). And cigarette smoking may appeal to people as a low-level distractor that helps them to escape self-awareness. Heatherton and Baumeister (1991) argued that binge eating is another way of escaping from consciousness. Binge eaters, including those who suffer from bulimia nervosa, have unusually high standards for the self, including success, achievement, popularity, and body thinness. As a result they find it difficult to live up to these standards. Because these individuals evaluate themselves according to demanding criteria, they will tend to fall short periodically. Becoming focused on eating, according to Heatherton and Baumeister, is a way to focus only on one particular activity and to forget the broader, negative aspects of the self.

The removal of self-awareness has also been depicted as the essential part of the appeal of masochism, in which people engage in bondage and other aspects of submission. Masochists are frequently tied up using ropes, scarves, neckties, stockings, handcuffs, and gags, and the outcome is that they no longer feel that they are in control of themselves, which relieves them from the burdens of the self (Baumeister, 1991).

Newman and Baumeister (1996) have argued that even the belief that one has been abducted by aliens may be driven by the need to escape everyday consciousness. Every day at least several hundred (and more likely several thousand) Americans claim that they are abducted by these aliens, although most of these stories occur after the individuals have consulted with a psychotherapist or someone else who believes in alien abduction. Again, Baumeister has found a number of indications that people who believe that they have been abducted may be using the belief as a way of escaping self-consciousness.

Key Takeaways

- Hypnosis is a trancelike state of consciousness consisting of heightened susceptibility, deep relaxation, and intense focus.
- Hypnosis is not useful for helping people remember past events, but it can be used to alleviate anxiety and pain.
- Sensory deprivation is the intentional reduction of stimulation to one or more of the senses. It can be used therapeutically to treat insomnia, muscle tension, and pain.
- Meditation refers to a range of techniques that can create relaxation and well-being.

Exercises and Critical Thinking

1. Do you think that you would be a good candidate for hypnosis? Why or why not?
2. Try the meditation exercise in this section for three consecutive days. Do you feel any different when or after you meditate?

Image Attributions

Figure 7.28: Franz Anton Mesmer (http://commons.wikimedia.org/wiki/Fi...ton_Mesmer.jpg) is in the public domain.

Figure 7.29: Flotation Tank SMC by SeanMack (http://commons.wikimedia.org/wiki/Fi...n_tank_SMC.jpg) used under CC BY SA 3.0 license (http://creativecommons.org/licenses/by-sa/3.0/deed.en).

Figure 7.30: "Meditate" by RelaxingMusic (http://www.flickr.com/photos/8390581...n/photostream/) is licensed under CC BY-NC-SA 2.0 (http://creativecommons.org/licenses/...2.0/deed.en_CA).

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7.7: The Unconscious

Ap Dijksterhuis

Unconscious psychological processes have fascinated people for a very long time. The idea that people must have an unconscious is based on the idea that (a) there is so much going on in our brains, and the capacity of consciousness is so small, that there must be much more than just consciousness; and that (b) unless you believe consciousness is causally disconnected from other bodily and mental processes, conscious experiences must be prepared by other processes in the brain of which we are not conscious. Not only logic dictates that action starts unconsciously, but research strongly suggests this too. Moreover, unconscious processes are very often highly important for human functioning, and many phenomena, such as attitude formation, goal pursuit, stereotyping, creativity, and decision making are impossible to fully understand without incorporating the role of unconscious processes.

Learning Objectives

- Understand the logic underlying the assumption that unconscious processes are important.
- Obtain a crude understanding of some important historical thoughts about unconscious processes.
- Learn about some of the important psychological experiments on the unconscious.
- Appreciate the distinction between consciousness and attention.

Have you ever grabbed a candy bar, chewing gum or a magazine as you purchased your groceries? These well-known "impulse buys" raise an intriguing question: what is *really* driving your decisions? While, on the one hand, you might argue that it is your conscious mind that decides what you buy, what you eat and what you read. On the other hand you'd probably have to admit that those celebrity magazines and salted chocolates weren't actually on your shopping list with the eggs and the bread. So where did the desire to purchase them come from? As we will see in this module, there are a number of forces that operate on your thinking and decisions that you might not even be aware of; all of them being processed by the unconscious.

A Little Bit of History

Although the term "**unconscious**" was only introduced fairly recently (in the 18th century by the German philosopher Platner, the German term being "Unbewusstsein"), the relative "unconsciousness" of human nature has evoked both marvel and frustration for more than two millennia. Socrates (490–399 BC) argued that free will is limited, or at least so it seems, after he noticed that people often do things they really do not want to do. He called this *akrasia*, which can best be translated as "the lack of control over oneself." A few centuries later, the Roman thinker Plotinus (AD 205–270) was presumably the first to allude to the possibility of unconscious psychological processes in writing: "The absence of a conscious perception is no proof of the absence of mental activity."

These two ideas, first verbalized by Socrates and Plotinus respectively, were—and still are—hotly debated in psychology, philosophy, and neuroscience. That is, scientists still investigate the extent to which human behaviour is (and/or seems) voluntary or involuntary, and scientists still investigate the relative importance of unconscious versus conscious psychological processes, or mental activity in general. And, perhaps not surprisingly, both issues are still controversial.



Figure 7.31 As far back as the Ancient Greeks people have been interested in the puzzle of the seeming lack of control that we exhibit in our decision-making. What would Socrates have thought if he could see how modern people navigate a typical supermarket?

During the scientific revolution in Europe, our unconscious was taken away from us, so to speak, by the French philosopher Descartes (1596–1650). Descartes's dualism entailed a strict distinction between body and mind. According to Descartes, the mind produces psychological processes and everything going on in our minds is by definition conscious. Some psychologists have called this idea, in which mental processes taking place outside conscious awareness were rendered impossible, the **Cartesian catastrophe**. It took well over two centuries for science to fully recover from the impoverishment dictated by Descartes.

This is not say that contemporaries of Descartes and later thinkers all agreed with Descartes's dualism. In fact, many of them disagreed and kept on theorizing about unconscious psychological processes. For instance, the British philosopher John Norris (1657–1711) said: "We may have ideas of which we are not conscious. . . . There are infinitely more ideas impressed on our minds than we can possibly attend to or perceive." Immanuel Kant (1724–1804) agreed: "The field of our sense-perceptions and sensations, of which we are not conscious . . .is immeasurable." Norris and Kant used a logical argument that many proponents of the importance of unconscious psychological processes still like to point at today: *There is so much going on in our brains, and the capacity of consciousness is so small, that there must be much more than just consciousness.*

The most famous advocate of the importance of unconscious processes arrived at the scene in the late 19th century: the Austrian neurologist Sigmund Freud. Most people associate Freud with psychoanalysis, with his theory on id, ego, and superego, and with his ideas on repression, hidden desires, and dreams. Such associations are fully justified, but Freud also published lesser-known general theoretical work (e.g., Freud, 1915/1963). This theoretical work sounds, in contrast to his psychoanalytic work, very fresh and contemporary. For instance, Freud already argued that human behaviour never starts with a conscious process (compare this to the Libet experiment discussed below).

Freud, and also Wilhelm Wundt, pointed at another logical argument for the necessity of unconscious psychological processes. Wundt put it like this: "Our mind is so fortunately equipped, that it brings us the most important bases for our thoughts without our having the least knowledge of this work of elaboration. Only the results of it become conscious. This unconscious mind is for us like an unknown being who creates and produces for us, and finally throws the ripe fruits in our lap." In other words, we may become consciously aware of many different things—the taste of a glass of Burgundy, the beauty of the Taj Mahal, or the sharp pain in our toe after a collision with a bed—but these experiences do not hover in the air before they reach us. They are prepared, somehow and somewhere. *Unless you believe consciousness is causally disconnected from other bodily and mental processes (for instance if one assumes it is guided by the gods), conscious experiences must be prepared by other processes in the brain of which we are not conscious.*

The German psychologist Watt (1905), in an appealing experiment, showed that we are only consciously aware of the results of mental processes. His participants were repeatedly presented with nouns (e.g., "oak") and had to respond with an associated word as quickly as they could. On some occasions participants were requested to name a superordinate word ("oak"-"tree"), while on other occasions they were asked to come up with a part ("oak"-"acorn") or a subordinate ("oak"-"beam") word. Hence,

participants' thinking was divided into four stages: the instructions (e.g., superordinate), the presentation of the noun (e.g., "oak"), the search for an appropriate association, and the verbalization of the reply (e.g., "tree"). Participants were asked to carefully introspect on all four stages to shed light on the role of consciousness during each stage. The third stage (searching for an association) is the stage during which the actual thinking takes place and hence this was considered the most interesting stage. However, unlike the other stages, this stage was, as psychologists call it, introspectively blank: Participants could not report anything. The thinking itself was unconscious, and participants were only conscious of the answer that surfaced.

Where Action Originates

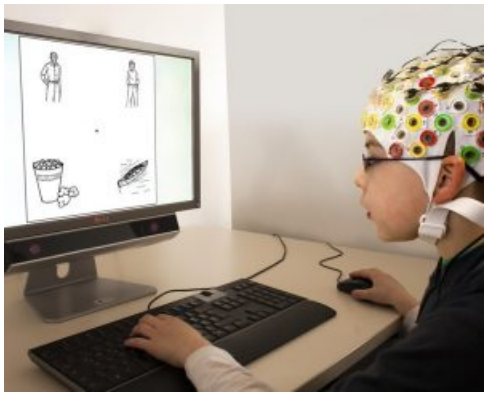


Figure 7.32 Using EEG in the psychology lab, experimenters have been able to show that unconscious preparation precedes conscious decision-making.

The idea that we unconsciously prepare an action before we are conscious of this action was tested in one of psychology's most famous experiments. Quite some time ago, Kornhuber and Deecke (1965) did experiments in which they asked their participants to perform a simple action, in this case flexing a finger. They also measured **EEG** to investigate when the brain starts to prepare the action. Their results showed that the first sign of unconscious preparation preceded an action by about 800 milliseconds. This is a serious amount of time, and it led Benjamin Libet to wonder whether conscious awareness of the decision to act appears just as long or even longer in advance as well. Libet (1985) replicated the Kornhuber and Deecke experiments while adding another measure: conscious awareness of the decision to act. He showed that conscious decisions *follow* unconscious preparation and only precede the actual execution of the action by about 200 milliseconds. In other words, the unconscious decides to act, we then become consciously aware of wanting to execute the action, and finally we act.

The experiment by Libet caused quite a stir, and some people tried to save the day for the decisive role of consciousness by criticizing the experiment. Some of this criticism made sense, such as the notion that the action sequence in the Libet experiments does not start with the EEG signals in the brain, but instead before that, with the instruction of the experimenter to flex a finger. And this instruction is consciously perceived. The dust surrounding the precise meaning of this experiment has still not completely settled, and recently Soon and colleagues (Soon, Brass, Heinze, & Haynes, 2008) reported an intriguing experiment in which they circumvented an important limitation of the Libet experiment. Participants had to repeatedly make a dichotomous choice (they were to press one of two buttons) and they could freely choose which one. The experimenters measured participants' brain activity. After the participants made their simple choice many times, the experimenters could, by looking at the difference in brain activity for the two different choices in earlier trials, predict which button a participant was going to press next up to ten seconds in advance —indeed, long before a participant had consciously "decided" what button to press next.

The Unconscious in Social Psychological Processes

These days, most scientific research on unconscious processes is aimed at showing that people do not need consciousness for certain psychological processes or behaviours. One such example is attitude formation. The most basic process of attitude formation is through mere exposure (Zajonc, 1968). Merely perceiving a stimulus repeatedly, such as a brand on a billboard one passes every day or a song that is played on the radio frequently, renders it more positive. Interestingly, mere exposure does not require conscious awareness of the object of an attitude. In fact, **mere-exposure effects** occur even when novel stimuli are presented subliminally for extremely brief durations (e.g., Kunst-Wilson & Zajonc, 1980). Intriguingly, in such subliminal mere-

exposure experiments, participants indicate a preference for, or a positive attitude towards, stimuli they do not consciously remember being exposed to.



Figure 7.33 Priming studies suggest that exposure to certain words or ideas can activate unconscious associations that directly impact our behavior. Could just the sight of the word bingo make you slow your walking pace?

Another example of modern research on unconscious processes is research on **priming**. In a well-known experiment by a research team led by the American psychologist John Bargh (Bargh, Chen, & Burrows, 1996), half the participants were primed with the stereotype of the elderly by doing a language task (they had to make sentences on the basis of lists of words). These lists contained words commonly associated with the elderly (e.g., “old,” “bingo,” “walking stick,” “Florida”). The remaining participants received a language task in which the critical words were replaced by words not related to the elderly. After participants had finished they were told the experiment was over, but they were secretly monitored to see how long they took to walk to the nearest elevator. The primed participants took significantly longer. That is, after being exposed to words typically associated with being old, they behaved in line with the stereotype of old people: being slow.

Such priming effects have been shown in many different domains. For example, Dijksterhuis and van Knippenberg (1998) demonstrated that priming can improve intellectual performance. They asked their participants to answer 42 general knowledge questions taken from the game Trivial Pursuit. Under normal conditions, participants answered about 50% of the questions correctly. However, participants primed with the stereotype of professors—who are by most people seen as intelligent—managed to answer 60% of the questions correctly. Conversely, performance of participants primed with the “dumb” stereotype of hooligans dropped to 40%.

Holland, Hendriks, and Aarts (2005) examined whether the mere priming with an odour is capable of changing behaviour. They exposed some of their participants to the scent of all-purpose cleaner without participants’ conscious awareness of the presence of this scent (a bucket was hidden in the laboratory). Because the scent of the cleaner was assumed to prime the concept of cleaning, the researchers hypothesized that participants exposed to the scent would spontaneously start to pay more attention to cleanliness. Participants were requested to eat a very crumbly cookie in the lab, and indeed, participants exposed to the scent put in more effort to keep their environment clean and free of crumbs.

Priming techniques are also applied to change people’s behaviour in the real world. Latham and Piccolo (2012) randomly assigned call center employees to a condition where the employees viewed a photograph of people making telephone calls in a call centre or a photograph of a woman winning a race. Both photographs led to a significant improvement in job performance compared to employees in the control condition, who did not see a photograph. In fact, the people who saw the photograph of people making phone calls raised 85% more money than the people in in the control group.

The research on unconscious processes also greatly improved our understanding of prejudice. People automatically categorize other people according to their race, and Patricia Devine (1989) demonstrated that categorization unconsciously leads to the activation of associated cultural stereotypes. Importantly, Devine also showed that stereotype activation was not moderated by people’s level of explicit prejudice. The conclusion of this work was bleak: We unconsciously activate cultural stereotypes, and this is true for all of us, even for people who are not explicitly prejudiced, or, in other words, for people who do not want to stereotype.



Figure 7.34 The “Eureka experience” is that moment when an idea enters conscious awareness.

Insight into unconscious processes has also contributed to our ideas about creativity. Creativity is usually seen as the result of a three-stage process. It begins with attending to a problem consciously. You think and read about a problem and discuss matters with others. This stage allows the necessary information to be gathered and organized, but during this stage a truly creative idea is rarely produced. The second stage is unconscious; it is the incubation stage during which people think unconsciously. The problem is put aside for a while, and conscious attention is directed elsewhere. The process of unconscious thought sometimes leads to a “**Eureka experience**” whereby the creative product enters consciousness. This third stage is one where conscious attention again plays a role. The creative product needs to be verbalized and communicated. For example, a scientific discovery needs detailed proof before it can be communicated to others.

The idea that people think unconsciously has also been applied to decision making (Dijksterhuis & Nordgren, 2006). In a recent set of experiments (Bos, Dijksterhuis, & van Baaren, 2008), participants were presented with information about various alternatives (such as cars or roommates) differing in attractiveness. Subsequently, participants engaged in a **distractor task** before they made a decision. That is, they consciously thought about something else; in this case, they solved anagrams. However, one group was told, prior to the distractor task, that they would be later asked questions about the decision problem. A second group was instead told that they were done with the decision problem and would not be asked anything later on. In other words, the first group had the goal to further process the information, whereas the second group had no such goal. Results showed that the first group made better decisions than the latter. Although they did the exact same thing consciously—again, solving anagrams—the first group made better decisions than the second group because the first thought unconsciously. Recently, researchers reported neuroscientific evidence for such unconscious thought processes, indeed showing that recently encoded information is further processed unconsciously when people have the goal to do so (Creswell, Bursley, & Satpute, in press).

People are sometimes surprised to learn that we can do so much, and so many sophisticated things, unconsciously. However, it is important to realize that there is no one-to-one relation between attention and consciousness (see e.g., Dijksterhuis & Aarts, 2010). Our behaviour is largely guided by goals and motives, and these goals determine what we pay attention to—that is, how many resources our brain spends on something—but not necessarily what we become consciously aware of. We can be conscious of things that we hardly pay attention to (such as fleeting daydreams), and we can be paying a lot of attention to something we are temporarily unaware of (such as a problem we want to solve or a big decision we are facing). Part of the confusion arises because attention and consciousness are correlated. When one pays more attention to an incoming stimulus, the probability that one becomes consciously aware of it increases. However, attention and consciousness are distinct. And to understand why we can do so many things unconsciously, attention is the key. We need attention, but for quite a number of things, we do not need conscious awareness.

These days, most researchers agree that the most sensible approach to learn about unconscious and conscious processes is to consider (higher) cognitive operations as unconscious, and test what (if anything) consciousness adds (Dijksterhuis & Aarts 2010;

van Gaal, Lamme, Fahrenfort, & Ridderinkhof, 2011; for an exception, see Newell & Shanks, in press). However, researchers still widely disagree about the relative importance or contribution of conscious and unconscious processes. Some theorists maintain the causal role of consciousness is limited or virtually nonexistent; others still believe that consciousness plays a crucial role in almost all human behaviour of any consequence.

Note: The historical overview of the way people thought about the unconscious is largely based on Koestler (1964).

Outside Resources

Book: A wonderful book about how little we know about ourselves: Wilson, T. D. (2002). Strangers to ourselves. Cambridge, MA: Harvard University Press.

Book: Another wonderful book about free will—or its absence?: Wegner, D. M. (2002). The illusion of conscious will. Cambridge, MA: MIT Press.

Video: An interesting video on attention http://www.dansimons.com/videos.html

Web: A good overview of priming http://en.wikipedia.org/wiki/Priming_(psychology)

Discussion Questions

1. Assess both the strengths and weaknesses of the famous Libet study.
2. Assuming that attention and consciousness are orthogonal, can you name examples of conscious processes that hardly require attention or of unconscious processes that require a lot of attention?
3. Do you think some of the priming experiments can also be explained purely by conscious processes?
4. What do you think could be the main function of consciousness?
5. Some people, scientists included, have a strong aversion to the idea that human behavior is largely guided by unconscious processes. Do you know why?

Image Attributions

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7.8: Summary, Key Terms, and Self-Test

Charles Stangor, Jennifer Walinga, and Lee Sanders

Summary

Consciousness is our subjective awareness of ourselves and our environment including bodily sensations and thoughts.

Consciousness is functional because we use it to reason logically, to plan activities, and to monitor our progress toward the goals we set for ourselves.

The French philosopher René Descartes (1596-1650) was a proponent of dualism, the idea that the mind, a nonmaterial entity, is separate from (although connected to) the physical body. In contrast to the dualists, psychologists believe the consciousness (and thus the mind) exists in the brain, not separate from it.

Several philosophical theories of human consciousness inform the present study of behaviour and mental processes. Socrates (490–399 BC) argued that free will is limited, or at least so it seems, after he noticed that people often do things they really do not want to do. He called this akrasia or *a lack of control over oneself*.

A few centuries later, the Roman thinker Plotinus (AD 205–270) was presumably the first to allude to the possibility of unconscious psychological processes where he noted that the absence of conscious perception does not necessarily prove the absence of mental activity.

Consciousness has been central to many theories of psychology. Freud's personality theories differentiated between the unconscious and the conscious aspects of behaviour, and present-day psychologists distinguish between automatic (unconscious) and controlled (conscious) behaviours and between implicit (unconscious) and explicit (conscious) cognitive processes.

Freud introduced the concept of the subconscious to account for things like memory and motivation that remain outside of the realm of consciousness

The concept of preconscious refers to information that we could pay attention to if we wanted, and where memories are stored for easy retrieval.

Awareness operates on two levels and humans fluctuate between these high and low thinking states.

Low awareness of subtle and even subliminal influences can become conscious as a result of cues.

Cues are stimulus of significant meaning.

High awareness refers to consciousness of what is going on around us.

Mindfulness is a state of heightened awareness, focus, and evaluation of our thoughts.

Attention is a mental resource that can be vigilant and sustained or divided and selective. William James referred to attention as a concentration of consciousness.

Priming studies aim to activate certain concepts and associations in people's memory below conscious awareness in order to understand the effect on subsequent behaviour.

Researchers can engage the implicit associations test (IAT) to study unconscious motives and beliefs.

The Flexible Correction Model suggests that humans have ability to correct or change beliefs and evaluations that have been influenced or biased by an undue outside source.

Because the brain varies in its current level and type of activity, consciousness is transitory. If we drink too much coffee or beer, the caffeine or alcohol influences the activity in our brain, and our consciousness may change. When we are anesthetized before an operation or experience a concussion after a knock on the head, we may lose consciousness entirely as a result of changes in brain activity. We also lose consciousness when we sleep.

Sleep is unique because while we lack full awareness in this state of consciousness, the brain is still active.

Sleep serves the function of mental and physical restoration.

The behaviour of organisms is influenced by biological rhythms, including the daily circadian rhythms that guide the waking and sleeping cycle in many animals.

Sleep researchers have found that sleeping people undergo a fairly consistent pattern of sleep stages, each lasting about 90 minutes. Each of the sleep stages has its own distinct pattern of brain activity. Rapid eye movement (REM) accounts for about 25% of our total sleep time, during which we dream. Non-rapid eye movement (non-REM) sleep is a deep sleep characterized by very slow brain waves, and is further subdivided into three stages: N1, N2, and N3.

Sleep has a vital restorative function, and a prolonged lack of sleep results in increased anxiety, diminished performance, and, if severe and extended, even death. Sleep deprivation suppresses immune responses that fight off infection, and it can lead to obesity, hypertension, and memory impairment.

Some people suffer from sleep disorders, including insomnia, sleep apnea, narcolepsy, sleepwalking, and REM sleep behaviour disorder.

Dream theories suggest that dreaming is our nonconscious attempt to make sense of daily experience and learning

According to Freud, dreams represent troublesome wishes and desires. Freud believed that the primary function of dreams was wish fulfilment, and he differentiated between the manifest and latent content of dreams.

Other theories of dreaming propose that we dream primarily to help with consolidation — the moving of information into long-term memory. The activation-synthesis theory of dreaming proposes that dreams are simply our brain's interpretation of the random firing of neurons in the brain stem.

Hypnosis is a trancelike state of consciousness, usually induced by a procedure known as hypnotic induction, which consists of heightened suggestibility, deep relaxation, and intense focus. Hypnosis also is frequently used to attempt to change unwanted behaviours, such as to reduce smoking, eating, and alcohol abuse.

Sensory deprivation is the intentional reduction of stimuli affecting one or more of the five senses, with the possibility of resulting changes in consciousness. Although sensory deprivation is used for relaxation or meditation purposes and to produce enjoyable changes in consciousness, when deprivation is prolonged, it is unpleasant and can be used as a means of torture.

Meditation refers to techniques in which the individual focuses on something specific, such as an object, a word, or one's breathing, with the goal of ignoring external distractions. Meditation has a variety of positive health effects.

A trance state involves a dissociation of the self where people are said to have less voluntary control over their behaviors and actions.

In some cases, consciousness may become aversive, and we may engage in behaviours that help us escape from consciousness, through the use of psychoactive drugs, for example.

Some substances can have a powerful effect on perception and on consciousness.

Psychoactive drugs are chemicals that change our states of consciousness, and particularly our perceptions and moods. The use (especially in combination) of psychoactive drugs has the potential to create very negative side effects, including tolerance, dependence, withdrawal symptoms, and addiction.

Depressants, including alcohol, barbiturates, benzodiazepines, and toxic inhalants, reduce the activity of the CNS. They are widely used as prescription medicines to relieve pain, to lower heart rate and respiration, and as anticonvulsants. Toxic inhalants are some of the most dangerous recreational drugs, with a safety index below 10, and their continued use may lead to permanent brain damage.

Stimulants speed up the body's physiological and mental processes**.** Stimulants, including caffeine, nicotine, cocaine, and amphetamine, are psychoactive drugs that operate by blocking the reuptake of dopamine, norepinephrine, and serotonin in the synapses of the CNS. Some amphetamines, such as Ecstasy, have very low safety ratios and thus are highly dangerous.

Opioids, including opium, morphine, heroin, and codeine, are chemicals that increase activity in opioid receptor neurons in the brain and in the digestive system, producing euphoria, analgesia, slower breathing, and constipation.

Hallucinogens, including cannabis, mescaline, and LSD, are psychoactive drugs that alter sensation and perception, and may create hallucinations.

Even when we know the potential costs of using drugs, we may engage in using them anyway because the rewards from using the drugs are occurring right now, whereas the potential costs are abstract and only in the future. And drugs are not the only things we enjoy or can abuse. It is normal to refer to the abuse of other behaviours, such as gambling, sex, overeating, and even overworking, as “addictions” to describe the overuse of pleasant stimuli.

Key Terms

- Activation-synthesis theory of dreaming
- Addiction
- Alcohol
- Amphetamine
- Automatic behavior
- Automatic empathy
- Barbiturates
- Benzodiazepines
- Biological rhythms
- Blood Alcohol Content (BAC)
- Bruxism
- Caffeine
- Cataplexy
- Cartesian catastrophe
- Circadian rhythm
- Cocaine
- Codeine
- Consciousness
- Controlled behavior
- Cues
- Conscious
- Dependence
- Depressants
- Dichotic listening
- Dissociation
- Distractor task
- Divided attention
- Dreams
- Dualism
- EEG (Electroencephalography)
- Eureka experience
- Euphoria
- Explicit memory
- False-belief test
- Flexible correction model
- Hallucinogens
- Heroin
- Hypnosis
- Hypnotherapy
- Implicit Associations Test (IAT)
- Implicit memory
- Inattentional blindness
- Insomnia
- Intentional
- Intentionality
- Jet lag
- Joint attention
- Latent content
- Limited capacity
- Manifest content
- Meditation
- Melatonin
- Mere-exposure effects
- Mimicry
- Mindfulness
- Mirror neurons
- Morphine
- Narcolepsy
- Nicotine
- Non-Rapid Eye Movement (non-REM) sleep
- Opioids
- Opium
- People’s (folk) explanations of behavior
- Periodic Limb Movement Disorder
- Priming
- Projection
- Psychoactive drug
- Rapid Eye Movement (REM) sleep
- REM Sleep Behaviour Disorder
- Restless Legs Syndrome
- Safety ratio
- Seasonal Affective Disorder (SAD)
- Selective attention
- Sensory deprivation
- Shadowing
- Simulation
- Sleep apnea
- Sleep spindles
- Sleep terrors
- Slow wave sleep
- Somnambulism (sleepwalking)
- Stimulant
- Subliminal perception
- Suprachiasmatic nucleus
- Synchrony
- Theory of mind
- Trance states
- Tolerance
- Toxic inhalants
- Unconscious
- Visual perspective taking
- Wish fulfilment
- Withdrawal

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CHAPTER OVERVIEW

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8.2: Memories as Types and Stages

Charles Stangor and Jennifer Walinga

Learning Objectives

- Compare and contrast explicit and implicit memory, identifying the features that define each.
- Explain the function and duration of eidetic and echoic memories.
- Summarize the capacities of short-term memory and explain how working memory is used to process information in it.

As you can see in Table 8.1, "Memory Conceptualized in Terms of Types, Stages, and Processes," psychologists conceptualize memory in terms of *types*, in terms of *stages*, and in terms of *processes*. In this section we will consider the two **types of memory**, *explicit memory* and *implicit memory*, and then the three major **memory stages**: *sensory*, *short-term*, and *long-term* (Atkinson & Shiffrin, 1968). Then, in the next section, we will consider the nature of long-term memory, with a particular emphasis on the cognitive techniques we can use to improve our memories. Our discussion will focus on the three processes that are central to **long-term memory**: *encoding*, *storage*, and *retrieval*.

Table 8.1 Memory Conceptualized in Terms of Types, Stages, and Processes.

As types	• Explicit memory • Implicit memory
As stages	• Sensory memory • Short-term memory • Long-term memory
As processes	• Encoding • Storage • Retrieval

Explicit Memory

When we assess memory by asking a person to consciously remember things, we are measuring *explicit memory*. **Explicit memory** refers to *knowledge or experiences that can be consciously remembered*. As you can see in Figure 8.2, "Types of Memory," there are two types of explicit memory: *episodic* and *semantic*. **Episodic memory** refers to *the firsthand experiences that we have had* (e.g., recollections of our high school graduation day or of the fantastic dinner we had in New York last year). **Semantic memory** refers to *our knowledge of facts and concepts about the world* (e.g., that the absolute value of −90 is greater than the absolute value of 9 and that one definition of the word "affect" is "the experience of feeling or emotion").

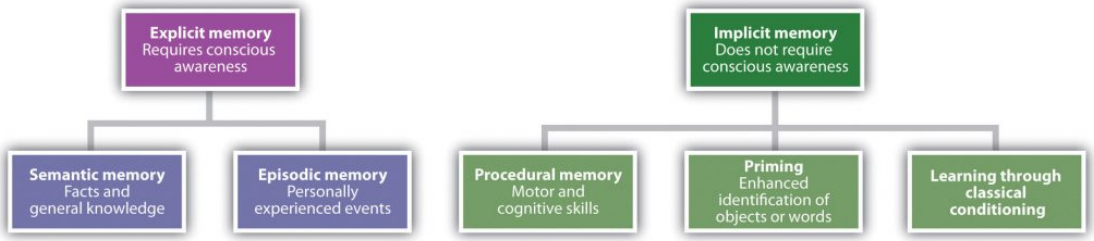


Figure 8.2 Types of Memory.

Explicit memory is assessed using measures in which the individual being tested must consciously attempt to remember the information. A **recall memory** test is *a measure of explicit memory that involves bringing from memory information that has previously been remembered*. We rely on our recall memory when we take an essay test, because the test requires us to generate previously remembered information. A multiple-choice test is an example of a **recognition memory test**, *a measure of explicit memory that involves determining whether information has been seen or learned before*.

Your own experiences taking tests will probably lead you to agree with the scientific research finding that recall is more difficult than recognition. Recall, such as required on essay tests, involves two steps: first generating an answer and then determining whether it seems to be the correct one. Recognition, as on multiple-choice test, only involves determining which item from a list seems most correct (Haist, Shimamura, & Squire, 1992). Although they involve different processes, recall and recognition memory measures tend to be correlated. Students who do better on a multiple-choice exam will also, by and large, do better on an essay exam (Bridgeman & Morgan, 1996).

A third way of measuring memory is known as *relearning* (Nelson, 1985). Measures of **relearning** (or savings) *assess how much more quickly information is processed or learned when it is studied again after it has already been learned but then forgotten*. If you have taken some French courses in the past, for instance, you might have forgotten most of the vocabulary you learned. But if you were to work on your French again, you'd learn the vocabulary much faster the second time around. Relearning can be a more sensitive measure of memory than either recall or recognition because it allows assessing memory in terms of "how much" or "how fast" rather than simply "correct" versus "incorrect" responses. Relearning also allows us to measure memory for procedures like driving a car or playing a piano piece, as well as memory for facts and figures.

Implicit Memory

While explicit memory consists of the things that we can consciously report that we know, implicit memory refers to knowledge that we cannot consciously access. However, implicit memory is nevertheless exceedingly important to us because it has a direct effect on our behaviour. **Implicit memory** refers to *the influence of experience on behaviour, even if the individual is not aware of those influences*. As you can see in Figure 8.2, "Types of Memory," there are three general types of implicit memory: procedural memory, classical conditioning effects, and priming.

Procedural memory refers to *our often unexplainable knowledge of how to do things*. When we walk from one place to another, speak to another person in English, dial a cell phone, or play a video game, we are using procedural memory. Procedural memory allows us to perform complex tasks, even though we may not be able to explain to others how we do them. There is no way to tell someone how to ride a bicycle; a person has to learn by doing it. The idea of implicit memory helps explain how infants are able to learn. The ability to crawl, walk, and talk are procedures, and these skills are easily and efficiently developed while we are children despite the fact that as adults we have no conscious memory of having learned them.

A second type of implicit memory is **classical conditioning effects**, in which *we learn, often without effort or awareness, to associate neutral stimuli (such as a sound or a light) with another stimulus (such as food), which creates a naturally occurring response, such as enjoyment or salivation*. The memory for the association is demonstrated when the conditioned stimulus (the sound) begins to create the same response as the unconditioned stimulus (the food) did before the learning.

The final type of implicit memory is known as **priming**, or *changes in behaviour as a result of experiences that have happened frequently or recently*. Priming refers both to the activation of knowledge (e.g., we can prime the concept of kindness by presenting people with words related to kindness) and to the influence of that activation on behaviour (people who are primed with the concept of kindness may act more kindly).

One measure of the influence of priming on implicit memory is the *word fragment test*, in which a person is asked to fill in missing letters to make words. You can try this yourself: First, try to complete the following word fragments, but work on each one for only three or four seconds. Do any words pop into mind quickly?

_ i b _ a _ y

_ h _ s _ _ i _ n

_ o _ k

_ h _ i s _

Now read the following sentence carefully:

"He got his materials from the shelves, checked them out, and then left the building."

Then try again to make words out of the word fragments.

I think you might find that it is easier to complete fragments 1 and 3 as “library” and “book,” respectively, after you read the sentence than it was before you read it. However, reading the sentence didn’t really help you to complete fragments 2 and 4 as “physician” and “chaise.” This difference in implicit memory probably occurred because as you read the sentence, the concept of “library” (and perhaps “book”) was primed, even though they were never mentioned explicitly. Once a concept is primed it influences our behaviours, for instance, on word fragment tests.

Our everyday behaviours are influenced by priming in a wide variety of situations. Seeing an advertisement for cigarettes may make us start smoking, seeing the flag of our home country may arouse our patriotism, and seeing a student from a rival school may arouse our competitive spirit. And these influences on our behaviours may occur without our being aware of them.

Research Focus: Priming Outside Awareness Influences Behaviour

One of the most important characteristics of implicit memories is that they are frequently formed and used *automatically*, without much effort or awareness on our part. In one demonstration of the automaticity and influence of priming effects, John Bargh and his colleagues (Bargh, Chen, & Burrows, 1996) conducted a study in which they showed undergraduate students lists of five scrambled words, each of which they were to make into a sentence. Furthermore, for half of the research participants, the words were related to stereotypes of the elderly. These participants saw words such as the following:

in Victoria retired live people

bingo man the forgetful plays

The other half of the research participants also made sentences, but from words that had nothing to do with elderly stereotypes. The purpose of this task was to prime stereotypes of elderly people in memory for some of the participants but not for others.

The experimenters then assessed whether the priming of elderly stereotypes would have any effect on the students’ behaviour — and indeed it did. When the research participant had gathered all of his or her belongings, thinking that the experiment was over, the experimenter thanked him or her for participating and gave directions to the closest elevator. Then, without the participants knowing it, the experimenters recorded the amount of time that the participant spent walking from the doorway of the experimental room toward the elevator. As you can see in Figure 8.3, “Research Results.” participants who had made sentences using words related to elderly stereotypes took on the behaviours of the elderly — they walked significantly more slowly as they left the experimental room.

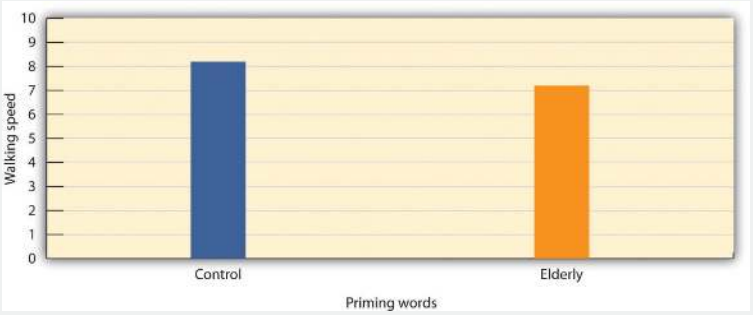


Figure 8.3 Research Results. Bargh, Chen, and Burrows found that priming words associated with the elderly made people walk more slowly (1996).

To determine if these priming effects occurred out of the awareness of the participants, Bargh and his colleagues asked still another group of students to complete the priming task and then to indicate whether they thought the words they had used to make the sentences had any relationship to each other, or could possibly have influenced their behaviour in any way. These students had no awareness of the possibility that the words might have been related to the elderly or could have influenced their behaviour.

Stages of Memory: Sensory, Short-Term, and Long-Term Memory

Another way of understanding memory is to think about it in terms of stages that describe the length of time that information remains available to us. According to this approach (see Figure 8.4, “Memory Duration”), information begins in *sensory memory*,

moves to *short-term memory*, and eventually moves to *long-term memory*. But not all information makes it through all three stages; most of it is forgotten. Whether the information moves from shorter-duration memory into longer-duration memory or whether it is lost from memory entirely depends on how the information is attended to and processed.

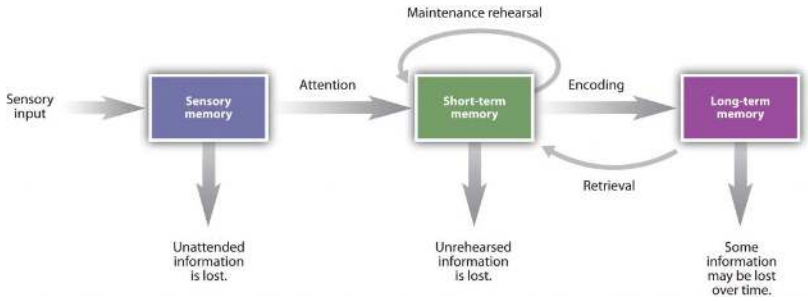


Figure 8.4 Memory Duration. Memory can characterized in terms of stages — the length of time that information remains available to us.

Sensory Memory

Sensory memory refers to *the brief storage of sensory information*. Sensory memory is a memory buffer that lasts only very briefly and then, unless it is attended to and passed on for more processing, is forgotten. The purpose of sensory memory is to give the brain some time to process the incoming sensations, and to allow us to see the world as an unbroken stream of events rather than as individual pieces.

Visual sensory memory is known as **iconic memory**. Iconic memory was first studied by the psychologist George Sperling (1960). In his research, Sperling showed participants a display of letters in rows, similar to that shown in Figure 8.5, "Measuring Iconic Memory." However, the display lasted only about 50 milliseconds (1/20 of a second). Then, Sperling gave his participants a recall test in which they were asked to name all the letters that they could remember. On average, the participants could remember only about one-quarter of the letters that they had seen.

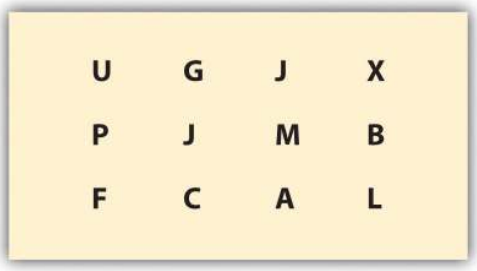


Figure 8.5 Measuring Iconic Memory. Sperling showed his participants displays such as this one for only 1/20th of a second. He found that when he cued the participants to report one of the three rows of letters, they could do it, even if the cue was given shortly after the display had been removed. The research demonstrated the existence of iconic memory.

Sperling reasoned that the participants had seen all the letters but could remember them only very briefly, making it impossible for them to report them all. To test this idea, in his next experiment, he first showed the same letters, but then after the display had been removed, he signaled to the participants to report the letters from either the first, second, or third row. In this condition, the participants now reported almost all the letters in that row. This finding confirmed Sperling's hunch: participants had access to all of the letters in their iconic memories, and if the task was short enough, they were able to report on the part of the display he asked them to. The "short enough" is the length of iconic memory, which turns out to be about 250 milliseconds (¼ of a second).

Auditory sensory memory is known as **echoic memory**. In contrast to iconic memories, which decay very rapidly, echoic memories can last as long as four seconds (Cowan, Lichty, & Grove, 1990). This is convenient as it allows you — among other things — to remember the words that you said at the beginning of a long sentence when you get to the end of it, and to take notes on your psychology professor's most recent statement even after he or she has finished saying it.

In some people iconic memory seems to last longer, a phenomenon known as **eidetic imagery** (or *photographic memory*) in which *people can report details of an image over long periods of time*. These people, who often suffer from psychological disorders such as autism, claim that they can "see" an image long after it has been presented, and can often report accurately on that image. There is also some evidence for eidetic memories in hearing; some people report that their echoic memories persist for unusually long periods of time. The composer Wolfgang Amadeus Mozart may have possessed eidetic memory for music, because even when he was very young and had not yet had a great deal of musical training, he could listen to long compositions and then play them back almost perfectly (Solomon, 1995).

Short-Term Memory

Most of the information that gets into sensory memory is forgotten, but information that we turn our attention to, with the goal of remembering it, may pass into *short-term memory*. **Short-term memory (STM)** is *the place where small amounts of information can be temporarily kept for more than a few seconds but usually for less than one minute* (Baddeley, Vallar, & Shallice, 1990). Information in short-term memory is not stored permanently but rather becomes available for us to process, and *the processes that we use to make sense of, modify, interpret, and store information in STM* are known as **working memory**.

Although it is called memory, working memory is not a store of memory like STM but rather a set of memory procedures or operations. Imagine, for instance, that you are asked to participate in a task such as this one, which is a measure of working memory (Unsworth & Engle, 2007). Each of the following questions appears individually on a computer screen and then disappears after you answer the question:

Is 10 × 2 − 5 = 15? (Answer YES OR NO) Then remember "S"

Is 12 ÷ 6 − 2 = 1? (Answer YES OR NO) Then remember "R"

Is 10 × 2 = 5? (Answer YES OR NO) Then remember "P"

Is 8 ÷ 2 − 1 = 1? (Answer YES OR NO) Then remember "T"

Is 6 × 2 − 1 = 8? (Answer YES OR NO) Then remember "U"

Is 2 × 3 − 3 = 0? (Answer YES OR NO) Then remember "Q"

To successfully accomplish the task, you have to answer each of the math problems correctly and at the same time remember the letter that follows the task. Then, after the six questions, you must list the letters that appeared in each of the trials in the correct order (in this case S, R, P, T, U, Q).

To accomplish this difficult task you need to use a variety of skills. You clearly need to use STM, as you must keep the letters in storage until you are asked to list them. But you also need a way to make the best use of your available attention and processing. For instance, you might decide to use a strategy of repeat the letters twice, then quickly solve the next problem, and then repeat the letters twice again including the new one. Keeping this strategy (or others like it) going is the role of working memory's **central executive** — *the part of working memory that directs attention and processing*. The central executive will make use of whatever strategies seem to be best for the given task. For instance, the central executive will direct the rehearsal process, and at the same time direct the visual cortex to form an image of the list of letters in memory. You can see that although STM is involved, the processes that we use to operate on the material in memory are also critical.

Short-term memory is limited in both the length and the amount of information it can hold. Peterson and Peterson (1959) found that when people were asked to remember a list of three-letter strings and then were immediately asked to perform a distracting task (counting backward by threes), the material was quickly forgotten (see Figure 8.6, "STM Decay"), such that by 18 seconds it was virtually gone.

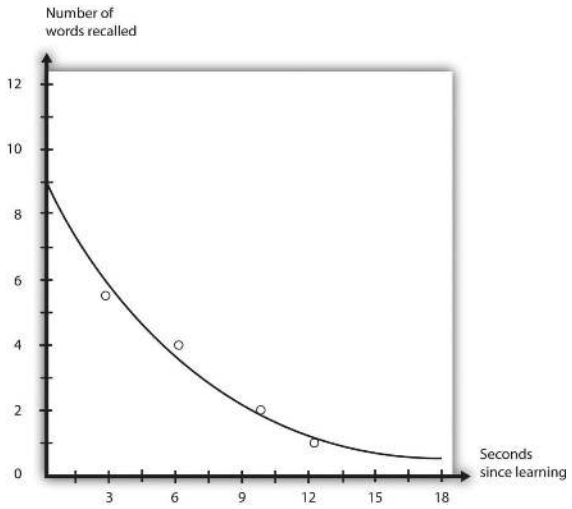


Figure 8.6 STM Decay. Researchers found that information that was not rehearsed decayed quickly from memory.

One way to prevent the decay of information from short-term memory is to use working memory to rehearse it. **Maintenance rehearsal** is *the process of repeating information mentally or out loud with the goal of keeping it in memory*. We engage in maintenance rehearsal to keep something that we want to remember (e.g., a person's name, email address, or phone number) in mind long enough to write it down, use it, or potentially transfer it to long-term memory.

If we continue to rehearse information, it will stay in STM until we stop rehearsing it, but there is also a capacity limit to STM. Try reading each of the following rows of numbers, one row at a time, at a rate of about one number each second. Then when you have finished each row, close your eyes and write down as many of the numbers as you can remember.

019

3586

10295

861059

1029384

75674834

657874104

6550423897

If you are like the average person, you will have found that on this test of working memory, known as a *digit span test*, you did pretty well up to about the fourth line, and then you started having trouble. I bet you missed some of the numbers in the last three rows, and did pretty poorly on the last one.

The digit span of most adults is between five and nine digits, with an average of about seven. The cognitive psychologist George Miller (1956) referred to "seven plus or minus two" pieces of information as the magic number in short-term memory. But if we can only hold a maximum of about nine digits in short-term memory, then how can we remember larger amounts of information than this? For instance, how can we ever remember a 10-digit phone number long enough to dial it?

One way we are able to expand our ability to remember things in STM is by using a memory technique called *chunking*. **Chunking** is *the process of organizing information into smaller groupings (chunks), thereby increasing the number of items that can be held in STM*. For instance, try to remember this string of 12 letters:

XOFCBANNCVTM

You probably won't do that well because the number of letters is more than the magic number of seven.

Now try again with this one:

CTVCBCTSNHBO

Would it help you if I pointed out that the material in this string could be chunked into four sets of three letters each? I think it would, because then rather than remembering 12 letters, you would only have to remember the names of four television stations. In this case, chunking changes the number of items you have to remember from 12 to only four.

Experts rely on chunking to help them process complex information. Herbert Simon and William Chase (1973) showed chess masters and chess novices various positions of pieces on a chessboard for a few seconds each. The experts did a lot better than the novices in remembering the positions because they were able to see the "big picture." They didn't have to remember the position of each of the pieces individually, but chunked the pieces into several larger layouts. But when the researchers showed both groups random chess positions — positions that would be very unlikely to occur in real games — both groups did equally poorly, because in this situation the experts lost their ability to organize the layouts (see Figure 8.7, "Possible and Impossible Chess Positions"). The same occurs for basketball. Basketball players recall actual basketball positions much better than do nonplayers, but only when the positions make sense in terms of what is happening on the court, or what is likely to happen in the near future, and thus can be chunked into bigger units (Didierjean & Marmèche, 2005).



Figure 8.7 Possible and Impossible Chess Positions. Experience matters: Experienced chess players are able to recall the positions of the game on the right much better than are those who are chess novices. But the experts do no better than the novices in remembering the positions on the left, which cannot occur in a real game.

If information makes it past short term-memory it may enter **long-term memory (LTM)**, *memory storage that can hold information for days, months, and years*. The capacity of long-term memory is large, and there is no known limit to what we can remember (Wang, Liu, & Wang, 2003). Although we may forget at least some information after we learn it, other things will stay with us forever. In the next section we will discuss the principles of long-term memory.

Key Takeaways

- Memory refers to the ability to store and retrieve information over time.
- For some things our memory is very good, but our active cognitive processing of information ensures that memory is never an exact replica of what we have experienced.
- Explicit memory refers to experiences that can be intentionally and consciously remembered, and it is measured using recall, recognition, and relearning. Explicit memory includes episodic and semantic memories.
- Measures of relearning (also known as "savings") assess how much more quickly information is learned when it is studied again after it has already been learned but then forgotten.
- Implicit memory refers to the influence of experience on behaviour, even if the individual is not aware of those influences. The three types of implicit memory are procedural memory, classical conditioning, and priming.
- Information processing begins in sensory memory, moves to short-term memory, and eventually moves to long-term memory.
- Maintenance rehearsal and chunking are used to keep information in short-term memory.
- The capacity of long-term memory is large, and there is no known limit to what we can remember.

Exercises and Critical Thinking

1. List some situations in which sensory memory is useful for you. What do you think your experience of the stimuli would be like if you had no sensory memory?
2. Describe a situation in which you need to use working memory to perform a task or solve a problem. How do your working memory skills help you?

Image Attributions

Figure 8.4: Adapted from Atkinson & Shiffrin (1968).

Figure 8.5: Adapted from Sperling (1960).

Figure 8.6: Adapted from Peterson & Peterson (1959).

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8.3: How We Remember- Cues to Improving Memory

Charles Stangor and Jennifer Walinga

Learning Objectives

- Label and review the principles of encoding, storage, and retrieval.
- Summarize the types of amnesia and their effects on memory.
- Describe how the context in which we learn information can influence our memory of that information

Although it is useful to hold information in sensory and short-term memory, we also rely on our long-term memory (LTM). We want to remember the name of the new boy in the class, the name of the movie we saw last week, and the material for our upcoming psychology test. Psychological research has produced a great deal of knowledge about long-term memory, and this research can be useful as you try to learn and remember new material (see Table 8.2, "Helpful Memory Techniques Based on Psychological Research"). In this section we will consider this question in terms of the types of processing that we do of the information we want to remember. To be successful, the information that we want to remember must be *encoded* and *stored*, and then *retrieved*.

Table 8.2 Helpful Memory Techniques Based on Psychological Research.

Technique	Description	Useful example
Use elaborative encoding.	Material is better remembered if it is processed more fully.	Think, for instance, "Proactive interference is like retroactive interference but it occurs in a forward manner."
Make use of the self-reference effect.	Material is better remembered if it is linked to thoughts about the self.	Think, for instance, "I remember a time when I knew the answer to an exam question but couldn't quite get it to come to mind. This was an example of the tip-of-the-tongue phenomenon."
Be aware of the forgetting curve.	Information that we have learned drops off rapidly with time.	Review the material that you have already studied right before the exam to increase the likelihood it will remain in memory.
Make use of the spacing effect.	Information is learned better when it is studied in shorter periods spaced over time.	Study a little bit every day; do not cram at the last minute.
Rely on overlearning.	We can continue to learn even after we think we know the information perfectly.	Keep studying, even if you think you already have it down.
Use context-dependent retrieval.	We have better retrieval when it occurs in the same situation in which we learned the material.	If possible, study under conditions similar to the conditions in which you will take the exam.
Use state-dependent retrieval.	We have better retrieval when we are in the same psychological state as we were when we learned the material.	Many possibilities, but don't study under the influence of drugs or alcohol, unless you plan to use them on the day of the exam (which is not recommended).

Encoding and Storage: How Our Perceptions Become Memories

Encoding is *the process by which we place the things that we experience into memory*. Unless information is encoded, it cannot be remembered. I'm sure you've been to a party where you've been introduced to someone and then — maybe only seconds later — you realize that you do not remember the person's name. Of course it's not really surprising that you can't remember the name, because you probably were distracted and you never encoded the name to begin with.

Not everything we experience can or should be encoded. We tend to encode things that we need to remember and not bother to encode things that are irrelevant. Look at Figure 8.8, “American Pennies in Different Styles,” which shows different images of U.S. pennies. Can you tell which one is the real one? Nickerson and Adams (1979) found that very few of the American participants they tested could identify the right one.



Figure 8.8 American Pennies in Different Styles. Can you identify the “real” penny? We tend to have poor memory for things that don’t matter, even if we see them frequently.

One way to improve our memory is to use better encoding strategies. Some ways of studying are more effective than others. Research has found that we are better able to remember information if we encode it in a meaningful way. When we engage in **elaborative encoding**we *process new information in ways that make it more relevant or meaningful* (Craik & Lockhart, 1972; Harris & Qualls, 2000).

Imagine that you are trying to remember the characteristics of the different schools of psychology we discussed in Chapter 1, “Introducing Psychology.” Rather than simply trying to remember the schools and their characteristics, you might try to relate the information to things you already know. For instance, you might try to remember the fundamentals of the cognitive school of psychology by linking the characteristics to the computer model. The cognitive school focuses on how information is input, processed, and retrieved, and you might think about how computers do pretty much the same thing. You might also try to organize the information into meaningful units. For instance, you might link the cognitive school to structuralism because both were concerned with mental processes. You also might try to use visual cues to help you remember the information. You might look at the image of Freud and imagine what he looked like as a child. That image might help you remember that childhood experiences were an important part of Freudian theory. Each person has his or her unique way of elaborating on information; the important thing is to try to develop unique and meaningful associations among the materials.

Research Focus: Elaboration and Memory

In an important study showing the effectiveness of elaborative encoding, Rogers, Kuiper, and Kirker (1977) studied how people recalled information that they had learned under different processing conditions. All the participants were presented with the same list of 40 adjectives to learn, but through the use of random assignment, the participants were given one of four different sets of instructions about how to process the adjectives.

Participants assigned to the *structural task condition* were asked to judge whether the word was printed in uppercase or lowercase letters. Participants in the *phonemic task condition* were asked whether or not the word rhymed with another given word. In the *semantic task condition*, the participants were asked if the word was a synonym of another word. And in the *self-reference task condition*, participants were asked to indicate whether or not the given adjective was or was not true of themselves. After completing the specified task, each participant was asked to recall as many adjectives as he or she could remember.

Rogers and his colleagues hypothesized that different types of processing would have different effects on memory. As you can see in Figure 8.9, “Self-Reference Effect Results,” the students in the self-reference task condition recalled significantly more adjectives than did students in any other condition. This finding, known as the *self-reference effect*, is powerful evidence that the self-concept helps us organize and remember information. The next time you are studying for an exam, you might try relating the material to your own experiences. The self-reference effect suggests that doing so will help you better remember the information (Symons & Johnson, 1997).

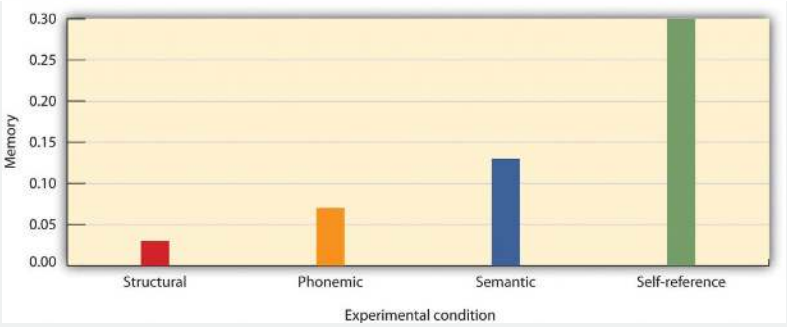


Figure 8.9 Self-Reference Effect Results. Participants recalled the same words significantly better when they were processed in relation to the self than when they were processed in other ways. [Long Description]

Using the Contributions of Hermann Ebbinghaus to Improve Your Memory

Hermann Ebbinghaus (1850-1909) was a pioneer of the study of memory. In this section we consider three of his most important findings, each of which can help you improve your memory. In his research, in which he was the only research participant, Ebbinghaus practised memorizing lists of nonsense syllables, such as the following:

DIF, LAJ, LEQ, MUV, WYC, DAL, SEN, KEP, NUD

You can imagine that because the material that he was trying to learn was not at all meaningful, it was not easy to do. Ebbinghaus plotted how many of the syllables he could remember against the time that had elapsed since he had studied them. He discovered an important principle of memory: Memory decays rapidly at first, but the amount of decay levels off with time (Figure 8.10, "Ebbinghaus Forgetting Curve"). Although Ebbinghaus looked at forgetting after days had elapsed, the same effect occurs on longer and shorter time scales. Bahrick (1984) found that students who took a Spanish language course forgot about one half of the vocabulary that they had learned within three years, but that after that time their memory remained pretty much constant. Forgetting also drops off quickly on a shorter time frame. This suggests that you should try to review the material that you have already studied right before you take an exam; that way, you will be more likely to remember the material during the exam.

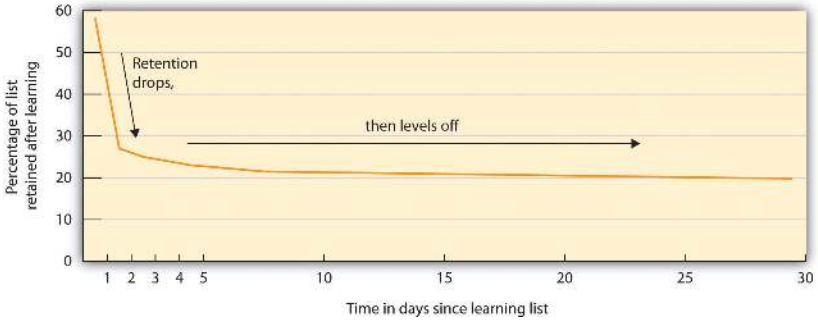


Figure 8.10 Ebbinghaus Forgetting Curve. Hermann Ebbinghaus found that memory for information drops off rapidly at first but then levels off after time.

Ebbinghaus also discovered another important principle of learning, known as the *spacing effect*. The **spacing effect** refers to *the fact that learning is better when the same amount of study is spread out over periods of time than it is when it occurs closer together or at the same time*. This means that even if you have only a limited amount of time to study, you'll learn more if you study continually throughout the semester (a little bit every day is best) than if you wait to cram at the last minute before your exam (Figure 8.11, "Effects of Massed versus Distributed Practice on Learning"). Another good strategy is to study and then wait as long as you can before you forget the material. Then review the information and again wait as long as you can before you forget it. (This probably will be a longer period of time than the first time.) Repeat and repeat again. The spacing effect is usually considered in terms of the difference between *distributed practice* (practice that is spread out over time) and *massed practice* (practice that comes in one block), with the former approach producing better memory.

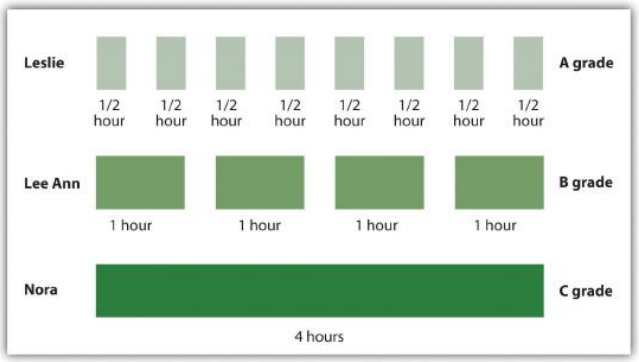


Figure 8.11 Effects of Massed versus Distributed Practice on Learning. The spacing effect refers to the fact that memory is better when it is distributed rather than massed. Leslie, Lee Ann, and Nora all studied for four hours total, but the students who spread out their learning into smaller study sessions did better on the exam.

Ebbinghaus also considered the role of **overlearning** — that is, *continuing to practice and study even when we think that we have mastered the material*. Ebbinghaus and other researchers have found that overlearning helps encoding (Driskell, Willis, & Copper, 1992). Students frequently think that they have already mastered the material but then discover when they get to the exam that they have not. The point is clear: try to keep studying and reviewing, even if you think you already know all the material.

Retrieval

Even when information has been adequately encoded and stored, it does not do us any good if we cannot retrieve it. **Retrieval** refers to *the process of reactivating information that has been stored in memory*. You can get an idea of the difficulty posed by retrieval by simply reading each of the words (but not the categories) in the sidebar below to someone. Tell the person that after you have read all the words, you will ask her to recall the words.

After you read the list to your friend, give her enough time to write down all the words that she can recall. Make sure that she cannot recall any more and then, for the words that were not listed, prompt your friend with some of the category names: “Do you remember any words that were furniture? Do you remember any words that were tools?” I think you will find that the category names, which serve as retrieval cues, will help your friend remember information that she could not retrieve otherwise.

Retrieval Demonstration

Try this test of the ability to retrieve information with a classmate. The instructions are in the text.

Apple	(Fruit)
Dresser	(Furniture)
Sander	(Tool)
Pomegranate	(Fruit)
Sunflower	(Flower)
Tangerine	(Fruit)
Chair	(Furniture)
Peony	(Flower)
Banana	(Fruit)
Sofa	(Furniture)
Bench	(Furniture)
Strawberry	(Fruit)
Television stand	(Furniture)
Magnolia	(Flower)
Rose	(Flower)
Wrench	(Tool)
Screwdriver	(Tool)
Dahlia	(Flower)
Drill press	(Tool)
Hammer	(Tool)

We have all experienced retrieval failure in the form of the frustrating **tip-of-the-tongue phenomenon**, in which *we are certain that we know something that we are trying to recall but cannot quite come up with it*. You can try this one on your friends as well. Read your friend the names of the 10 provinces listed in the sidebar, and ask him to name the capital city of each province. Now, for the capital cities that your friend can't name, give him just the first letter of the capital city. You'll probably find that having the first letters of the cities helps with retrieval. The tip-of-the-tongue experience is a very good example of the inability to retrieve information that is actually stored in memory.

Provinces and Capital Cities

Try this demonstration of the tip-of-the-tongue phenomenon with a classmate. Instructions are in the text.

Alberta	Edmonton
British Columbia	Victoria
Manitoba	Winnipeg
New Brunswick	Fredericton
Newfoundland/Labrador	St. John's
Nova Scotia	Halifax
Ontario	Toronto
Prince Edward Island	Charlottetown
Quebec	Quebec City
Saskatchewan	Regina

We are more likely to be able to retrieve items from memory when conditions at retrieval are similar to the conditions under which we encoded them. **Context-dependent learning** refers to *an increase in retrieval when the external situation in which information is learned matches the situation in which it is remembered*. Godden and Baddeley (1975) conducted a study to test this idea using scuba divers. They asked the divers to learn a list of words either when they were on land or when they were underwater. Then they tested the divers on their memory, either in the same or the opposite situation. As you can see in Figure 8.12, "Context-dependent Learning," the divers' memory was better when they were tested in the same context in which they had learned the words than when they were tested in the other context.

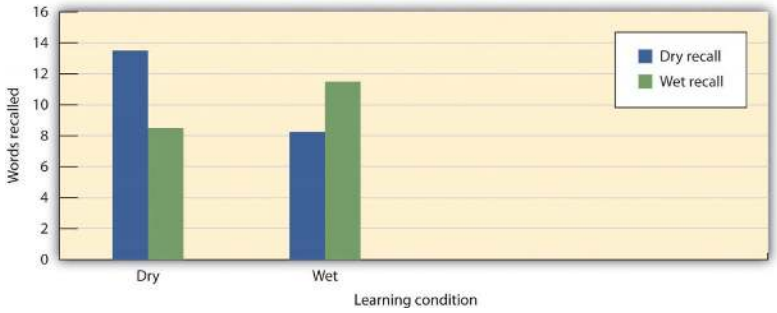


Figure 8.12 Context-dependent Learning. Researchers tested the memory of scuba divers to learn and retrieve information in different contexts and found strong evidence for context-dependent learning. [Long Description]

You can see that context-dependent learning might also be important in improving your memory. For instance, you might want to try to study for an exam in a situation that is similar to the one in which you are going to take the exam.

Whereas context-dependent learning refers to a match in the external situation between learning and remembering, **state-dependent learning** refers to *superior retrieval of memories when the individual is in the same physiological or psychological state as during encoding*. Research has found, for instance, that animals that learn a maze while under the influence of one drug tend to remember their learning better when they are tested under the influence of the same drug than when they are tested without the drug (Jackson, Koek, & Colpaert, 1992). And research with humans finds that bilinguals remember better when tested in the same language in which they learned the material (Marian & Kaushanskaya, 2007). Mood states may also produce state-dependent learning. People who learn information when they are in a bad (rather than a good) mood find it easier to recall these memories when they are tested while they are in a bad mood, and vice versa. It is easier to recall unpleasant memories than pleasant ones when we're sad, and easier to recall pleasant memories than unpleasant ones when we're happy (Bower, 1981; Eich, 2008).

Variations in the ability to retrieve information are also seen in the *serial position curve*. When we give people a list of words one at a time (e.g., on flashcards) and then ask them to recall them, the results look something like those in Figure 8.13, "The Serial Position Curve." *People are able to retrieve more words that were presented to them at the beginning and the end of the list than they are words that were presented in the middle of the list*. This pattern, known as the **serial position curve**, is caused by two retrieval phenomenon: The **primacy effect** refers to *a tendency to better remember stimuli that are presented early in a list*. The **recency effect** refers to *the tendency to better remember stimuli that are presented later in a list*.

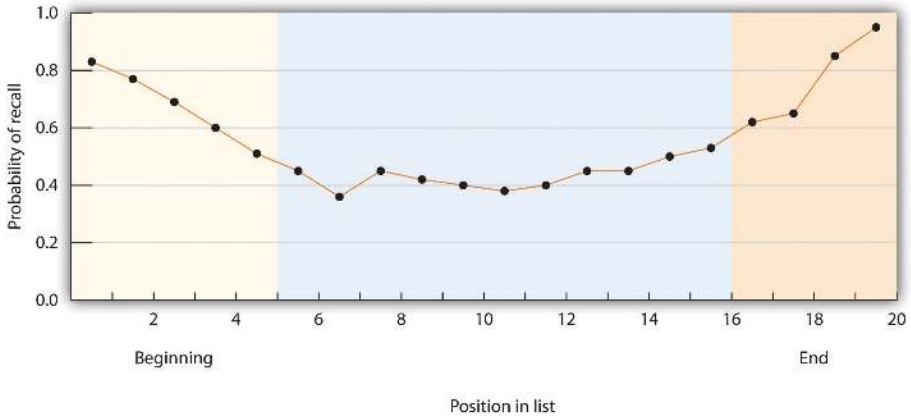


Figure 8.13 The Serial Position Curve. The serial position curve is the result of both primacy effects and recency effects.

There are a number of explanations for primacy and recency effects, but one of them is in terms of the effects of rehearsal on short-term and long-term memory (Baddeley, Eysenck, & Anderson, 2009). Because we can keep the last words that we learned in the presented list in short-term memory by rehearsing them before the memory test begins, they are relatively easily remembered. So the recency effect can be explained in terms of maintenance rehearsal in short-term memory. And the primacy effect may also be due to rehearsal — when we hear the first word in the list we start to rehearse it, making it more likely that it will be moved from short-term to long-term memory. And the same is true for the other words that come early in the list. But for the words in the middle of the list, this rehearsal becomes much harder, making them less likely to be moved to LTM.

In some cases our existing memories influence our new learning. This may occur either in a backward way or a forward way (Figure 8.14, "Proactive and Retroactive Interference"). **Retroactive interference** occurs when *learning something new impairs our ability to retrieve information that was learned earlier*. For example, if you have learned to program in one computer language, and then you learn to program in another similar one, you may start to make mistakes programming the first language that you never would have made before you learned the new one. In this case the new memories work backward (retroactively) to influence retrieval from memory that is already in place.

In contrast to retroactive interference, *proactive interference* works in a forward direction. **Proactive interference** occurs when *earlier learning impairs our ability to encode information that we try to learn later*. For example, if we have learned French as a second language, this knowledge may make it more difficult, at least in some respects, to learn a third language (say Spanish), which involves similar but not identical vocabulary.

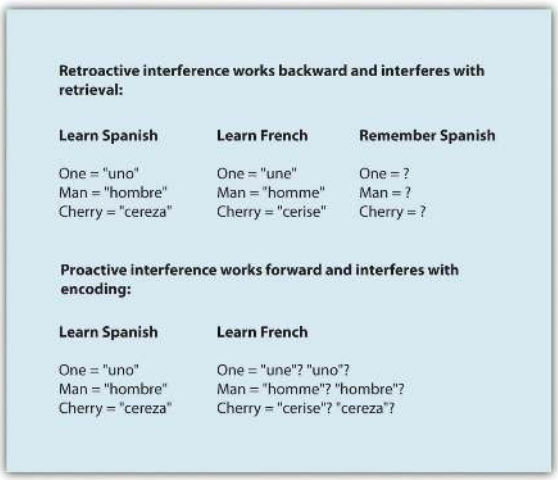


Figure 8.14 Proactive and Retroactive Interference. Retroactive and proactive interference can both influence memory.

The Structure of LTM: Categories, Prototypes, and Schemas

Memories that are stored in LTM are not isolated but rather are linked together into **categories**— *networks of associated memories that have features in common with each other*. Forming categories, and using categories to guide behaviour, is a fundamental part of human nature. Associated concepts within a category are connected through *spreading activation*, which occurs when activating one element of a category activates other associated elements. For instance, because tools are associated in a category, reminding people of the word "screwdriver" will help them remember the word "wrench." And, when people have learned lists of words that come from different categories (e.g., as in "Retrieval Demonstration"), they do not recall the information haphazardly. If they have just remembered the word "wrench," they are more likely to remember the word "screwdriver" next than they are to remember the word "dahlia," because the words are organized in memory by category and because "dahlia" is activated by spreading activation from "wrench" (Srull & Wyer, 1989).

Some categories have *defining features* that must be true of all members of the category. For instance, all members of the category triangles have three sides, and all members of the category birds lay eggs. But most categories are not so well defined; the members of the category share some common features, but it is impossible to define which are or are not members of the category. For instance, there is no clear definition of the category "tool." Some examples of the category, such as a hammer and a wrench, are clearly and easily identified as category members, whereas other members are not so obvious. Is an ironing board a tool? What about a car?

Members of categories (even those with defining features) can be compared with the **category prototype**, which is *the member of the category that is most average or typical of the category*. Some category members are more prototypical of, or similar to, the category than others (Figure 8.15, "Prototypicality"). For instance, some category members (robins and sparrows) are highly prototypical of the category birds, whereas other category members (penguins and ostriches) are less prototypical. We retrieve information that is prototypical of a category faster than we retrieve information that is less prototypical (Rosch, 1975).



Figure 8.15 Prototypicality. Category members vary in terms of their prototypicality. Some cats are “better” members of the category than are others.

Mental categories are sometimes referred to as **schemas**— *patterns of knowledge in long-term memory that help us organize information*. We have schemas about objects (that a triangle has three sides and may take on different angles), about people (that Sam is friendly, likes to golf, and always wears sandals), about events (the particular steps involved in ordering a meal at a restaurant), and about social groups (we call these group schemas *stereotypes*) – Figure 8.16, “Different Schemas”.



Figure 8.16 Different Schemas. Our schemas about people, couples, and events help us organize and remember information.

Schemas are important in part because they help us remember new information by providing an organizational structure for it. Read the following paragraph (Bransford & Johnson, 1972) and then try to write down everything you can remember.

> The procedure is actually quite simple. First you arrange things into different groups. Of course, one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities, that is the next step; otherwise you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run this may not seem important, but complications can easily arise. A mistake can be expensive as well. At first the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then one never can tell. After the procedure is completed, one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually they will be used once more and the whole cycle will then have to be repeated. However, that is part of life.

It turns out that people’s memory for this information is quite poor, unless they have been told ahead of time that the information describes “doing the laundry,” in which case their memory for the material is much better. This demonstration of the role of schemas in memory shows how our existing knowledge can help us organize new information, and how this organization can improve encoding, storage, and retrieval.

The Biology of Memory

Just as information is stored on digital media such as DVDs and flash drives, the information in LTM must be stored in the brain. The ability to maintain information in LTM involves a gradual strengthening of the connections among the neurons in the brain. When pathways in these neural networks are frequently and repeatedly fired, the synapses become more efficient in communicating

with each other, and these changes create memory. This process, known as **long-term potentiation (LTP)**, refers to *the strengthening of the synaptic connections between neurons as result of frequent stimulation* (Lynch, 2002). Drugs that block LTP reduce learning, whereas drugs that enhance LTP increase learning (Lynch et al., 1991). Because the new patterns of activation in the synapses take time to develop, LTP happens gradually. The period of time in which LTP occurs and in which memories are stored is known as the period of *consolidation*.

Memory is not confined to the cortex; it occurs through sophisticated interactions between new and old brain structures (Figure 8.17, "Schematic Image of Brain with Hippocampus, Amygdala, and Cerebellum Highlighted"). One of the most important brain regions in explicit memory is the hippocampus, which serves as a preprocessor and elaborator of information (Squire, 1992). The hippocampus helps us encode information about spatial relationships, the context in which events were experienced, and the associations among memories (Eichenbaum, 1999). The hippocampus also serves in part as a switching point that holds the memory for a short time and then directs the information to other parts of the brain, such as the cortex, to actually do the rehearsing, elaboration, and long-term storage (Jonides, Lacey, & Nee, 2005). Without the hippocampus, which might be described as the brain's "librarian," our explicit memories would be inefficient and disorganized.

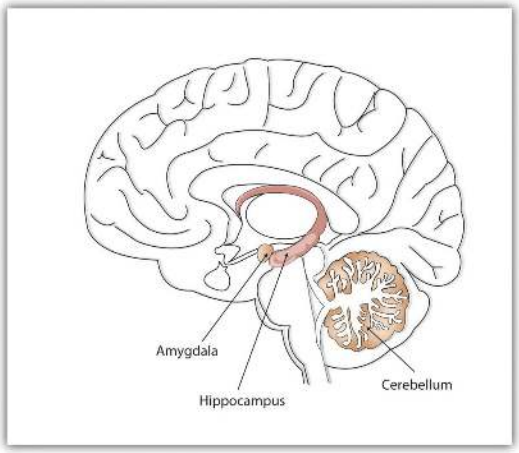


Figure 8.17 Schematic Image of Brain with Hippocampus, Amygdala, and Cerebellum Highlighted. Different brain structures help us remember different types of information. The hippocampus is particularly important in explicit memories, the cerebellum is particularly important in implicit memories, and the amygdala is particularly important in emotional memories.

While the hippocampus is handling explicit memory, the cerebellum and the amygdala are concentrating on implicit and emotional memories, respectively. Research shows that the cerebellum is more active when we are learning associations and in priming tasks, and animals and humans with damage to the cerebellum have more difficulty in classical conditioning studies (Krupa, Thompson, & Thompson, 1993; Woodruff-Pak, Goldenberg, Downey-Lamb, Boyko, & Lemieux, 2000). The storage of many of our most important emotional memories, and particularly those related to fear, is initiated and controlled by the amygdala (Sigurdsson, Doyère, Cain, & LeDoux, 2007).

Evidence for the role of different brain structures in different types of memories comes in part from case studies of patients who suffer from **amnesia**, *a memory disorder that involves the inability to remember information*. As with memory interference effects, amnesia can work in either a forward or a backward direction, affecting retrieval or encoding. For people who suffer damage to the brain, for instance, as a result of a stroke or other trauma, the amnesia may work backward. The outcome is **retrograde amnesia**, *a memory disorder that produces an inability to retrieve events that occurred before a given time*. Demonstrating the fact that LTP takes time (the process of consolidation), retrograde amnesia is usually more severe for memories that occurred just prior to the trauma than it is for older memories, and events that occurred just before the event that caused memory loss may never be recovered because they were never completely encoded.

Organisms with damage to the hippocampus develop a type of amnesia that works in a forward direction to affect encoding, known as *anterograde amnesia*. **Anterograde amnesia** is *the inability to transfer information from short-term into long-term memory*, making it impossible to form new memories. One well-known case study was a man named Henry Gustav Molaison (before he died in 2008, he was referred to only as H. M.) who had parts of his hippocampus removed to reduce severe seizures (Corkin,

Amaral, González, Johnson, & Hyman, 1997). Following the operation, Molaison developed virtually complete anterograde amnesia. Although he could remember most of what had happened before the operation, and particularly what had occurred early in his life, he could no longer create new memories. Molaison was said to have read the same magazines over and over again without any awareness of having seen them before.

Cases of anterograde amnesia also provide information about the brain structures involved in different types of memory (Bayley & Squire, 2005; Helmuth, 1999; Paller, 2004). Although Molaison's explicit memory was compromised because his hippocampus was damaged, his implicit memory was not (because his cerebellum was intact). He could learn to trace shapes in a mirror, a task that requires procedural memory, but he never had any explicit recollection of having performed this task or of the people who administered the test to him.

Kent Cochrane, born in Toronto in 1951, lived with severe amnesia after a motorcycle accident in 1981. His brain was among the most studied in the world. Cochrane suffered from both anterograde amnesia and temporally graded retrograde amnesia. Both forms of amnesia are characterized by damage to the medial temporal lobes, specifically within the hippocampal region. The trauma caused by Cochrane's accident made it impossible for him to remember both new personal experiences and semantic information. Research conducted on Cochrane has shown that he was able to recall factual information learned prior to his accident, such as the difference between stalactites and stalagmites, but was unable to remember emotional details such as his brother's death and a dangerous fall he had.

Although some brain structures are particularly important in memory, this does not mean that all memories are stored in one place. The psychologist Karl Lashley (1929) attempted to determine where memories were stored in the brain by teaching rats how to run mazes, and then lesioning different brain structures to see if they were still able to complete the maze. This idea seemed straightforward, and Lashley expected to find that memory was stored in certain parts of the brain. But he discovered that no matter where he removed brain tissue, the rats retained at least some memory of the maze, leading him to conclude that memory isn't located in a single place in the brain, but rather is distributed around it.

Long-term potentiation occurs as a result of changes in the synapses, which suggests that chemicals, particularly neurotransmitters and hormones, must be involved in memory. There is quite a bit of evidence that this is true. **Glutamate**, a *neurotransmitter and a form of the amino acid glutamic acid, is perhaps the most important neurotransmitter in memory* (McEntee & Crook, 1993). When animals, including people, are under stress, more glutamate is secreted, and this glutamate can help them remember (McGaugh, 2003). The neurotransmitter *serotonin* is also secreted when animals learn, and *epinephrine* may also increase memory, particularly for stressful events (Maki & Resnick, 2000; Sherwin, 1998). *Estrogen*, a female sex hormone, also seems critical, because women who are experiencing menopause, along with a reduction in estrogen, frequently report memory difficulties (Chester, 2001).

Our knowledge of the role of biology in memory suggests that it might be possible to use drugs to improve our memories, and North Americans spend several hundred million dollars per year on memory supplements with the hope of doing just that. Yet controlled studies comparing memory enhancers, including Ritalin, methylphenidate, ginkgo biloba, and amphetamines, with placebo drugs find very little evidence for their effectiveness (Gold, Cahill, & Wenk, 2002; McDaniel, Maier, & Einstein, 2002). Memory supplements are usually no more effective than drinking a sugared soft drink, which also releases glucose and thus improves memory slightly. This is not to say that we cannot someday create drugs that will significantly improve our memory. It is likely that this will occur in the future, but the implications of these advances are as yet unknown (Farah et al., 2004; Turner & Sahakian, 2006).

Although the most obvious potential use of drugs is to attempt to improve memory, drugs might also be used to help us forget. This might be desirable in some cases, such as for those suffering from *post-traumatic stress disorder (PTSD)* who are unable to forget disturbing memories. Although there are no existing therapies that involve using drugs to help people forget, it is possible that they will be available in the future. These possibilities will raise some important ethical issues: is it ethical to erase memories, and if it is, is it desirable to do so? Perhaps the experience of emotional pain is a part of being a human being. And perhaps the experience of emotional pain may help us cope with the trauma.

Key Takeaways

- Information is better remembered when it is meaningfully elaborated.
- Hermann Ebbinghaus made important contributions to the study of learning, including modelling the forgetting curve, and studying the spacing effect and the benefits of overlearning.

- Context- and state-dependent learning, as well as primacy and recency effects, influence long-term memory.
- Memories are stored in connected synapses through the process of long-term potentiation (LTP). In addition to the cortex, other parts of the brain, including the hippocampus, cerebellum, and the amygdala, are also important in memory.
- Damage to the brain may result in retrograde amnesia or anterograde amnesia. Case studies of patients with amnesia can provide information about the brain structures involved in different types of memory.
- Memory is influenced by chemicals including glutamate, serotonin, epinephrine, and estrogen.
- Studies comparing memory enhancers with placebo drugs find very little evidence for their effectiveness.

Exercises and Critical Thinking

1. Plan a course of action to help you study for your next exam, incorporating as many of the techniques mentioned in this section as possible. Try to implement the plan.
2. Make a list of some of the schemas that you have stored in your memory. What are the contents of each schema, and how might you use the schema to help you remember new information?
3. In the film *Eternal Sunshine of the Spotless Mind*, the characters undergo a medical procedure designed to erase their memories of a painful romantic relationship. Would you engage in such a procedure if it were safely offered to you?

Image Attributions

Figure 8.9: Adapted from Rogers, Kuiper, & Kirker (1977).

Figure 8.12: Adapted from Godden & Baddeley (1975).

Figure 8.15: "Orange cat on the wall" by Tambako The Jaguar (http://www.flickr.com/photos/tambako/5535036973/) is licensed under CC BY-ND 2.0 license (http://creativecommons.org/licenses/...2.0/deed.en_CA). "Mac OS X Lion's New Wallpapers" by Halil Gokdal (http://www.flickr.com/photos/halilgokdal/5720227468/) is licensed under CC BY-NC-SA 2.0 license (http://creativecommons.org/licenses/...2.0/deed.en_CA). "Gatos pelados" by Galaxy fm ® (http://www.flickr.com/photos/galaxyfm/268089084/) is licensed under CC BY-NC 2.0 license (http://creativecommons.org/licenses/...2.0/deed.en_CA). "Siamese (cat)" by Radosiewka (http://commons.wikimedia.org/wiki/Fi...mese_(cat).JPG) is in public domain.

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Long Descriptions

Figure 8.9 long description: Self-Reference Effect Results

	Experimental Condition			
	Structural	Phonemic	Semantic	Self-reference
Memory	0.03	0.07	0.13	0.30

Figure 8.12 long description: Context-Dependent Learning

	Number of words recalled on land	Number of words recalled in water
Words learned on land	13	8.6
Words learned in water	8	10.4

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8.4: Accuracy and Inaccuracy in Memory and Cognition

Charles Stangor and Jennifer Walinga

Learning Objectives

- Outline the variables that can influence the accuracy of our memory for events.
- Explain how schemas can distort our memories.
- Describe the representativeness heuristic and the availability heuristic and explain how they may lead to errors in judgment.

As we have seen, our memories are not perfect. They fail in part due to our inadequate encoding and storage, and in part due to our inability to accurately retrieve stored information. But memory is also influenced by the setting in which it occurs, by the events that occur to us after we have experienced an event, and by the cognitive processes that we use to help us remember. Although our cognition allows us to attend to, rehearse, and organize information, cognition may also lead to distortions and errors in our judgments and our behaviours.

In this section we consider some of the *cognitive biases* that are known to influence humans. **Cognitive biases** are *errors in memory or judgment that are caused by the inappropriate use of cognitive processes* (Table 8.3 ,"Cognitive Processes That Pose Threats to Accuracy"). The study of cognitive biases is important both because it relates to the important psychological theme of accuracy versus inaccuracy in perception, and because being aware of the types of errors that we may make can help us avoid them and therefore improve our decision-making skills.

Table 8.3 Cognitive Processes That Pose Threats to Accuracy.

Cognitive process	Description	Potential threat to accuracy
Source monitoring	The ability to accurately identify the source of a memory	Uncertainty about the source of a memory may lead to mistaken judgments.
Confirmation bias	The tendency to verify and confirm our existing memories rather than to challenge and disconfirm them	Once beliefs become established, they become self-perpetuating and difficult to change.
Functional fixedness	When schemas prevent us from seeing and using information in new and nontraditional ways	Creativity may be impaired by the overuse of traditional, expectancy-based thinking.
Misinformation effect	Errors in memory that occur when new but incorrect information influences existing accurate memories	Eyewitnesses who are questioned by the police may change their memories of what they observed at the crime scene.
Overconfidence	When we are more certain that our memories and judgments are accurate than we should be	Eyewitnesses may be very confident that they have accurately identified a suspect, even though their memories are incorrect.
Salience	When some stimuli (e.g., those that are colourful, moving, or unexpected) grab our attention and make them more likely to be remembered	We may base our judgments on a single salient event while we ignore hundreds of other equally informative events that we do not see.
Representativeness heuristic	Tendency to make judgments according to how well the event matches our expectations	After a coin has come up “heads” many times in a row, we may erroneously think that the next flip is more likely to be “tails” (the gambler’s fallacy).
Availability heuristic	Idea that things that come to mind easily are seen as more common	We may overestimate the crime statistics in our own area, because these crimes are so easy to recall.
Cognitive accessibility	Idea that some memories are more highly activated than others	We may think that we contributed more to a project than we really did because it is so easy to remember our own contributions.
Counterfactual thinking	When we “replay” events such that they turn out differently (especially when only minor changes in the events leading up to them make a difference)	We may feel particularly bad about events that might not have occurred if only a small change had occurred before them.

Source Monitoring: Did It Really Happen?

One potential error in memory involves mistakes in differentiating the sources of information. **Source monitoring** refers to *the ability to accurately identify the source of a memory*. Perhaps you’ve had the experience of wondering whether you really experienced an event or only dreamed or imagined it. If so, you wouldn’t be alone. Rassin, Merkelbach, and Spaan (2001) reported that up to 25% of undergraduate students reported being confused about real versus dreamed events. Studies suggest that people who are fantasy-prone are more likely to experience source monitoring errors (Winograd, Peluso, & Glover, 1998), and such errors also occur more often for both children and the elderly than for adolescents and younger adults (Jacoby & Rhodes, 2006).

In other cases we may be sure that we remembered the information from real life but be uncertain about exactly where we heard it. Imagine that you read a news story in a tabloid magazine such as *HELLO! Canada*. Probably you would have discounted the information because you know that its source is unreliable. But what if later you were to remember the story but forget the source of the information? If this happens, you might become convinced that the news story is true because you forget to discount it. The

sleeper effect refers to *attitude change that occurs over time when we forget the source of information* (Pratkanis, Greenwald, Leippe, & Baumgardner, 1988).

In still other cases we may forget where we learned information and mistakenly assume that we created the memory ourselves. Canadian authors Wayson Choy, Sky Lee, and Paul Yee launched a $6 million copyright infringement lawsuit against the parent company of Penguin Group Canada, claiming that the novel *Gold Mountain Blues* contained "substantial elements" of certain works by the plaintiffs (Cbc.ca, 2011). The suit was filed against Pearson Canada Inc., author Ling Zhang, and the novel's U.K.-based translator Nicky Harman. Zhang claimed that the book shared a few general plot similarities with the other works but that those similarities reflect common events and experiences in the Chinese immigrant community. She argued that the novel was "the result of years of research and several field trips to China and Western Canada," and that she had not read the other works. Nothing was proven in court.

Finally, the musician George Harrison claimed that he was unaware that the melody of his song *My Sweet Lord* was almost identical to an earlier song by another composer. The judge in the copyright suit that followed ruled that Harrison did not intentionally commit the plagiarism. (Please use this knowledge to become extra vigilant about source attributions in your written work, not to try to excuse yourself if you are accused of plagiarism.)

Schematic Processing: Distortions Based on Expectations

We have seen that schemas help us remember information by organizing material into coherent representations. However, although schemas can improve our memories, they may also lead to cognitive biases. Using schemas may lead us to falsely remember things that never happened to us and to distort or misremember things that did. For one, schemas lead to the **confirmation bias**, which is *the tendency to verify and confirm our existing memories rather than to challenge and disconfirm them*. The confirmation bias occurs because once we have schemas, they influence how we seek out and interpret new information. The confirmation bias leads us to remember information that fits our schemas better than we remember information that disconfirms them (Stangor & McMillan, 1992), a process that makes our stereotypes very difficult to change. And we ask questions in ways that confirm our schemas (Trope & Thompson, 1997). If we think that a person is an extrovert, we might ask her about ways that she likes to have fun, thereby making it more likely that we will confirm our beliefs. In short, once we begin to believe in something — for instance, a stereotype about a group of people — it becomes very difficult to later convince us that these beliefs are not true; the beliefs become self-confirming.

Darley and Gross (1983) demonstrated how schemas about social class could influence memory. In their research they gave participants a picture and some information about a Grade 4 girl named Hannah. To activate a schema about her social class, Hannah was pictured sitting in front of a nice suburban house for one-half of the participants and pictured in front of an impoverished house in an urban area for the other half. Then the participants watched a video that showed Hannah taking an intelligence test. As the test went on, Hannah got some of the questions right and some of them wrong, but the number of correct and incorrect answers was the same in both conditions. Then the participants were asked to remember how many questions Hannah got right and wrong. Demonstrating that stereotypes had influenced memory, the participants who thought that Hannah had come from an upper-class background remembered that she had gotten more correct answers than those who thought she was from a lower-class background.

Our reliance on schemas can also make it more difficult for us to "think outside the box." Peter Wason (1960) asked undergraduate students to determine the rule that was used to generate the numbers 2-4-6 by asking them to generate possible sequences and then telling them if those numbers followed the rule. The first guess that students made was usually "consecutive ascending even numbers," and they then asked questions designed to confirm their hypothesis ("Does 102-104-106 fit?" "What about 404-406-408?"). Upon receiving information that those guesses did fit the rule, the students stated that the rule was "consecutive ascending even numbers." But the students' use of the confirmation bias led them to ask only about instances that confirmed their hypothesis, and not about those that would disconfirm it. They never bothered to ask whether 1-2-3 or 3-11-200 would fit, and if they had they would have learned that the rule was not "consecutive ascending even numbers," but simply "any three ascending numbers." Again, you can see that once we have a schema (in this case a hypothesis), we continually retrieve that schema from memory rather than other relevant ones, leading us to act in ways that tend to confirm our beliefs.

Functional fixedness occurs when *people's schemas prevent them from using an object in new and nontraditional ways*. Duncker (1945) gave participants a candle, a box of thumbtacks, and a book of matches, and asked them to attach the candle to the wall so

that it did not drip onto the table below (Figure 8.18, “Functional Fixedness”). Few of the participants realized that the box could be tacked to the wall and used as a platform to hold the candle. The problem again is that our existing memories are powerful, and they bias the way we think about new information. Because the participants were “fixated” on the box’s normal function of holding thumbtacks, they could not see its alternative use.

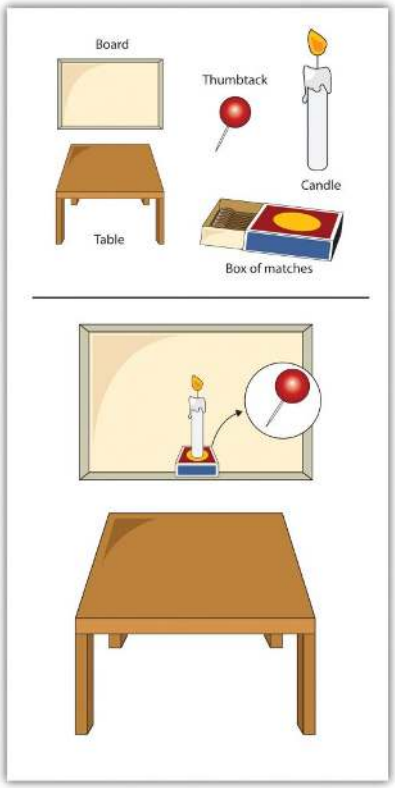


Figure 8.18 Functional Fixedness. In the candle-tack-box problem, functional fixedness may lead us to see the box only as a box and not as a potential candleholder.

Misinformation Effects: How Information That Comes Later Can Distort Memory

A particular problem for eyewitnesses such as the Winnipeg waitress in the introduction of this chapter is that our memories are often influenced by the things that occur to us after we have learned the information (Erdmann, Volbert, & Böhm, 2004; Loftus, 1979; Zaragoza, Belli, & Payment, 2007). This new information can distort our original memories such that we are no longer sure what is the real information and what was provided later. The **misinformation effect** refers to *errors in memory that occur when new information influences existing memories*.

In an experiment by Loftus and Palmer (1974), participants viewed a film of a traffic accident and then, according to random assignment to experimental conditions, answered one of three questions:

1. “About how fast were the cars going when they hit each other?”
2. “About how fast were the cars going when they smashed each other?”
3. “About how fast were the cars going when they contacted each other?”

As you can see in Figure 8.19, “Misinformation Effect,” although all the participants saw the same accident, their estimates of the cars’ speed varied by condition. Participants who had been asked about the cars “smashing” each other estimated the highest average speed, and those who had been asked the “contacted” question estimated the lowest average speed.

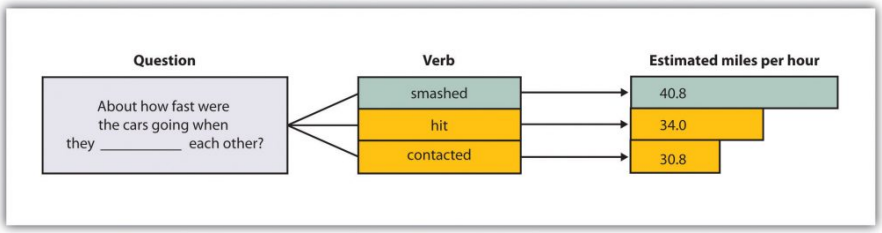


Figure 8.19 Misinformation Effect. Participants viewed a film of a traffic accident and then answered a question about the accident. According to random assignment, the verb in the question was filled by either "hit," "smashed," or "contacted" each other. The wording of the question influenced the participants' memory of the accident.

In addition to distorting our memories for events that have actually occurred, misinformation may lead us to falsely remember information that never occurred. Loftus and her colleagues asked parents to provide them with descriptions of events that did happen to their children (e.g., moving to a new house) and that did not happen (e.g., being lost in a shopping mall). Then (without telling the children which events were real or made up) the researchers asked the children to imagine both types of events. The children were instructed to "think real hard" about whether the events had occurred (Ceci, Huffman, Smith, & Loftus, 1994). More than half of the children generated stories regarding at least one of the made-up events, and they remained insistent that the events did in fact occur even when told by the researcher that they could not possibly have occurred (Loftus & Pickrell, 1995). Even college or university students are susceptible to manipulations that make events that did not actually occur seem as if they did (Mazzoni, Loftus, & Kirsch, 2001).

The ease with which memories can be created or implanted is particularly problematic when the events to be recalled have important consequences. Therapists often argue that patients may repress memories of traumatic events they experienced as children, such as childhood sexual abuse, and then recover the events years later as the therapist leads them to recall the information — for instance, by using dream interpretation and hypnosis (Brown, Scheflin, & Hammond, 1998).

But other researchers argue that painful memories such as sexual abuse are usually very well remembered, that few memories are actually repressed, and that even if they are it is virtually impossible for patients to accurately retrieve them years later (McNally, Bryant, & Ehlers, 2003; Pope, Poliakoff, Parker, Boynes, & Hudson, 2007). These researchers have argued that the procedures used by the therapists to "retrieve" the memories are more likely to actually implant false memories, leading the patients to erroneously recall events that did not actually occur. Because hundreds of people have been accused, and even imprisoned, on the basis of claims about *recovered memory* of child sexual abuse, the accuracy of these memories has important societal implications. Many psychologists now believe that most of these claims of recovered memories are due to implanted, rather than real, memories (Loftus & Ketcham, 1994).

Overconfidence

One of the most remarkable aspects of the Winnipeg waitress's mistaken identification of James Sophonow was her certainty. But research reveals a pervasive cognitive bias toward **overconfidence**, which is *the tendency for people to be too certain about their ability to accurately remember events and to make judgments*. David Dunning and his colleagues (Dunning, Griffin, Milojkovic, & Ross, 1990) asked undergraduate students to predict how another student would react in various situations. Some participants made predictions about a fellow student whom they had just met and interviewed, and others made predictions about their roommates whom they knew very well. In both cases, participants reported their confidence in each prediction, and accuracy was determined by the responses of the people themselves. The results were clear: regardless of whether they judged a stranger or a roommate, the participants consistently overestimated the accuracy of their own predictions.

Eyewitnesses to crimes are also frequently overconfident in their memories, and there is only a small correlation between how accurate and how confident an eyewitness is. The witness who claims to be absolutely certain about his or her identification is not much more likely to be accurate than one who appears much less sure, making it almost impossible to determine whether a particular witness is accurate or not (Wells & Olson, 2003).

I am sure that you have a clear memory of when you first heard about the 9/11 attacks in the United States in 2001, and perhaps also when you heard that Princess Diana was killed in 1997, or when the Canadian men's and women's hockey teams scored the

winning goals in the 2010 and 2014 Winter Olympics. This type of memory, which we experience along with a great deal of emotion, is known as a **flashbulb memory** — *a vivid and emotional memory of an unusual event that people believe they remember very well* (Brown & Kulik, 1977).

People are very certain of their memories of these important events, and frequently overconfident. Talarico and Rubin (2003) tested the accuracy of flashbulb memories by asking students to write down their memory of how they had heard the news about either the September 11, 2001, terrorist attacks or about an everyday event that had occurred to them during the same time frame. These recordings were made on September 12, 2001. Then the participants were asked again, either one, six, or 32 weeks later, to recall their memories. The participants became less accurate in their recollections of both the emotional event and the everyday events over time. But the participants' confidence in the accuracy of their memory of learning about the attacks did not decline over time. After 32 weeks the participants were overconfident; they were much more certain about the accuracy of their flashbulb memories than they should have been.

Heuristic Processing: Availability and Representativeness

Another way that our information processing may be biased occurs when we use **heuristics**, which are *information-processing strategies that are useful in many cases but may lead to errors when misapplied*. Let's consider two of the most frequently applied (and misapplied) heuristics: the *representativeness heuristic* and the *availability heuristic*.

In many cases we *base our judgments on information that seems to represent, or match, what we expect will happen, while ignoring other potentially more relevant statistical information*. When we do so, we are using the **representativeness heuristic**. Consider, for instance, the puzzle presented in Table 8.4, "The Representativeness Heuristic". Let's say that you went to a hospital, and you checked the records of the babies that were born today. Which pattern of births do you think you are most likely to find?

Table 8.4 The Representativeness Heuristic.

List A		List B	
6:31 a.m.	Girl	6:31 a.m.	Boy
8:15 a.m.	Girl	8:15 a.m.	Girl
9:42 a.m.	Girl	9:42 a.m.	Boy
1:13 p.m.	Girl	1:13 p.m.	Girl
3:39 p.m.	Boy	3:39 p.m.	Girl
5:12 p.m.	Boy	5:12 p.m.	Boy
7:42 p.m.	Boy	7:42 p.m.	Girl
11:44 p.m.	Boy	11:44 p.m.	Boy

Using the representativeness heuristic may lead us to incorrectly believe that some patterns of observed events are more likely to have occurred than others. In this case, list B seems more random, and thus is judged as more likely to have occurred, but statistically both lists are equally likely.

Most people think that list B is more likely, probably because list B looks more random, and thus matches (is "representative of") our ideas about randomness. But statisticians know that any pattern of four girls and four boys is mathematically equally likely. The problem is that we have a schema of what randomness should be like, which doesn't always match what is mathematically the case. Similarly, people who see a flipped coin come up "heads" five times in a row will frequently predict, and perhaps even wager money, that "tails" will be next. This behaviour is known as the *gambler's fallacy*. But mathematically, the gambler's fallacy is an error: the likelihood of any single coin flip being "tails" is always 50%, regardless of how many times it has come up "heads" in the past.

Our judgments can also be influenced by how easy it is to retrieve a memory. *The tendency to make judgments of the frequency or likelihood that an event occurs on the basis of the ease with which it can be retrieved from memory* is known as the **availability heuristic** (MacLeod & Campbell, 1992; Tversky & Kahneman, 1973). Imagine, for instance, that I asked you to indicate whether

there are more words in the English language that begin with the letter “R” or that have the letter “R” as the third letter. You would probably answer this question by trying to think of words that have each of the characteristics, thinking of all the words you know that begin with “R” and all that have “R” in the third position. Because it is much easier to retrieve words by their first letter than by their third, we may incorrectly guess that there are more words that begin with “R,” even though there are in fact more words that have “R” as the third letter.

The availability heuristic may also operate on episodic memory. We may think that our friends are nice people, because we see and remember them primarily when they are around us (their friends, who they are, of course, nice to). And the traffic might seem worse in our own neighbourhood than we think it is in other places, in part because nearby traffic jams are more easily retrieved than are traffic jams that occur somewhere else.

Salience and Cognitive Accessibility

Still another potential for bias in memory occurs because we are more likely to attend to, and thus make use of and remember, some information more than other information. For one, we tend to attend to and remember things that are highly salient, meaning that they attract our attention. Things that are unique, colourful, bright, moving, and unexpected are more salient (McArthur & Post, 1977; Taylor & Fiske, 1978). In one relevant study, Loftus, Loftus, and Messo (1987) showed people images of a customer walking up to a bank teller and pulling out either a pistol or a chequebook. By tracking eye movements, the researchers determined that people were more likely to look at the gun than at the chequebook, and that this reduced their ability to accurately identify the criminal in a lineup that was given later. The salience of the gun drew people’s attention away from the face of the criminal.

The salience of the stimuli in our social worlds has a big influence on our judgment, and in some cases may lead us to behave in ways that might not benefit us. Imagine, for instance, that you wanted to buy a new music player for yourself. You’ve been trying to decide whether to get the iPod or the Zune. You checked *Consumer Reports* online and found that, although the players differed on many dimensions, including price, battery life, ability to share music, and so forth, the Zune was nevertheless rated significantly higher by owners than was the iPod. As a result, you decide to purchase the Zune the next day. That night, however, you go to a party, and a friend shows you her iPod. You check it out, and it seems really cool. You tell her that you were thinking of buying a Zune, and she tells you that you are crazy. She says she knows someone who had one and it had a lot of problems — it didn’t download music correctly, the battery died right after the warranty expired, and so forth — and that she would never buy one. Would you still buy the Zune, or would you switch your plans?

If you think about this question logically, the information that you just got from your friend isn’t really all that important. You now know the opinion of one more person, but that can’t change the overall rating of the two machines very much. On the other hand, the information your friend gives you, and the chance to use her iPod, are highly salient. The information is right there in front of you, in your hand, whereas the statistical information from *Consumer Reports* is only in the form of a table that you saw on your computer. The outcome in cases such as this is that people frequently ignore the less salient but more important information, such as the likelihood that events occur across a large population (these statistics are known as *base rates*), in favour of the less important but nevertheless more salient information.

People also vary in the schemas that they find important to use when judging others and when thinking about themselves. **Cognitive accessibility** refers to *the extent to which knowledge is activated in memory, and thus likely to be used in cognition and behaviour*. For instance, you probably know a person who is a golf nut (or fanatic of another sport). All he can talk about is golf. For him, we would say that golf is a highly accessible construct. Because he loves golf, it is important to his self-concept, he sets many of his goals in terms of the sport, and he tends to think about things and people in terms of it (“if he plays golf, he must be a good person!”). Other people have highly accessible schemas about environmental issues, eating healthy food, or drinking really good coffee. When schemas are highly accessible, we are likely to use them to make judgments of ourselves and others, and this overuse may inappropriately colour our judgments.

Counterfactual Thinking

In addition to influencing our judgments about ourselves and others, the ease with which we can retrieve potential experiences from memory can have an important effect on our own emotions. If we can easily imagine an outcome that is better than what actually happened, then we may experience sadness and disappointment; on the other hand, if we can easily imagine that a result might have been worse than what actually happened, we may be more likely to experience happiness and satisfaction. *The tendency to*

think about and experience events according to "what might have been" is known as **counterfactual thinking** (Kahneman & Miller, 1986; Roese, 2005).

Imagine, for instance, that you were participating in an important contest, and you won the silver (second-place) medal. How would you feel? Certainly you would be happy that you won the silver medal, but wouldn't you also be thinking about what might have happened if you had been just a little bit better — you might have won the gold medal! On the other hand, how might you feel if you won the bronze (third-place) medal? If you were thinking about the *counterfactuals* (the "what might have beens") perhaps the idea of not getting any medal at all would have been highly accessible; you'd be happy that you got the medal that you did get, rather than coming in fourth.



Figure 8.20 Counterfactual Thinking. Does the bronze medalist look happier to you than the silver medalist? Medvec, Madey, and Gilovich (1995) found that, on average, bronze medalists were happier.

Tom Gilovich and his colleagues (Medvec, Madey, & Gilovich, 1995) investigated this idea by videotaping the responses of athletes who won medals in the 1992 Summer Olympic Games (Figure 8.20). They videotaped the athletes both as they learned that they had won a silver or a bronze medal and again as they were awarded the medal. Then the researchers showed these videos, without any sound, to raters who did not know which medal which athlete had won. The raters were asked to indicate how they thought the athlete was feeling, using a range of feelings from "agony" to "ecstasy." The results showed that the bronze medalists were, on average, rated as happier than were the silver medalists. In a follow-up study, raters watched interviews with many of these same athletes as they talked about their performance. The raters indicated what we would expect on the basis of counterfactual thinking — the silver medalists talked about their disappointments in having finished second rather than first, whereas the bronze medalists focused on how happy they were to have finished third rather than fourth.

You might have experienced counterfactual thinking in other situations. Once I was driving across country, and my car was having some engine trouble. I really wanted to make it home when I got near the end of my journey; I would have been extremely disappointed if the car broke down only a few miles from my home. Perhaps you have noticed that once you get close to finishing something, you feel like you really need to get it done. Counterfactual thinking has even been observed in juries. Jurors who were asked to award monetary damages to others who had been in an accident offered them substantially more in compensation if they barely avoided injury than they offered if the accident seemed inevitable (Miller, Turnbull, & McFarland, 1988).

Psychology in Everyday Life: Cognitive Biases in the Real World

Perhaps you are thinking that the kinds of errors that we have been talking about don't seem that important. After all, who really cares if we think there are more words that begin with the letter "R" than there actually are, or if bronze medal winners are happier than the silver medalists? These are not big problems in the overall scheme of things. But it turns out that what seem to be relatively small cognitive biases on the surface can have profound consequences for people.

Why would so many people continue to purchase lottery tickets, buy risky investments in the stock market, or gamble their money in casinos when the likelihood of them ever winning is so low? One possibility is that they are victims of salience; they focus their attention on the salient likelihood of a big win, forgetting that the base rate of the event occurring is very low. The belief in astrology, which all scientific evidence suggests is not accurate, is probably driven in part by the salience of the occasions when the predictions are correct. When a horoscope comes true (which will, of course, happen sometimes), the correct prediction is highly salient and may allow people to maintain the overall false belief.

People may also take more care to prepare for unlikely events than for more likely ones, because the unlikely ones are more salient. For instance, people may think that they are more likely to die from a terrorist attack or a homicide than they are from diabetes, stroke, or tuberculosis. But the odds are much greater of dying from the latter than the former. And people are frequently more afraid of flying than driving, although the likelihood of dying in a car crash is hundreds of times greater than dying in a plane crash (about 1.2 million people are killed in road crashes globally each year, and about 20 to 50 million are injured). Because people don't accurately calibrate their behaviours to match the true potential risks (e.g., they drink and drive or don't wear their seatbelts), the individual and societal level costs are often quite large (Peden, 2010; Slovic, 2000).

Salience and accessibility also colour how we perceive our social worlds, which may have a big influence on our behaviour. For instance, people who watch a lot of violent television shows also view the world as more dangerous (Doob & Macdonald, 1979), probably because violence becomes more cognitively accessible for them. We also unfairly overestimate our contribution to joint projects (Ross & Sicoly, 1979), perhaps in part because our own contributions are highly accessible, whereas the contributions of others are much less so.

Even people who should know better, and who *need* to know better, are subject to cognitive biases. Economists, stock traders, managers, lawyers, and even doctors make the same kinds of mistakes in their professional activities that people make in their everyday lives (Gilovich, Griffin, & Kahneman, 2002). Just like us, these people are victims of overconfidence, heuristics, and other biases.

Furthermore, every year thousands of individuals, such as Ronald Cotton, are charged with and often convicted of crimes based largely on eyewitness evidence. When eyewitnesses testify in courtrooms regarding their memories of a crime, they often are completely sure that they are identifying the right person. But the most common cause of innocent people being falsely convicted is erroneous eyewitness testimony (Wells, Wright, & Bradfield, 1999). The many people who were convicted by mistaken eyewitnesses prior to the advent of forensic DNA and who have now been exonerated by DNA tests have certainly paid for all-too-common memory errors (Wells, Memon, & Penrod, 2006).

Although cognitive biases are common, they are not impossible to control, and psychologists and other scientists are working to help people make better decisions. One possibility is to provide people with better feedback about their judgments. Weather forecasters, for instance, learn to be quite accurate in their judgments because they have clear feedback about the accuracy of their predictions. Other research has found that accessibility biases can be reduced by leading people to consider multiple alternatives rather than focus only on the most obvious ones, and particularly by leading people to think about opposite possible outcomes than the ones they are expecting (Lilienfeld, Ammirtai, & Landfield, 2009). Forensic psychologists are also working to reduce the incidence of false identification by helping police develop better procedures for interviewing both suspects and eyewitnesses (Steblay, Dysart, Fulero, & Lindsay, 2001).

Key Takeaways

- Our memories fail in part due to inadequate encoding and storage, and in part due to the inability to accurately retrieve stored information.
- The human brain is wired to develop and make use of social categories and schemas. Schemas help us remember new information but may also lead us to falsely remember things that never happened to us and to distort or misremember things that did.
- A variety of cognitive biases influence the accuracy of our judgments.

Exercises and Critical Thinking

1. Consider a time when you were uncertain if you really experienced an event or only imagined it. What impact did this have on you, and how did you resolve it?
2. Consider again some of the cognitive schemas that you hold in your memory. How do these knowledge structures bias your information processing and behaviour, and how might you prevent them from doing so?
3. Imagine that you were involved in a legal case in which an eyewitness claimed that he had seen a person commit a crime. Based on your knowledge about memory and cognition, what techniques would you use to reduce the possibility that the eyewitness was making a mistaken identification?

Image Attributions

Figure 8.19: Adapted from Loftus & Palmer (1974).

Figure 8.20: 2010 Winter Ol ympic Men's Snowboard Cross medalists by kinnigurl (http://commons.wikimedia.org/wiki/Fi...er_Olympic_Men's_Snowboard_Cross_medalists.jpg) used under CC BY SA 2.0 (http://creativecommons.org/licenses/by-sa/2.0/deed.en).

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8.5: Eyewitness Testimony and Memory Biases

Cara Laney and Elizabeth F. Loftus

Eyewitnesses can provide very compelling legal testimony, but rather than recording experiences flawlessly, their memories are susceptible to a variety of errors and biases. They (like the rest of us) can make errors in remembering specific details and can even remember whole events that did not actually happen. In this module, we discuss several of the common types of errors, and what they can tell us about human memory and its interactions with the legal system.

Learning Objectives

- Describe the kinds of mistakes that eyewitnesses commonly make and some of the ways that this can impede justice.
- Explain some of the errors that are common in human memory.
- Describe some of the important research that has demonstrated human memory errors and their consequences.

What Is Eyewitness Testimony?

Eyewitness testimony is what happens when a person witnesses a crime (or accident, or other legally important event) and later gets up on the stand and recalls for the court all the details of the witnessed event. It involves a more complicated process than might initially be presumed. It includes what happens during the actual crime to facilitate or hamper witnessing, as well as everything that happens from the time the event is over to the later courtroom appearance. The eyewitness may be interviewed by the police and numerous lawyers, describe the perpetrator to several different people, and make an identification of the perpetrator, among other things.



Figure 8.21 What can happen to our memory from the time we witness an event to the retelling of that event later? What can influence how we remember, or misremember, highly significant events like a crime or accident?

Why Is Eyewitness Testimony an Important Area of Psychological Research?

When an eyewitness stands up in front of the court and describes what happened from her own perspective, this testimony can be extremely compelling—it is hard for those hearing this testimony to take it “with a grain of salt,” or otherwise adjust its power. But to what extent is this necessary?

There is now a wealth of evidence, from research conducted over several decades, suggesting that eyewitness testimony is probably the most persuasive form of evidence presented in court, but in many cases, its accuracy is dubious. There is also evidence that mistaken eyewitness evidence can lead to wrongful conviction—sending people to prison for years or decades, even to death row, for crimes they did not commit. Faulty eyewitness testimony has been implicated in at least 75% of DNA exoneration cases—more than any other cause (Garrett, 2011). In a particularly famous case, a man named Ronald Cotton was identified by a rape victim, Jennifer Thompson, as her rapist, and was found guilty and sentenced to life in prison. After more than 10 years, he was exonerated (and the real rapist identified) based on DNA evidence. For details on this case and other (relatively) lucky individuals whose false convictions were subsequently overturned with DNA evidence, see the Innocence Project website (http://www.innocenceproject.org/).

There is also hope, though, that many of the errors may be avoidable if proper precautions are taken during the investigative and judicial processes. Psychological science has taught us what some of those precautions might involve, and we discuss some of that science now.



Figure 8.22 Misinformation can be introduced into the memory of a witness between the time of seeing an event and reporting it later. Something as straightforward as which sort of traffic sign was in place at an intersection can be confused if subjects are exposed to erroneous information after the initial incident.

In an early study of eyewitness memory, undergraduate subjects first watched a slideshow depicting a small red car driving and then hitting a pedestrian (Loftus, Miller, & Burns, 1978). Some subjects were then asked leading questions about what had happened in the slides. For example, subjects were asked, “How fast was the car traveling when it passed the yield sign?” But this question was actually designed to be misleading, because the original slide included a stop sign rather than a yield sign.

Later, subjects were shown pairs of slides. One of the pair was the original slide containing the stop sign; the other was a replacement slide containing a yield sign. Subjects were asked which of the pair they had previously seen. Subjects who had been asked about the yield sign were likely to pick the slide showing the yield sign, even though they had originally seen the slide with the stop sign. In other words, the misinformation in the leading question led to inaccurate memory.

This phenomenon is called the **misinformation effect**, because the misinformation that subjects were exposed to after the event (here in the form of a misleading question) apparently contaminates subjects’ memories of what they witnessed. Hundreds of subsequent studies have demonstrated that memory can be contaminated by erroneous information that people are exposed to after they witness an event (see Frenda, Nichols, & Loftus, 2011; Loftus, 2005). The misinformation in these studies has led people to incorrectly remember everything from small but crucial details of a perpetrator’s appearance to objects as large as a barn that wasn’t there at all.

These studies have demonstrated that young adults (the typical research subjects in psychology) are often susceptible to misinformation, but that children and older adults can be even more susceptible (Bartlett & Memon, 2007; Ceci & Bruck, 1995). In addition, misinformation effects can occur easily, and without any intention to deceive (Allan & Gabbert, 2008). Even slight differences in the wording of a question can lead to misinformation effects. Subjects in one study were more likely to say yes when asked “Did you see the broken headlight?” than when asked “Did you see a broken headlight?” (Loftus, 1975).

Other studies have shown that misinformation can corrupt memory even more easily when it is encountered in social situations (Gabbert, Memon, Allan, & Wright, 2004). This is a problem particularly in cases where more than one person witnesses a crime. In these cases, witnesses tend to talk to one another in the immediate aftermath of the crime, including as they wait for police to arrive. But because different witnesses are different people with different perspectives, they are likely to see or notice different things, and thus remember different things, even when they witness the same event. So when they communicate about the crime later, they not only reinforce common memories for the event, they also contaminate each other’s memories for the event (Gabbert, Memon, & Allan, 2003; Paterson & Kemp, 2006; Takarangi, Parker, & Garry, 2006).

The misinformation effect has been modeled in the laboratory. Researchers had subjects watch a video in pairs. Both subjects sat in front of the same screen, but because they wore differently polarized glasses, they saw two different versions of a video, projected onto a screen. So, although they were both watching the same screen, and believed (quite reasonably) that they were watching the same video, they were actually watching two different versions of the video (Garry, French, Kinzett, & Mori, 2008).

In the video, Eric the electrician is seen wandering through an unoccupied house and helping himself to the contents thereof. A total of eight details were different between the two videos. After watching the videos, the "co-witnesses" worked together on 12 memory test questions. Four of these questions dealt with details that were different in the two versions of the video, so subjects had the chance to influence one another. Then subjects worked individually on 20 additional memory test questions. Eight of these were for details that were different in the two videos. Subjects' accuracy was highly dependent on whether they had discussed the details previously. Their accuracy for items they had *not* previously discussed with their co-witness was 79%. But for items that they *had* discussed, their accuracy dropped markedly, to 34%. That is, subjects allowed their co-witnesses to corrupt their memories for what they had seen.

Identifying Perpetrators

In addition to correctly remembering many details of the crimes they witness, eyewitnesses often need to remember the faces and other identifying features of the perpetrators of those crimes. Eyewitnesses are often asked to describe that perpetrator to law enforcement and later to make identifications from books of mug shots or lineups. Here, too, there is a substantial body of research demonstrating that eyewitnesses can make serious, but often understandable and even predictable, errors (Caputo & Dunning, 2007; Cutler & Penrod, 1995).

In most jurisdictions in the United States, lineups are typically conducted with pictures, called **photo spreads**, rather than with actual people standing behind one-way glass (Wells, Memon, & Penrod, 2006). The eyewitness is given a set of small pictures of perhaps six or eight individuals who are dressed similarly and photographed in similar circumstances. One of these individuals is the police suspect, and the remainder are "**foils**" or "fillers" (people known to be innocent of the particular crime under investigation). If the eyewitness identifies the suspect, then the investigation of that suspect is likely to progress. If a witness identifies a foil or no one, then the police may choose to move their investigation in another direction.



Figure 8.23 Mistakes in identifying perpetrators can be influenced by a number of factors including poor viewing conditions, too little time to view the perpetrator, or too much delay from time of witnessing to identification.

This process is modeled in laboratory studies of eyewitness identifications. In these studies, research subjects witness a mock crime (often as a short video) and then are asked to make an identification from a photo or a live lineup. Sometimes the lineups are target present, meaning that the perpetrator from the mock crime is actually in the lineup, and sometimes they are target absent, meaning that the lineup is made up entirely of foils. The subjects, or **mock witnesses**, are given some instructions and asked to pick the perpetrator out of the lineup. The particular details of the witnessing experience, the instructions, and the lineup members can all influence the extent to which the mock witness is likely to pick the perpetrator out of the lineup, or indeed to make any selection at all. Mock witnesses (and indeed real witnesses) can make errors in two different ways. They can fail to pick the perpetrator out of a target present lineup (by picking a foil or by neglecting to make a selection), or they can pick a foil in a target absent lineup (wherein the only correct choice is to not make a selection).

Some factors have been shown to make eyewitness identification errors particularly likely. These include poor vision or viewing conditions during the crime, particularly stressful witnessing experiences, too little time to view the perpetrator or perpetrators, too much delay between witnessing and identifying, and being asked to identify a perpetrator from a race other than one's own (Bornstein, Deffenbacher, Penrod, & McGorty, 2012; Brigham, Bennett, Meissner, & Mitchell, 2007; Burton, Wilson, Cowan, & Bruce, 1999; Deffenbacher, Bornstein, Penrod, & McGorty, 2004).

It is hard for the legal system to do much about most of these problems. But there are some things that the justice system can do to help lineup identifications "go right." For example, investigators can put together high-quality, fair lineups. A fair lineup is one in which the suspect and each of the foils is equally likely to be chosen by someone who has read an eyewitness description of the perpetrator but who did not actually witness the crime (Brigham, Ready, & Spier, 1990). This means that no one in the lineup should "stick out," and that everyone should match the description given by the eyewitness. Other important recommendations that have come out of this research include better ways to conduct lineups, "double blind" lineups, unbiased instructions for witnesses, and conducting lineups in a sequential fashion (see Technical Working Group for Eyewitness Evidence, 1999; Wells et al., 1998; Wells & Olson, 2003).

Kinds of Memory Biases

Memory is also susceptible to a wide variety of other biases and errors. People can forget events that happened to them and people they once knew. They can mix up details across time and place. They can even remember whole complex events that never happened at all. Importantly, these errors, once made, can be very hard to unmake. A memory is no less "memorable" just because it is wrong.



Figure 8.24 For most of our experiences schematas are a benefit and help with information overload. However, they may make it difficult or impossible to recall certain details of a situation later. Do you recall the library as it actually was or the library as approximated by your library schemata?

Some small memory errors are commonplace, and you have no doubt experienced many of them. You set down your keys without paying attention, and then cannot find them later when you go to look for them. You try to come up with a person's name but cannot find it, even though you have the sense that it is right at the tip of your tongue (psychologists actually call this the tip-of-the-tongue effect, or TOT) (Brown, 1991).

Other sorts of memory biases are more complicated and longer lasting. For example, it turns out that our expectations and beliefs about how the world works can have huge influences on our memories. Because many aspects of our everyday lives are full of redundancies, our memory systems take advantage of the recurring patterns by forming and using **schemata**, or memory templates (Alba & Hasher, 1983; Brewer & Treyens, 1981). Thus, we know to expect that a library will have shelves and tables and librarians, and so we don't have to spend energy noticing these at the time. The result of this lack of attention, however, is that one is likely to remember schema-consistent information (such as tables), and to remember them in a rather generic way, whether or not they were actually present.

False Memory

Some memory errors are so "large" that they almost belong in a class of their own: **false memories**. Back in the early 1990s a pattern emerged whereby people would go into therapy for depression and other everyday problems, but over the course of the therapy develop memories for violent and horrible victimhood (Loftus & Ketcham, 1994). These patients' therapists claimed that the patients were recovering genuine memories of real childhood abuse, buried deep in their minds for years or even decades. But some experimental psychologists believed that the memories were instead likely to be false—created in therapy. These researchers then set out to see whether it would indeed be possible for wholly false memories to be created by procedures similar to those used in these patients' therapy.

In early false memory studies, undergraduate subjects' family members were recruited to provide events from the students' lives. The student subjects were told that the researchers had talked to their family members and learned about four different events from their childhoods. The researchers asked if the now undergraduate students remembered each of these four events—introduced via short hints. The subjects were asked to write about each of the four events in a booklet and then were interviewed two separate times. The trick was that one of the events came from the researchers rather than the family (and the family had actually assured the researchers that this event had *not* happened to the subject). In the first such study, this researcher-introduced event was a story about being lost in a shopping mall and rescued by an older adult. In this study, after just being asked whether they remembered these events occurring on three separate occasions, a quarter of subjects came to believe that they had indeed been lost in the mall (Loftus & Pickrell, 1995). In subsequent studies, similar procedures were used to get subjects to believe that they nearly drowned and had been rescued by a lifeguard, or that they had spilled punch on the bride's parents at a family wedding, or that they had been attacked by a vicious animal as a child, among other events (Heaps & Nash, 1999; Hyman, Husband, & Billings, 1995; Porter, Yuille, & Lehman, 1999).

More recent false memory studies have used a variety of different manipulations to produce false memories in substantial minorities and even occasional majorities of manipulated subjects (Braun, Ellis, & Loftus, 2002; Lindsay, Hagen, Read, Wade, & Garry, 2004; Mazzoni, Loftus, Seitz, & Lynn, 1999; Seamon, Philbin, & Harrison, 2006; Wade, Garry, Read, & Lindsay, 2002). For example, one group of researchers used a mock-advertising study, wherein subjects were asked to review (fake) advertisements for Disney vacations, to convince subjects that they had once met the character Bugs Bunny at Disneyland—an impossible false memory because Bugs is a Warner Brothers character (Braun et al., 2002). Another group of researchers photoshopped childhood photographs of their subjects into a hot air balloon picture and then asked the subjects to try to remember and describe their hot air balloon experience (Wade et al., 2002). Other researchers gave subjects unmanipulated class photographs from their childhoods along with a fake story about a class prank, and thus enhanced the likelihood that subjects would falsely remember the prank (Lindsay et al., 2004).

Using a false feedback manipulation, we have been able to persuade subjects to falsely remember having a variety of childhood experiences. In these studies, subjects are told (falsely) that a powerful computer system has analyzed questionnaires that they completed previously and has concluded that they had a particular experience years earlier. Subjects apparently believe what the computer says about them and adjust their memories to match this new information. A variety of different false memories have been implanted in this way. In some studies, subjects are told they once got sick on a particular food (Bernstein, Laney, Morris, & Loftus, 2005). These memories can then spill out into other aspects of subjects' lives, such that they often become less interested in eating that food in the future (Bernstein & Loftus, 2009b). Other false memories implanted with this methodology include having an unpleasant experience with the character Pluto at Disneyland and witnessing physical violence between one's parents (Berkowitz, Laney, Morris, Garry, & Loftus, 2008; Laney & Loftus, 2008).

Importantly, once these false memories are implanted—whether through complex methods or simple ones—it is extremely difficult to tell them apart from true memories (Bernstein & Loftus, 2009a; Laney & Loftus, 2008).

Conclusion

To conclude, eyewitness testimony is very powerful and convincing to jurors, even though it is not particularly reliable. Identification errors occur, and these errors can lead to people being falsely accused and even convicted. Likewise, eyewitness memory can be corrupted by leading questions, misinterpretations of events, conversations with co-witnesses, and their own expectations for what should have happened. People can even come to remember whole events that never occurred.

The problems with memory in the legal system are real. But what can we do to start to fix them? A number of specific recommendations have already been made, and many of these are in the process of being implemented (e.g., Steblay & Loftus, 2012; Technical Working Group for Eyewitness Evidence, 1999; Wells et al., 1998). Some of these recommendations are aimed at specific legal procedures, including when and how witnesses should be interviewed, and how lineups should be constructed and conducted. Other recommendations call for appropriate education (often in the form of expert witness testimony) to be provided to jury members and others tasked with assessing eyewitness memory. Eyewitness testimony can be of great value to the legal system, but decades of research now argues that this testimony is often given far more weight than its accuracy justifies.

Outside Resources

Video 1: Eureka Foong's – The Misinformation Effect. This is a student-made video illustrating this phenomenon of altered memory. It was one of the winning entries in the 2014 Noba Student Video Award.



Video 2: Ang Rui Xia & Ong Jun Hao's – The Misinformation Effect. Another student-made video exploring the misinformation effect. Also an award winner from 2014.



Discussion Questions

1. Imagine that you are a juror in a murder case where an eyewitness testifies. In what ways might your knowledge of memory errors affect your use of this testimony?
2. How true to life do you think television shows such as CSI or Law & Order are in their portrayals of eyewitnesses?
3. Many jurisdictions in the United States use "show-ups," where an eyewitness is brought to a suspect (who may be standing on the street or in handcuffs in the back of a police car) and asked, "Is this the perpetrator?" Is this a good or bad idea, from a

psychological perspective? Why?

Image Attributions

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8.6: Summary, Key Terms, Self-Test

Charles Stangor, Jennifer Walinga, and Lee Sanders

Summary

Memory and cognition are the two major interests of cognitive psychologists. The cognitive school was influenced in large part by the development of the electronic computer. Psychologists conceptualize memory in terms of types, stages, and processes.

Explicit memory is assessed using measures in which the individual being tested must consciously attempt to remember the information. Explicit memory includes semantic and episodic memory. Explicit memory tests include recall memory tests, recognition memory tests, and measures of relearning (also known as savings).

Implicit memory refers to the influence of experience on behaviour, even if the individual is not aware of those influences. Implicit memory is made up of procedural memory, classical conditioning effects, and priming. Priming refers both to the activation of knowledge and to the influence of that activation on behaviour. An important characteristic of implicit memories is that they are frequently formed and used automatically, without much effort or awareness on our part.

Sensory memory, including iconic and echoic memory, is a memory buffer that lasts only very briefly and then, unless it is attended to and passed on for more processing, is forgotten.

Information that we turn our attention to may move into short-term memory (STM). STM is limited in both the length and the amount of information it can hold. Working memory is a set of memory procedures or operations that operates on the information in STM. Working memory's central executive directs the strategies used to keep information in STM, such as maintenance rehearsal, visualization, and chunking.

Long-term memory (LTM) is memory storage that can hold information for days, months, and years. The information that we want to remember in LTM must be encoded and stored, and then retrieved. Some strategies for improving LTM include elaborative encoding, relating information to the self, making use of the forgetting curve and the spacing effect, overlearning, and being aware of context- and state-dependent retrieval effects.

Memories that are stored in LTM are not isolated but rather are linked together into categories and schemas. Schemas are important in part because they help us encode and retrieve information by providing an organizational structure for it.

The ability to maintain information in LTM involves a gradual strengthening of the connections among the neurons in the brain, known as long-term potentiation (LTP). The hippocampus is important in explicit memory, the cerebellum is important in implicit memory, and the amygdala is important in emotional memory. A number of neurotransmitters are important in consolidation and memory. Evidence for the role of different brain structures in different types of memories comes in part from case studies of patients who suffer from amnesia.

Cognitive biases are errors in memory or judgment that are caused by the inappropriate use of cognitive processes. These biases are caused by the overuse of schemas, the reliance on salient and cognitive accessible information, and the use of rule-of-thumb strategies known as heuristics. These biases include errors in source monitoring, the confirmation bias, functional fixedness, the misinformation effect, overconfidence, and counterfactual thinking. Understanding the cognitive errors that we frequently make can help us make better decisions and engage in more appropriate behaviours.

Eyewitness testimony is very powerful and convincing to jurors, even though it is not particularly reliable. Identification errors occur, and these errors can lead to people being falsely accused and even convicted. Likewise, eyewitness memory can be corrupted by leading questions, misinterpretations of events, conversations with co-witnesses, and their own expectations for what should have happened. People can even come to remember whole events that never occurred.

The problems with memory in the legal system are real. Misinformation can be introduced into the memory of a witness between the time of seeing an event and reporting it later.
The misinformation effect occurs when misinformation that subjects are exposed to after the event contaminates subjects' memories of what they witnessed. Hundreds of studies have demonstrated that memory can be contaminated by erroneous information that people are exposed to after they witness an event.

False memory studies suggest that once these false memories are implanted it is difficult to tell them apart from true memories.

In addition to correctly remembering the many details of a crime, eyewitnesses often need to remember the faces and other identifying features of the perpetrators of those crimes. There is a substantial body of research demonstrating that eyewitnesses can make serious, but often understandable and even predictable, errors while engaging with mug shots, photo spreads, and line ups. Memory is also susceptible to a wide variety of biases and errors. People can forget events that happened to them and people they once knew. They can mix up details across time and place. They can even remember whole complex events that never happened at all.

Recommendations have been made to improve the use of and reliance on the use of eyewitness testimony in the legal system, and many of these are in the process of being implemented. Some are aimed at specific legal procedures, including when and how witnesses should be interviewed, and how lineups should be constructed and conducted. Other recommendations call for appropriate education (often in the form of expert witness testimony) to be provided to jury members and others tasked with assessing eyewitness memory.

Eyewitness testimony can be of great value to the legal system, but decades of research now argues that this testimony is often given far more weight than its accuracy justifies.

Key Terms

- Amnesia
- Anterograde amnesia
- Autobiographical memory
- Availability heuristic
- Categories
- Category prototype
- Central executive
- Chunking
- Classical conditioning effects
- Cognition
- Cognitive accessibility
- Cognitive biases
- Confirmation bias
- Consolidation
- Context-dependent learning
- Counterfactual thinking
- Cue overload principle
- Decay
- Declarative memory
- Dissociative amnesia
- Distinctiveness
- Echoic memory
- Eidetic imagery (or Photographic memory)
- Elaborative encoding
- Encoding
- Encoding specificity principle
- Engrams
- Episodic memory
- Explicit memory
- False memories
- Flashbulb memory
- Foils
- Functional fixedness
- Glutamate
- Heuristics
- Iconic memory
- Implicit memory
- Interference
- Long-Term Memory
- Long-Term Potentiation (LTP)
- Maintenance rehearsal
- Medial temporal lobes
- Memory
- Memory stages
- Memory traces
- Misinformation effect
- Mock witnesses
- Overconfidence
- Overlearning
- Photo spreads
- Primacy effect
- Priming
- Proactive interference
- Procedural memory
- Recall memory test
- Recency effect
- Recoding
- Recognition memory test
- Relearning
- Representativeness heuristic
- Retrieval
- Retroactive interference
- Retrograde amnesia
- Schemas (also known as Schematas)
- Semantic memory
- Sensory memory
- Serial position curve
- Sleeper effect
- Short-term Memory (STM)
- Source monitoring
- Spacing effect
- State-dependent learning
- Storage
- Temporally Graded Retrograde Amnesia
- Tip-of-the-tongue phenomenon
- Types of memory
- Working memory

Self-Test

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CHAPTER OVERVIEW

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9.1: Introduction

Charles Stangor and Jennifer Walinga

How We Talk (or Do Not Talk) about Intelligence

In January 2005, the president of Harvard University, Lawrence H. Summers, sparked an uproar during a presentation at an economic conference on women and minorities in the science and engineering workforce. During his talk, Summers proposed three reasons why there are so few women who have careers in math, physics, chemistry, and biology. One explanation was that it might be due to discrimination against women in these fields, and a second was that it might be a result of women's preference for raising families rather than for competing in academia. But Summers also argued that women might be less genetically capable of performing science and mathematics — that they may have less "intrinsic aptitude" than men do.

Summers's comments on genetics set off a flurry of responses. One of the conference participants, a biologist at the Massachusetts Institute of Technology, walked out on the talk, and other participants said that they were deeply offended. Summers replied that he was only putting forward hypotheses based on the scholarly work assembled for the conference, and that research has shown that genetics have been found to be very important in many domains compared with environmental factors. As an example, he mentioned the psychological disorder of autism, which was once believed to be a result of parenting but is now known to be primarily genetic in origin.

The controversy did not stop with the conference. Many Harvard faculty members were appalled that a prominent person could even consider the possibility that mathematical skills were determined by genetics, and the controversy and protests that followed the speech led to a first-ever faculty vote for a motion expressing a "lack of confidence" in a Harvard president. Summers resigned his position, in large part as a result of the controversy, in 2006 (Goldin, Goldin, & Foulkes, 2005).

Researchers at the University of Western Ontario in Canada (Vingilis-Jeremko & Vingilis, 2006), conducting a meta-analysis of three decades of research on gender differences in performance and participation within the science, technology, engineering, and math (STEM) areas, state: "…clearly, gender stereotypic messages and priming can have negative effects. Unfortunately gender stereotypic messages abound and remain ubiquitous in the 21st century. Much work has yet to be done" (p. 6).

Yet, the 2010 Pan-Canadian Assessment Program (PCAP) from the Council of Ministers of Education in Canada shows that in studying 32,000 Grade 8 students from across Canada, female Grade 8 students outperformed their male counterparts on reading and science, with no significant difference between the two genders in math skills. Researchers believe that the cultural shift to making math and science more gender neutral may be an influencing factor. Girls scored better than boys in both science and reading. Researchers hypothesize that boys appear to believe that reading and writing is a feminine act and are therefore reluctant to partake fully in these subject areas. Stereotype-threat, the reduction in performance of individuals who belong to negatively stereotyped groups, seems to apply to both genders (CMEC, 2010).

In this chapter we consider how psychologists conceptualize and measure **human intelligence** — *the ability to think, to learn from experience, to solve problems, and to adapt to new situations*. We'll consider whether intelligence involves a single ability or many different abilities, how we measure intelligence, what intelligence predicts, and how cultures and societies think about it. We'll also consider intelligence in terms of nature versus nurture and in terms of similarities versus differences among people.

Intelligence is important because it has an impact on many human behaviours. Intelligence is more strongly related than any other individual difference variable to successful educational, occupational, economic, and social outcomes. Scores on intelligence tests predict academic and military performance, as well as success in a wide variety of jobs (Ones, Viswesvaran, & Dilchert, 2005; Schmidt & Hunter, 1998). Intelligence is also negatively correlated with criminal behaviours — the average *intelligence quotient (IQ)* of delinquent adolescents is about seven points lower than that of other adolescents (Wilson & Herrnstein, 1985) — and positively correlated with health-related outcomes, including longevity (Gottfredson, 2004; Gottfredson & Deary, 2004). At least some of this latter relationship may be due to the fact that people who are more intelligent are better able to predict and avoid accidents and to understand and follow instructions from doctors or on drug labels.

The advantages of having a higher IQ increase as life settings become more complex. The correlation between IQ and job performance is higher in more mentally demanding occupations, such as physician or lawyer, than in less mentally demanding occupations, like clerk or newspaper delivery person (Salgado et al., 2003). Although some specific personality traits, talents, and physical abilities are important for success in some jobs, intelligence predicts performance across all types of jobs.

Our vast intelligence also allows us to have **language**, *a system of communication that uses symbols in a regular way to create meaning*. Language gives us the ability communicate our intelligence to others by talking, reading, and writing. As the psychologist Steven Pinker put it, language is the "the jewel in the crown of cognition" (Pinker, 1994). Although other species have at least some ability to communicate, none of them have language. In the last section of this chapter we will consider the structure and development of language, as well as its vital importance to human beings.

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9.2: Defining and Measuring Intelligence

Charles Stangor and Jennifer Walinga

Learning Objectives

- Define intelligence and list the different types of intelligences psychologists study.
- Summarize the characteristics of a scientifically valid intelligence test.
- Outline the biological and environmental determinants of intelligence.

Psychologists have long debated how to best conceptualize and measure intelligence (Sternberg, 2003). These questions include how many types of intelligence there are, the role of nature versus nurture in intelligence, how intelligence is represented in the brain, and the meaning of group differences in intelligence.

General (g) versus Specific (s) Intelligences

In the early 1900s, the French psychologist Alfred Binet (1857-1914) and his colleague Henri Simon (1872-1961) began working in Paris to develop a measure that would differentiate students who were expected to be better learners from students who were expected to be slower learners. The goal was to help teachers better educate these two groups of students. Binet and Simon developed what most psychologists today regard as the first intelligence test (Figure 9.1, "Intelligence Tests in Schools"), which consisted of a wide variety of questions that included the ability to name objects, define words, draw pictures, complete sentences, compare items, and construct sentences.

Binet and Simon (Binet, Simon, & Town, 1915; Siegler, 1992) believed that the questions they asked their students, even though they were on the surface dissimilar, all assessed the basic abilities to understand, reason, and make judgments. And it turned out that the correlations among these different types of measures were in fact all positive; students who got one item correct were more likely to also get other items correct, even though the questions themselves were very different.



Figure 9.1 Intelligence Tests in Schools. This child is completing an intelligence test, in this case answering questions about pictures.

On the basis of these results, the psychologist Charles Spearman (1863-1945) hypothesized that there must be a single underlying construct that all of these items measure. He called *the construct that the different abilities and skills measured on intelligence tests have in common* **the general intelligence factor** (g). Virtually all psychologists now believe that there is a generalized intelligence factor, g, that relates to abstract thinking and that includes the abilities to acquire knowledge, to reason abstractly, to adapt to novel situations, and to benefit from instruction and experience (Gottfredson, 1997; Sternberg, 2003). People with higher general intelligence learn faster.

Soon after Binet and Simon introduced their test, the American psychologist Lewis Terman (1877-1956) developed an American version of Binet's test that became known as the *Stanford-Binet Intelligence Test*. The **Stanford-Binet** is *a measure of general intelligence made up of a wide variety of tasks including vocabulary, memory for pictures, naming of familiar objects, repeating sentences, and following commands*.

Although there is general agreement among psychologists that g exists, there is also evidence for **specific intelligence** (s), *a measure of specific skills in narrow domains*. One empirical result in support of the idea of s comes from intelligence tests

themselves. Although the different types of questions do correlate with each other, some items correlate more highly with each other than do other items; they form clusters or clumps of intelligences.

One distinction is between **fluid intelligence**, which refers to *the capacity to learn new ways of solving problems and performing activities*, and **crystallized intelligence**, which refers to *the accumulated knowledge of the world we have acquired throughout our lives* (Salthouse, 2004). These intelligences must be different because crystallized intelligence increases with age — older adults are as good as or better than young people in solving crossword puzzles — whereas fluid intelligence tends to decrease with age (Horn, Donaldson, & Engstrom, 1981; Salthouse, 2004).

Other researchers have proposed even more types of intelligences. L. L. Thurstone (1938) proposed that there were seven clusters of **primary mental abilities**, made up of *word fluency, verbal comprehension, spatial ability, perceptual speed, numerical ability, inductive reasoning, and memory*. But even these dimensions tend to be at least somewhat correlated, showing again the importance of g.

One advocate of the idea of multiple intelligences is the psychologist Robert Sternberg. Sternberg has proposed a triarchic (three-part) **theory of intelligence** that proposes that *people may display more or less analytical intelligence, creative intelligence, and practical intelligence*. Sternberg (1985, 2003) argued that traditional intelligence tests assess analytical intelligence, the ability to answer problems with a single right answer, but that they do not well assess creativity (the ability to adapt to new situations and create new ideas) or practicality (e.g., the ability to write good memos or to effectively delegate responsibility).

As Sternberg proposed, research has found that creativity is not highly correlated with analytical intelligence (Furnham & Bachtiar, 2008), and exceptionally creative scientists, artists, mathematicians, and engineers do not score higher on intelligence than do their less creative peers (Simonton, 2000). Furthermore, the brain areas that are associated with **convergent thinking**, *thinking that is directed toward finding the correct answer to a given problem*, are different from those associated with **divergent thinking**, *the ability to generate many different ideas for or solutions to a single problem* (Tarasova, Volf, & Razoumnikova, 2010), as suggested by Figure 9.2, “Test Your Divergent Thinking.” On the other hand, being creative often takes some of the basic abilities measured by g, including the abilities to learn from experience, to remember information, and to think abstractly (Bink & Marsh, 2000).

Figure 9.2 Test Your Divergent Thinking. How many uses for a paper clip can you think of?

Studies of creative people suggest at least five components that are likely to be important for creativity:

1. *Expertise*. Creative people have carefully studied and know a lot about the topic that they are working in. Creativity comes with a lot of hard work (Ericsson, 1998; Weisberg, 2006).
2. *Imaginative thinking*. Creative people often view a problem in a visual way, allowing them to see it from a new and different point of view.
3. *Risk taking*. Creative people are willing to take on new but potentially risky approaches.
4. *Intrinsic interest*. Creative people tend to work on projects because they love doing them, not because they are paid for them. In fact, research has found that people who are paid to be creative are often less creative than those who are not (Hennessey & Amabile, 2010).
5. *Working in a creative environment*. Creativity is in part a social phenomenon. Simonton (1992) found that the most creative people were supported, aided, and challenged by other people working on similar projects.

The last aspect of the triarchic model, practical intelligence, refers primarily to intelligence that cannot be gained from books or formal learning. Practical intelligence represents a type of street smarts or common sense that is learned from life experiences.

Although a number of tests have been devised to measure practical intelligence (Sternberg, Wagner, & Okagaki, 1993; Wagner & Sternberg, 1985), research has not found much evidence that practical intelligence is distinct from g or that it is predictive of success at any particular tasks (Gottfredson, 2003). Practical intelligence may include, at least in part, certain abilities that help people perform well at specific jobs, and these abilities may not always be highly correlated with general intelligence (Sternberg, Wagner, & Okagaki, 1993). On the other hand, these abilities or skills are very specific to particular occupations and thus do not seem to represent the broader idea of intelligence.

Another champion of the idea of multiple intelligences is the psychologist Howard Gardner (1983, 1999). Gardner argued that it would be evolutionarily functional for different people to have different talents and skills, and proposed that there are eight intelligences that can be differentiated from each other (Table 9.1, "Howard Gardner's Eight Specific Intelligences"). Gardner noted that some evidence for multiple intelligences comes from the abilities of *autistic savants*, people who score low on intelligence tests overall but who nevertheless may have exceptional skills in a given domain, such as math, music, art, or in being able to recite statistics in a given sport (Treffert & Wallace, 2004).

Table 9.1 Howard Gardner's Eight Specific Intelligences.

Intelligence	Description
Linguistic	The ability to speak and write well
Logico-mathematical	The ability to use logic and mathematical skills to solve problems
Spatial	The ability to think and reason about objects in three dimensions
Musical	The ability to perform and enjoy music
Kinesthetic (body)	The ability to move the body in sports, dance, or other physical activities
Interpersonal	The ability to understand and interact effectively with others
Intrapersonal	The ability to have insight into the self
Naturalistic	The ability to recognize, identify, and understand animals, plants, and other living things

Adapted from Gardner, 1999.

Figure 9.3 Intelligence. Although intelligence is often conceptualized in a general way (as the g factor), there is a variety of specific skills that can be useful for particular tasks.

The idea of multiple intelligences has been influential in the field of education, and teachers have used these ideas to try to teach differently to different students (Figure 9.3, "Intelligence"). For instance, to teach math problems to students who have particularly good kinesthetic intelligence, a teacher might encourage the students to move their bodies or hands according to the numbers. On the other hand, some have argued that these intelligences sometimes seem more like abilities or talents rather than real intelligence. And there is no clear conclusion about how many intelligences there are. Are sense of humour, artistic skills, dramatic skills, and so

forth also separate intelligences? Furthermore, and again demonstrating the underlying power of a single intelligence, the many different intelligences are in fact correlated and thus represent, in part, g (Brody, 2003).

Measuring Intelligence: Standardization and the Intelligence Quotient

The goal of most intelligence tests is to measure g, the general intelligence factor. Good intelligence tests are **reliable**, *meaning that they are consistent over time*, and also demonstrate **construct validity**, *meaning that they actually measure intelligence rather than something else*. Because intelligence is such an important individual difference dimension, psychologists have invested substantial effort in creating and improving measures of intelligence, and these tests are now the most accurate of all psychological tests. In fact, the ability to accurately assess intelligence is one of the most important contributions of psychology to everyday public life.

Intelligence changes with age. A three-year-old who could accurately multiply 183 by 39 would certainly be intelligent, but a 25-year-old who could not do so would be seen as unintelligent. Thus understanding intelligence requires that we know the norms or standards in a given population of people at a given age. The **standardization** of a test involves *giving it to a large number of people at different ages and computing the average score on the test at each age level*.

It is important that intelligence tests be standardized on a regular basis because the overall level of intelligence in a population may change over time. The **Flynn effect** refers to the *observation that scores on intelligence tests worldwide have increased substantially over the past decades* (Flynn, 1999). Although the increase varies somewhat from country to country, the average increase is about three intelligence (IQ) points every 10 years. There are many explanations for the Flynn effect, including better nutrition, increased access to information, and more familiarity with multiple-choice tests (Neisser, 1998). But whether people are actually getting smarter is debatable (Neisser, 1997).

Once the standardization has been accomplished, we have a picture of the average abilities of people at different ages and can calculate a **person's mental age**, which is *the age at which a person is performing intellectually*. If we compare the mental age of a person to the person's chronological age, the result is the **IQ**, *a measure of intelligence that is adjusted for age*. A simple way to calculate IQ is by using the following formula:

$$\text{IQ} = \text{mental age} \div \text{chronological age} \times 100.$$

Thus a 10-year-old child who does as well as the average 10-year-old child has an IQ of 100 ($10 \div 10 \times 100$), whereas an eight-year-old child who does as well as the average 10-year-old child would have an IQ of 125 ($10 \div 8 \times 100$). Most modern intelligence tests are based the relative position of a person's score among people of the same age, rather than on the basis of this formula, but the idea of an *intelligence ratio* or *quotient* provides a good description of the score's meaning.

A number of scales are based on the IQ. The **Wechsler Adult Intelligence Scale (WAIS)** is *the most widely used intelligence test for adults* (Watkins, Campbell, Nieberding, & Hallmark, 1995). The current version of the WAIS, the WAIS-IV, was standardized on 2,200 people ranging from 16 to 90 years of age. It consists of 15 different tasks, each designed to assess intelligence, including working memory, arithmetic ability, spatial ability, and general knowledge about the world (see Figure 9.4, "Sample Items from the Wechsler Adult Intelligence Scale (WAIS)"). The WAIS-IV yields scores on four domains: verbal, perceptual, working memory, and processing speed. The reliability of the test is high (more than 0.95), and it shows substantial construct validity. The WAIS-IV is correlated highly with other IQ tests such as the Stanford-Binet, as well as with criteria of academic and life success, including grades, measures of work performance, and occupational level. It also shows significant correlations with measures of everyday functioning among the mentally retarded.

The Wechsler scale has also been adapted for preschool children in the form of the *Wechsler Primary and Preschool Scale of Intelligence (WPPSI-III)* and for older children and adolescents in the form of the *Wechsler Intelligence Scale for Children (WISC-IV)*.

Figure 9.4 Sample Items from the Wechsler Adult Intelligence Scale (WAIS). [Long Description]

The intelligence tests that you may be most familiar with are **aptitude tests**, which are *designed to measure one's ability to perform a given task*, such as doing well in undergraduate, graduate, or post-graduate training. Canadian post-secondary institutions request official high school transcripts demonstrating minimum grade admission requirements, while most American colleges and universities require students to take the Scholastic Assessment Test (SAT) or the American College Test (ACT). Post-graduate schools in both countries require the Graduate Record Examination (GRE), Graduate Management Admission Test (GMAT), Medical College Admissions Test (MCAT), or the Law School Admission Test (LSAT). These tests are useful for selecting students because they predict success in the programs that they are designed for, particularly in the first year of the program (Kuncel, Hezlett, & Ones, 2010). These aptitude tests also measure, in part, intelligence. Frey and Detterman (2004) found that the SAT correlated highly (between about $r = .7$ and $r = .8$) with standard measures of intelligence.

Intelligence tests are also used by industrial and organizational psychologists in the process of *personnel selection*. **Personnel selection** is *the use of structured tests to select people who are likely to perform well at given jobs* (Schmidt & Hunter, 1998). The psychologists begin by conducting a **job analysis** in which they *determine what knowledge, skills, abilities, and personal characteristics (KSAPs) are required for a given job*. This is normally accomplished by surveying and/or interviewing current workers and their supervisors. Based on the results of the job analysis, the psychologists choose selection methods that are most likely to be predictive of job performance. Measures include tests of cognitive and physical ability and job knowledge tests, as well as measures of IQ and personality.

The Biology of Intelligence

The brain processes underlying intelligence are not completely understood, but current research has focused on four potential factors: brain size, sensory ability, speed and efficiency of neural transmission, and working memory capacity.

There is at least some truth to the idea that smarter people have bigger brains. Studies that have measured brain volume using neuroimaging techniques find that larger brain size is correlated with intelligence (McDaniel, 2005), and intelligence has also been found to be correlated with the number of neurons in the brain and with the thickness of the cortex (Haier, 2004; Shaw et al., 2006). It is important to remember that these correlational findings do not mean that having more brain volume causes higher intelligence. It is possible that growing up in a stimulating environment that rewards thinking and learning may lead to greater brain growth (Garlick, 2003), and it is also possible that a third variable, such as better nutrition, causes both brain volume and intelligence.

Another possibility is that the brains of more intelligent people operate faster or more efficiently than the brains of the less intelligent. Some evidence supporting this idea comes from data showing that people who are more intelligent frequently show less brain activity (suggesting that they need to use less capacity) than those with lower intelligence when they work on a task (Haier, Siegel, Tang, & Abel, 1992). And the brains of more intelligent people also seem to run faster than the brains of the less intelligent. Research has found that the speed with which people can perform simple tasks — such as determining which of two lines is longer or pressing, as quickly as possible, one of eight buttons that is lighted — is predictive of intelligence (Deary, Der, & Ford, 2001). Intelligence scores also correlate at about $r = .5$ with measures of working memory (Ackerman, Beier, & Boyle, 2005), and working memory is now used as a measure of intelligence on many tests.

Although intelligence is not located in a specific part of the brain, it is more prevalent in some brain areas than others. Duncan et al. (2000) administered a variety of intelligence tasks and observed the places in the cortex that were most active. Although different tests created different patterns of activation, as you can see in Figure 9.5, “Where Is Intelligence?”, these activated areas were primarily in the outer parts of the cortex, the area of the brain most involved in planning, executive control, and short-term memory.

Figure 9.5 Where Is Intelligence? fMRI studies have found that the areas of the brain most related to intelligence are in the outer parts of the cortex.

Is Intelligence Nature or Nurture?

Intelligence has both genetic and environmental causes, and these have been systematically studied through a large number of twin and adoption studies (Neisser et al., 1996; Plomin, 2003). These studies have found that between 40% and 80% of the variability in IQ is due to genetics, meaning that overall, genetics plays a bigger role than environment does in creating IQ differences among individuals (Plomin & Spinath, 2004). The IQs of identical twins correlate very highly ($r = .86$), much higher than do the scores of fraternal twins who are less genetically similar ($r = .60$). And the correlations between the IQs of parents and their biological children ($r = .42$) is significantly greater than the correlation between parents and adopted children ($r = .19$). The role of genetics gets stronger as children get older. The intelligence of very young children (less than 3 years old) does not predict adult intelligence, but by age 7 it does, and IQ scores remain very stable in adulthood (Deary, Whiteman, Starr, Whalley, & Fox, 2004).

But there is also evidence for the role of nurture, indicating that individuals are not born with fixed, unchangeable levels of intelligence. Twins raised together in the same home have more similar IQs than do twins who are raised in different homes, and fraternal twins have more similar IQs than do nontwin siblings, which is likely due to the fact that they are treated more similarly than nontwin siblings are.

The fact that intelligence becomes more stable as we get older provides evidence that early environmental experiences matter more than later ones. Environmental factors also explain a greater proportion of the variance in intelligence for children from lower-class households than they do for children from upper-class households (Turkheimer, Haley, Waldron, D'Onofrio, & Gottesman, 2003). This is because most upper-class households tend to provide a safe, nutritious, and supporting environment for children, whereas these factors are more variable in lower-class households.

Social and economic deprivation can adversely affect IQ. Children from households in poverty have lower IQs than do children from households with more resources even when other factors such as education, race, and parenting are controlled (Brooks-Gunn & Duncan, 1997). Poverty may lead to diets that are undernourishing or lacking in appropriate vitamins, and poor children may also be more likely to be exposed to toxins such as lead in drinking water, dust, or paint chips (Bellinger & Needleman, 2003). Both of these factors can slow brain development and reduce intelligence.

If impoverished environments can harm intelligence, we might wonder whether enriched environments can improve it. Government-funded after-school programs such as Head Start are designed to help children learn. Research has found that attending such programs may increase intelligence for a short time, but these increases rarely last after the programs end (McLoyd, 1998; Perkins & Grotzer, 1997). But other studies suggest that Head Start and similar programs may improve emotional intelligence and reduce the likelihood that children will drop out of school or be held back a grade (Reynolds, Temple, Robertson, & Mann 2001).

Intelligence is improved by education; the number of years a person has spent in school correlates at about $r = .6$ with IQ (Ceci, 1991). In part this correlation may be due to the fact that people with higher IQ scores enjoy taking classes more than people with low IQ scores, and thus they are more likely to stay in school. But education also has a causal effect on IQ. Comparisons between children who are almost exactly the same age but who just do or just do not make a deadline for entering school in a given school year show that those who enter school a year earlier have higher IQ than those who have to wait until the next year to begin school (Baltes & Reinert, 1969; Ceci & Williams, 1997). Children's IQs tend to drop significantly during summer vacations (Huttenlocher, Levine, & Vevea, 1998), a finding that suggests that a longer school year, as is used in Europe and East Asia, is beneficial.

It is important to remember that the relative roles of nature and nurture can never be completely separated. A child who has higher than average intelligence will be treated differently than a child who has lower than average intelligence, and these differences in behaviours will likely amplify initial differences. This means that modest genetic differences can be multiplied into big differences over time.

Psychology in Everyday Life: Emotional Intelligence

Although most psychologists have considered intelligence a cognitive ability, people also use their emotions to help them solve problems and relate effectively to others. **Emotional intelligence** refers to *the ability to accurately identify, assess, and understand emotions, as well as to effectively control one's own emotions* (Feldman-Barrett & Salovey, 2002; Mayer, Salovey, & Caruso, 2000).

The idea of emotional intelligence is seen in Howard Gardner's **interpersonal intelligence** (*the capacity to understand the emotions, intentions, motivations, and desires of other people*) and **intrapersonal intelligence** (*the capacity to understand oneself, including one's emotions*). Public interest in, and research on, emotional intellgence became widely prevalent following the publication of Daniel Goleman's best-selling book, *Working with emotional intelligence* (1998).

There are a variety of measures of emotional intelligence (Mayer, Salovey, & Caruso, 2008; Petrides & Furnham, 2000). One popular measure, the Mayer-Salovey-Caruso Emotional Intelligence Test (http://www.emotionaliq.org), includes items about the ability to understand, experience, and manage emotions, such as these:

- What mood(s) might be helpful to feel when meeting in-laws for the very first time?
- Tom felt anxious and became a bit stressed when he thought about all the work he needed to do. When his supervisor brought him an additional project, he felt ____ (fill in the blank).

- Contempt most closely combines which two emotions?
    1. anger and fear
    2. fear and surprise
    3. disgust and anger
    4. surprise and disgust
- Debbie just came back from vacation. She was feeling peaceful and content. How well would each of the following actions help her preserve her good mood?
    - Action 1: She started to make a list of things at home that she needed to do.
    - Action 2: She began thinking about where and when she would go on her next vacation.
    - Action 3: She decided it was best to ignore the feeling since it wouldn't last anyway.

One problem with emotional intelligence tests is that they often do not show a great deal of reliability or construct validity (Føllesdal & Hagtvet, 2009). Although it has been found that people with higher emotional intelligence are also healthier (Martins, Ramalho, & Morin, 2010), findings are mixed about whether emotional intelligence predicts life success — for instance, job performance (Harms & Credé, 2010). Furthermore, other researchers have questioned the construct validity of the measures, arguing that emotional intelligence really measures knowledge about what emotions are, but not necessarily how to use those emotions (Brody, 2004), and that emotional intelligence is actually a personality trait, a part of g, or a skill that can be applied in some specific work situations — for instance, academic and work situations (Landy, 2005).

Although measures of the ability to understand, experience, and manage emotions may not predict effective behaviours, another important aspect of emotional intelligence — *emotion regulation* — does. **Emotion regulation** refers to *the ability to control and productively use one's emotions*. Research has found that people who are better able to override their impulses to seek immediate gratification and who are less impulsive also have higher cognitive and social intelligence. They have better test scores, are rated by their friends as more socially adept, and cope with frustration and stress better than those with less skill at emotion regulation (Ayduk et al., 2000; Eigsti et al., 2006; Mischel & Ayduk, 2004).

Because emotional intelligence seems so important, many school systems have designed programs to teach it to their students. However, the effectiveness of these programs has not been rigorously tested, and we do not yet know whether emotional intelligence can be taught, or if learning it would improve the quality of people's lives (Mayer & Cobb, 2000).

Key Takeaways

- Intelligence is the ability to think, to learn from experience, to solve problems, and to adapt to new situations. Intelligence is important because it has an impact on many human behaviours.
- Psychologists believe that there is a construct, known as general intelligence (g), that accounts for the overall differences in intelligence among people.
- There is also evidence for specific intelligences (s), which are measures of specific skills in narrow domains, including creativity and practical intelligence.
- The intelligence quotient (IQ) is a measure of intelligence that is adjusted for age. The Wechsler Adult lntelligence Scale (WAIS) is the most widely used IQ test for adults.
- Brain volume, speed of neural transmission, and working memory capacity are related to IQ.
- Between 40% and 80% of the variability in IQ is due to genetics, meaning that overall genetics plays a bigger role than environment does in creating IQ differences among individuals.
- Intelligence is improved by education and may be hindered by environmental factors such as poverty.
- Emotional intelligence refers to the ability to identify, assess, manage, and control one's emotions. People who are better able to regulate their behaviours and emotions are also more successful in their personal and social encounters.

Exercises and Critical Thinking

1. Consider your own IQ. Are you smarter than the average person? What specific intelligences do you think you excel in?
2. Did your parents try to improve your intelligence? Do you think their efforts were successful?
3. Consider the meaning of the Flynn effect. Do you think people are really getting smarter?

4. Give some examples of how emotional intelligence (or the lack of it) influences your everyday life and the lives of other people you know.

Image Attributions

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Figure 9.4: Adapted from Thorndike & Hagen (1997).

Figure 9.5: Adapted from Duncan, et al. (2000).

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Long Descirption

Figure 9.4 long description:

1. What day of the year is Independence Day?
2. If eggs cost 60 cents a dozen, what does 1 egg cost?
3. Tell me the meaning of "corrupt."
4. Why do people buy fire insurance?
5. Say the following numbers after me: 7 3 4 1 8 6
6. Say the following numbers backwards: 3 8 4 1 6

The last two questions involve making pictures out of blocks.

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9.3: The Social, Cultural, and Political Aspects of Intelligence

Charles Stangor, Jennifer Walinga, and Lee Sanders

Learning Objectives

- Explain how very high and very low intelligence is defined and what it means to have them.
- Consider and comment on the meaning of biological and environmental explanations for gender and racial differences in IQ.
- Define stereotype threat and explain how it might influence scores on intelligence tests.

Intelligence is defined by the culture in which it exists. Most people in Western cultures tend to agree with the idea that intelligence is an important personality variable that should be admired in those who have it. But people from Eastern cultures tend to place less emphasis on individual intelligence and are more likely to view intelligence as reflecting wisdom and the desire to improve the society as a whole rather than only themselves (Baral & Das, 2004; Sternberg, 2007). In some cultures it is seen as unfair and prejudicial to argue, even at a scholarly conference, that men and women might have different abilities in domains such as math and science and that these differences may be caused by context, environment, culture, and genetics. In short, although psychological tests accurately measure intelligence, a culture interprets the meanings of those tests and determines how people with differing levels of intelligence are treated.

Extremes of Intelligence: Retardation and Giftedness

The results of studies assessing the measurement of intelligence show that IQ is distributed in the population in the form of a **normal distribution (or bell curve)**, which is *the pattern of scores usually observed in a variable that clusters around its average*. In a normal distribution, the bulk of the scores fall toward the middle, with many fewer scores falling at the extremes. The normal distribution of intelligence (Figure 9.6, “Distribution of IQ Scores in the General Population”) shows that on IQ tests, as well as on most other measures, the majority of people cluster around the average (in this case, where IQ = 100), and fewer are either very smart or very dull. Because the standard deviation of an IQ test is about 15, this means that about 2% of people score above an IQ of 130 (often considered the threshold for *giftedness*), and about the same percentage score below an IQ of 70 (often being considered the threshold for *mental retardation*).

Although Figure 9.6, “Distribution of IQ Scores in the General Population” presents a single distribution, the actual IQ distribution varies by sex such that the distribution for men is more spread out than is the distribution for women. These sex differences mean that about 20% more men than women fall in the extreme (very smart or very dull) ends of the distribution (Johnson, Carothers, & Deary, 2009). Boys are about five times more likely to be diagnosed with the reading disability dyslexia than girls are (Halpern, 1992) and are also more likely to be classified as mentally disabled. But boys are also about 20% more highly represented in the upper end of the IQ distribution.

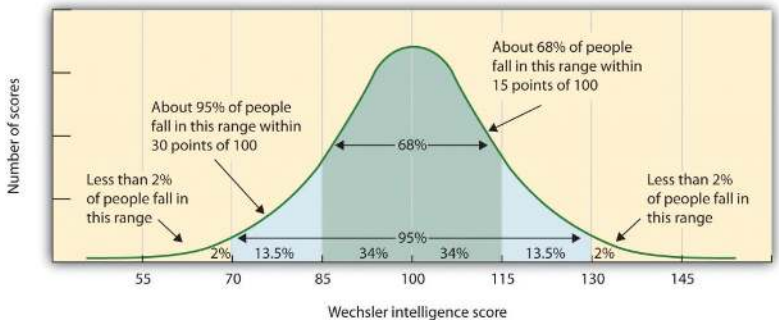


Figure 9.6 Distribution of IQ Scores in the General Population. The normal distribution of IQ scores in the general population shows that most people have about average intelligence, while very few have extremely high or extremely low intelligence.

Extremely Low Intelligence

One end of the distribution of intelligence scores is defined by people with very low IQ. **Mental retardation** is *a generalized disorder ascribed to people who have an IQ below 70, who have experienced deficits since childhood, and who have trouble with basic life skills, such as dressing and feeding themselves and communicating with others* (Switzky & Greenspan, 2006). About 1% of the Canadian population, most of them males, fulfill the criteria for mental retardation, but some children who are diagnosed as mentally disabled lose the classification as they get older and better learn to function in society. A particular vulnerability of people with low IQ is that they may be taken advantage of by others, and this is an important aspect of the definition of mental retardation (Greenspan, Loughlin, & Black, 2001). Mental retardation is divided into four categories: mild, moderate, severe, and profound. Severe and profound mental retardation are usually caused by genetic mutations or accidents during birth, whereas mild forms have both genetic and environmental influences.

One cause of mental retardation is **Down syndrome**, *a chromosomal disorder leading to mental retardation caused by the presence of all or part of an extra 21st chromosome*. The incidence of Down syndrome is estimated at one per 800 to 1,000 births, although its prevalence rises sharply in those born to older mothers (Figure 9.7, "Children with Down Syndrome"). People with Down syndrome typically exhibit a distinctive pattern of physical features, including a flat nose, upwardly slanted eyes, a protruding tongue, and a short neck.



Figure 9.7 Children with Down Syndrome. About one in every 800 to 1,000 children has Down syndrome.

Societal attitudes toward individuals with mental disabilities have changed over the past decades. We no longer use terms such as moron, idiot, or imbecile to describe these people, although these were the official psychological terms used to describe degrees of mental retardation in the past. Laws, such as the Canadians with Disabilities Act, have made it illegal to discriminate on the basis of mental and physical disability, and there has been a trend to bring the mentally disabled out of institutions and into our workplaces and schools. In 2002, although capital punishment continues to be practised there, the U.S. Supreme Court ruled that the execution of people with mental retardation is "cruel and unusual punishment," thereby ending the practice of their execution (Atkins v. Virginia, 2002). In Canada, capital punishment was abolished in 1976.

Extremely High Intelligence

It is often assumed that schoolchildren who are labeled as gifted may have adjustment problems that make it more difficult for them to create social relationships. To study gifted children, Lewis Terman and his colleagues (Terman & Oden, 1959) selected about 1,500 high school students who scored in the top 1% on the Stanford-Binet and similar IQ tests (i.e., who had IQs of about 135 or higher), and tracked them for more than seven decades (the children became known as the "termites" and are still being studied today). This study found, first, that these students were not unhealthy or poorly adjusted but rather were above average in physical health and were taller and heavier than individuals in the general population. The students also had above average social relationships—for instance, being less likely to divorce than the average person (Seagoe, 1975).

Terman's study also found that many of these students went on to achieve high levels of education and entered prestigious professions, including medicine, law, and science. Of the sample, 7% earned doctoral degrees, 4% earned medical degrees, and 6% earned law degrees. These numbers are all considerably higher than what would have been expected from a more general population. Another study of young adolescents who had even higher IQs found that these students ended up attending graduate school at a rate more than 50 times higher than that in the general population (Lubinski & Benbow, 2006).

As you might expect based on our discussion of intelligence, children who are gifted have higher scores on general intelligence (g). But there are also different types of giftedness. Some children are particularly good at math or science, some at automobile repair or carpentry, some at music or art, some at sports or leadership, and so on. There is a lively debate among scholars about whether it

is appropriate or beneficial to label some children as gifted and talented in school and to provide them with accelerated special classes and other programs that are not available to everyone. Although doing so may help the gifted kids (Colangelo & Assouline, 2009), it also may isolate them from their peers and make such provisions unavailable to those who are not classified as gifted.

Sex Differences in Intelligence

As discussed in the introduction to Chapter 9, "Intelligence and Language," Lawrence Summers's claim about the reasons why women might be underrepresented in the hard sciences was based in part on the assumption that environment, such as the presence of gender discrimination or social norms, was important but also in part on the possibility that women may be less genetically capable of performing some tasks than are men. These claims, and the responses they provoked, provide another example of how cultural interpretations of the meanings of IQ can create disagreements and even guide public policy.

Assumptions about sex differences in intelligence are increasingly challenged in the research. In Canada, recent statistics show that women outnumber men in university degrees earned. The Organisation for Economic Co-operation and Development (OECD) released its *Education at a Glance 2013* report where Canada ranked first among 34 OECD countries with adults who had attained a tertiary (post-secondary) education — 51% of 25- to 64-year-olds in 2011 (OECD, 2013). The report found women in Canada had significantly higher tertiary attainment rates compared with men (56% versus 46%), with a 16 percentage-point gap between the genders among younger adults.

There are also observed sex differences on some particular types of tasks. Women tend to do better than men on some verbal tasks, including spelling, writing, and pronouncing words (Halpern et al., 2007), and they have better emotional intelligence in the sense that they are better at detecting and recognizing the emotions of others (McClure, 2000). On average, men do better than women on tasks requiring spatial ability, such as the mental rotation tasks shown in Figure 9.8 Spatial Rotation (Voyer, Voyer, & Bryden, 1995). Boys tend to do better than girls on both geography and geometry tasks (Vogel, 1996).

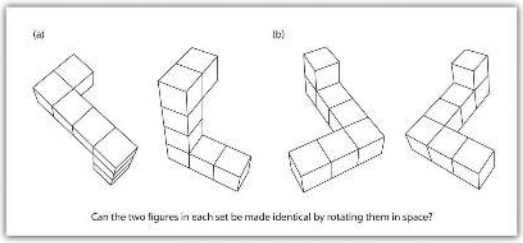


Figure 9.8 Spatial Rotation. Men outperform women on measures of spatial rotation, such as this task requires, but women are better at recognizing the emotions of others.

Although these differences are real, and can be important, keep in mind that like virtually all sex-group differences, the average difference between men and women is small compared with the average differences within each sex (Lynn & Irwing, 2004). There are many women who are better than the average man on spatial tasks, and many men who score higher than the average women in terms of emotional intelligence. Sex differences in intelligence allow us to make statements only about average differences and do not say much about any individual person.

Although society may not want to hear it, differences between men and women may be in part genetically determined, perhaps by differences in brain lateralization or by hormones (Kimura & Hampson, 1994; Voyer, Voyer, & Bryden, 1995). But nurture is also likely important (Newcombe & Huttenlocher, 2006). As infants, boys and girls show no or few differences in spatial or counting abilities, suggesting that the differences occur at least in part as a result of socialization (Spelke, 2005). Furthermore, the number of women entering the hard sciences has been increasing steadily over the past years, again suggesting that some of the differences may have been due to gender discrimination and societal expectations about the appropriate roles and skills of women.

Racial Differences in Intelligence

Although their bell curves overlap considerably, there are also differences in which members of different racial and ethnic groups cluster along the IQ line. Lynn's 2006 work on racial differences in intelligence organizes the data by nine global regions, surveying 620 published studies from around the world, with a total of 813,778 tested individuals. Lynn's meta-analysis lists the average IQ scores of East Asians (105), Europeans (99), Inuit (91), Southeast Asians and Amerindians each (87), Pacific Islanders

(85), Middle Easterners (including South Asians and North Africans) (84), East and West Africans (67), Australian Aborigines (62), and Bushmen and Pygmies (54). Lynn and co-author Tatu Vanhanen (from the University of Helsinki) argue that differences in national income correlate with, and can be at least partially attributed to, differences in average national IQ (2002).

The observed average differences in intelligence between groups has at times led to malicious and misguided attempts to try to correct for them through discriminatory treatment of people from different races, ethnicities, and nationalities (Lewontin, Rose, & Kamin, 1984). One of the most egregious was the spread of **eugenics**, *the proposal that one could improve the human species by encouraging or permitting reproduction of only those people with genetic characteristics judged desirable*.

Eugenics became popular in Canada and the United States in the early 20th century and was supported by many prominent psychologists, including Sir Francis Galton. Dozens of universities offered courses in eugenics, and the topic was presented in most high school and university biology texts (Selden, 1999). Belief in the policies of eugenics led the Canadian legislatures in Alberta and British Columbia as well as the U.S. Congress to pass laws designed to restrict immigration from other countries supposedly marked by low intelligence, particularly those in eastern and southern Europe. Two of Canada's provinces and more than one-half of the U.S. states passed laws requiring the sterilization of low-IQ individuals. In Canada, approximately 5,000 were affected. Between 1928 and 1972, mostly Indigenous women and "mental defectives" underwent forced sterilizations. Fortunately, the practice of sterilization was abandoned in Canada between the 1940s and the 1960s, although sterilization laws remained on the books in some American states until the 1970s.

One explanation for race differences in IQ is that intelligence tests are biased against some groups and in favour of others. By **bias**, what psychologists mean is that *a test predicts outcomes — such as grades or occupational success — better for one group than it does for another*. If IQ is a better predictor of school grade point average for Whites than it is for Asians, for instance, then the test would be biased against Asians, even though the average IQ scores for Asians might be higher. But IQ tests do not seem to be racially biased because the observed correlations between IQ tests and both academic and occupational achievement are about equal across races (Brody, 1992).

Another way that tests might be biased is if questions are framed such that they are easier for people from one culture to understand than for people from other cultures. For example, even a very smart person will not do well on a test if he or she is not fluent in the language in which the test is administered, or does not understand the meaning of the questions being asked. But modern intelligence tests are designed to be culturally neutral, and group differences are found even on tests that only ask about spatial intelligence. Although some researchers still are concerned about the possibility that intelligence tests are culturally biased, it is probably not the case that the tests are creating all of the observed group differences (Suzuki & Valencia, 1997).

Research Focus: Stereotype Threat

Although intelligence tests may not be culturally biased, the situation in which one takes a test may be. One environmental factor that may affect how individuals perform and achieve is their expectations about their ability at a task. In some cases these beliefs may be positive, and they have the effect of making us feel more confident and thus better able to perform tasks. For instance, research has found that because Asian students are aware of the cultural stereotype that "Asians are good at math," reminding them of this fact before they take a difficult math test can improve their performance on the test (Walton & Cohen, 2003).

On the other hand, sometimes these beliefs are negative, and they create negative self-fulfilling prophecies such that we perform more poorly just because of our knowledge about the stereotypes. In 1995 Claude Steele and Joshua Aronson tested the hypothesis that the differences in performance on IQ tests between Blacks and Whites might be due to the activation of negative stereotypes (Steele & Aronson, 1995). Because Black students are aware of the stereotype that Blacks are intellectually inferior to Whites, this stereotype might create a negative expectation, which might interfere with their performance on intellectual tests through fear of confirming that stereotype.

In support of this hypothesis, the experiments revealed that Black university students performed worse (in comparison to their prior test scores) on standardized test questions when this task was described to them as being diagnostic of their verbal ability (and thus when the stereotype was relevant), but that their performance was not influenced when the same questions were described as an exercise in problem solving. And in another study, the researchers found that when Black students were asked

to indicate their race before they took a math test (again activating the stereotype), they performed more poorly than they had on prior exams, whereas White students were not affected by first indicating their race.

Researchers concluded that thinking about negative stereotypes that are relevant to a task that one is performing creates **stereotype threat** — *performance decrements that are caused by the knowledge of cultural stereotypes*. That is, they argued that the negative impact of race on standardized tests may be caused, at least in part, by the performance situation itself.

Research has found that stereotype threat effects can help explain a wide variety of performance decrements among those who are targeted by negative stereotypes. When stereotypes are activated, children with low socioeconomic status perform more poorly in math than do those with high socioeconomic status, and psychology students perform more poorly than do natural science students (Brown, Croizet, Bohner, Fournet, & Payne, 2003; Croizet & Claire, 1998). Even groups who typically enjoy advantaged social status can be made to experience stereotype threat. White men perform more poorly on a math test when they are told that their performance will be compared with that of Asian men (Aronson, Lustina, Good, Keough, & Steele, 1999), and Whites perform more poorly than Blacks on a sport-related task when it is described to them as measuring their natural athletic ability (Stone, 2002; Stone, Lynch, Sjomeling, & Darley, 1999).

Research has found that stereotype threat is caused by both cognitive and emotional factors (Schmader, Johns, & Forbes, 2008). On the cognitive side, individuals who are experiencing stereotype threat show an increased vigilance toward the environment as well as increased attempts to suppress stereotypic thoughts. Engaging in these behaviours takes cognitive capacity away from the task. On the affective side, stereotype threat occurs when there is a discrepancy between our positive concept of our own skills and abilities and the negative stereotypes that suggest poor performance. These discrepancies create stress and anxiety, and these emotions make it harder to perform well on the task.

Stereotype threat is not, however, absolute; we can get past it if we try. What is important is to reduce the self doubts that are activated when we consider the negative stereotypes. Manipulations that affirm positive characteristics about the self or one's social group are successful at reducing stereotype threat (Marx & Roman, 2002; McIntyre, Paulson, & Lord, 2003). In fact, just knowing that stereotype threat exists and may influence our performance can help alleviate its negative impact (Johns, Schmader, & Martens, 2005).

In summary, although there is no definitive answer to why IQ bell curves differ across racial and ethnic groups, and most experts believe that environment is important in pushing the bell curves apart, genetics can also be involved. It is important to realize that although IQ is heritable, this does not mean that group differences are caused by genetics. Although some people are naturally taller than others (height is heritable), people who get plenty of nutritious food are taller than people who do not, and this difference is clearly due to environment. This is a reminder that group differences may be created by environmental variables but can also be reduced through appropriate environmental actions such as educational and training programs.

Key Takeaways

- IQ is distributed in the population in the form of a normal distribution (commonly known as a bell curve).
- Mental retardation is a generalized disorder ascribed to people who have an IQ below 70, who have experienced deficits since childhood, and who have trouble with basic life skills, such as dressing and feeding themselves and communicating with others. One cause of mental retardation is Down syndrome.
- Extremely intelligent individuals are not unhealthy or poorly adjusted, but rather are above average in physical health and taller and heavier than individuals in the general population.
- Men and women have almost identical intelligence, but men have more variability in their IQ scores than women do.
- On average, men do better than women on tasks requiring spatial ability, whereas women do better on verbal tasks and score higher on emotional intelligence.
- Although their bell curves overlap considerably, there are also average group differences for members of different racial and ethnic groups.
- The observed average differences in intelligence between racial and ethnic groups has at times led to malicious attempts to correct for them, such as the eugenics movement in the early part of the 20th century.
- The situation in which one takes a test may create stereotype threat — performance decrements that are caused by the knowledge of cultural stereotypes.

Exercises and Critical Thinking

1. Were Lawrence Summers's ideas about the potential causes of differences between men and women in math and hard sciences careers offensive to you? Why or why not?
2. Do you think that we should give intelligence tests? Why or why not? Does it matter to you whether or not the tests have been standardized and shown to be reliable and valid?
3. Give your ideas about the practice of providing accelerated classes to children listed as "gifted" in high school. What are the potential positive and negative outcomes of doing so? What research evidence has helped you form your opinion?
4. Consider the observed sex and racial differences in intelligence. What implications do you think the differences have for education and career choices?

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Figure 9.8: Adapted from Halpern, et al. (2007).

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9.4: Communicating with Others- The Development and Use of Language

Charles Stangor, Jennifer Walinga, and Jorden A. Cummings

Learning Objectives

- Review the components and structure of language.
- Explain the biological underpinnings of language.
- Outline the theories of language development.

Human language is the most complex behaviour on the planet and, at least as far as we know, in the universe. Language involves both the ability to comprehend spoken and written words and to create communication in real time when we speak or write. Most languages are oral, generated through speaking. Speaking involves a variety of complex cognitive, social, and biological processes including operation of the vocal cords, and the coordination of breath with movements of the throat, mouth, and tongue.

Other languages are sign languages, in which the communication is expressed by movements of the hands. The most common sign language is American Sign Language (ASL), commonly used in many countries across the world and adapted for use in varying countries. The other main sign language used in Canada is la Langue des Signes Québécoise (LSQ); there is also a regional dialect, Maritimes Sign Language (MSL).

Although language is often used for the transmission of information ("turn right at the next light and then go straight," "Place tab A into slot B"), this is only its most mundane function. Language also allows us to access existing knowledge, to draw conclusions, to set and accomplish goals, and to understand and communicate complex social relationships. Language is fundamental to our ability to think, and without it we would be nowhere near as intelligent as we are.

Language can be conceptualized in terms of sounds, meaning, and the environmental factors that help us understand it. *Phonemes* are the elementary sounds of our language, *morphemes* are the smallest units of meaning in a language, *syntax* is the set of grammatical rules that control how words are put together, and *contextual information* is the elements of communication that are not part of the content of language but that help us understand its meaning.

The Components of Language

A **phoneme** is *the smallest unit of sound that makes a meaningful difference in a language*. The word "bit" has three phonemes, /b/, /i/, and /t/ (in transcription, phonemes are placed between slashes), and the word "pit" also has three: /p/, /i/, and /t/. In spoken languages, phonemes are produced by the positions and movements of the vocal tract, including our lips, teeth, tongue, vocal cords, and throat, whereas in sign languages phonemes are defined by the shapes and movement of the hands.

There are hundreds of unique phonemes that can be made by human speakers, but most languages only use a small subset of the possibilities. English contains about 45 phonemes, whereas other languages have as few as 15 and others more than 60. The Hawaiian language contains only about a dozen phonemes, including five vowels (a, e, i, o, and u) and seven consonants (h, k, l, m, n, p, and w).

In addition to using a different set of phonemes, because the phoneme is actually a category of sounds that are treated alike within the language, speakers of different languages are able to hear the difference only between some phonemes but not others. This is known as the *categorical perception of speech sounds*. English speakers can differentiate the /r/ phoneme from the /l/ phoneme, and thus "rake" and "lake" are heard as different words. In Japanese, however, /r/ and /l/ are the same phoneme, and thus speakers of that language cannot tell the difference between the word "rake" and the word "lake." Try saying the words "cool" and "keep" out loud. Can you hear the difference between the two /k/ sounds? To English speakers they both sound the same, but to speakers of Arabic these represent two different phonemes (Figure 9.9, "Speech Sounds and Adults").

Infants are born able to understand all phonemes, but they lose their ability to do so as they get older; by 10 months of age a child's ability to recognize phonemes becomes very similar to that of the adult speakers of the native language. Phonemes that were initially differentiated come to be treated as equivalent (Werker & Tees, 2002).

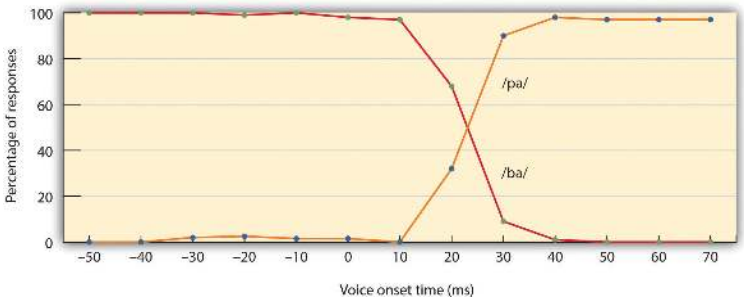


Figure 9.9 Speech Sounds and Adults. When adults hear speech sounds that gradually change from one phoneme to another, they do not hear the continuous change; rather, they hear one sound until they suddenly begin hearing the other. In this case, the change is from /ba/ to /pa/.

Whereas phonemes are the smallest units of sound in language, a **morpheme** is *a string of one or more phonemes that makes up the smallest units of meaning in a language*. Some morphemes, such as one-letter words like "I" and "a," are also phonemes, but most morphemes are made up of combinations of phonemes. Some morphemes are prefixes and suffixes used to modify other words. For example, the syllable "re-" as in "rewrite" or "repay" means "to do again," and the suffix "-est" as in "happiest" or "coolest" means "to the maximum."

Syntax is *the set of rules of a language by which we construct sentences*. Each language has a different syntax. The syntax of the English language requires that each sentence have a noun and a verb, each of which may be modified by adjectives and adverbs. Some syntaxes make use of the order in which words appear, while others do not. In English, "The man bites the dog" is different from "The dog bites the man." In German, however, only the article endings before the noun matter. "Der Hund beisst den Mann" means "The dog bites the man" but so does "Den Mann beisst der Hund."

Words do not possess fixed meanings but change their interpretation as a function of the context in which they are spoken. We use **contextual information** — *the information surrounding language*—to help us interpret it. Examples of contextual information include the knowledge that we have and that we know that other people have, and nonverbal expressions such as facial expressions, postures, gestures, and tone of voice. Misunderstandings can easily arise if people aren't attentive to contextual information or if some of it is missing, such as it may be in newspaper headlines or in text messages.

Examples in Which Syntax Is Correct but the Interpretation Can Be Ambiguous

- Grandmother of Eight Makes Hole in One
- Milk Drinkers Turn to Powder
- Farmer Bill Dies in House
- Old School Pillars Are Replaced by Alumni
- Two Convicts Evade Noose, Jury Hung
- Include Your Children When Baking Cookies

The Biology and Development of Language

Anyone who has tried to master a second language as an adult knows the difficulty of language learning. And yet children learn languages easily and naturally. Children who are not exposed to language early in their lives will likely never learn one. Case studies, including Victor the "Wild Child," who was abandoned as a baby in France and not discovered until he was 12, and Genie, a child whose parents kept her locked in a closet from 18 months until 13 years of age, are (fortunately) two of the only known examples of these deprived children. Both of these children made some progress in socialization after they were rescued, but neither of them ever developed language (Rymer, 1993). This is also why it is important to determine quickly if a child is deaf and to begin immediately to communicate in sign language. Deaf children who are not exposed to sign language during their early years will likely never learn it (Mayberry, Lock, & Kazmi, 2002).

Research Focus: When Can We Best Learn Language? Testing the Critical Period Hypothesis

For many years psychologists assumed that there was a **critical period** (*a time in which learning can easily occur*) for language learning, lasting between infancy and puberty, and after which language learning was more difficult or impossible (Lenneberg, 1967; Penfield & Roberts, 1959). But later research provided a different interpretation.

An important study by Jacqueline Johnson and Elissa Newport (1989) using Chinese and Korean speakers who had learned English as a second language provided the first insight. The participants were all adults who had immigrated to the United States between three and 39 years of age and who were tested on their English skills by being asked to detect grammatical errors in sentences. Johnson and Newport found that the participants who had begun learning English before they were seven years old learned it as well as native English speakers but that the ability to learn English dropped off gradually for the participants who had started later. Newport and Johnson also found a correlation between the age of acquisition and the variance in the ultimate learning of the language. While early learners were almost all successful in acquiring their language to a high degree of proficiency, later learners showed much greater individual variation.

Johnson and Newport's finding that children who immigrated before they were seven years old learned English fluently seemed consistent with the idea of a critical period in language learning. But their finding of a gradual decrease in proficiency for those who immigrated between eight and 39 years of age was not — rather, it suggested that there might not be a single critical period of language learning that ended at puberty, as early theorists had expected, but that language learning at later ages is simply better when it occurs earlier. This idea was reinforced in research by Hakuta, Bialystok, and Wiley (2003), who examined census records of language learning in millions of Chinese and Spanish immigrants. The census form asks respondents to describe their own English ability using one of five categories: not at all, not well, well, very well, and speak only English. The results of this research dealt another blow to the idea of the critical period, because it showed that regardless of what year was used as a cutoff point for the end of the critical period, there was no evidence for any discontinuity in language-learning potential. Rather, the results (Figure 9.10, "English Proficiency in Native Chinese Speakers") showed that the degree of success in second-language acquisition declined steadily throughout the respondent's life span. The difficulty of learning language as one gets older is probably due to the fact that, with age, the brain loses its **plasticity** — that is, *its ability to develop new neural connections*.

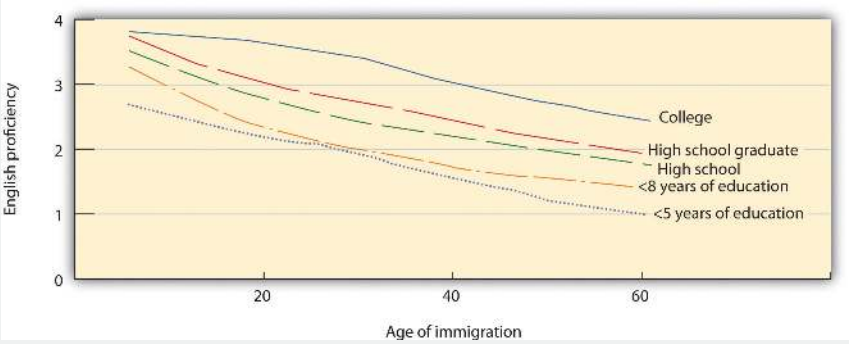


Figure 9.10 English Proficiency in Native Chinese Speakers. Hakuta, Bialystok, and Wiley (2003) found no evidence for critical periods in language learning. Regardless of level of education, self-reported second-language skills decreased consistently across age of immigration.

For the 90% of people who are right-handed, language is stored and controlled by the left cerebral cortex, although for some left-handers this pattern is reversed. These differences can easily be seen in the results of neuroimaging studies that show that listening to and producing language creates greater activity in the left hemisphere than in the right. **Broca's area**, *an area in front of the left hemisphere near the motor cortex*, is responsible for language production (Figure 9.11, "Drawing of Brain Showing Broca's and Wernicke's Areas"). This area was first localized in the 1860s by the French physician Paul Broca, who studied patients with lesions to various parts of the brain. **Wernicke's area**, *an area of the brain next to the auditory cortex*, is responsible for language comprehension.

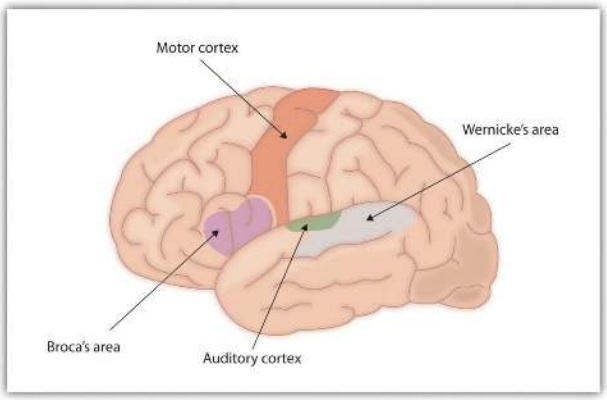


Figure 9.11 Drawing of Brain Showing Broca's and Wernicke's Areas.

Evidence for the importance of Broca's and Wernicke's areas in language is seen in patients who experience **aphasia**, *a condition in which language functions are severely impaired*. People with Broca's aphasia have difficulty producing speech, whereas people with damage to Wernicke's area can produce speech, but what they say makes no sense and they have trouble understanding language.

Learning Language

Language learning begins even before birth, because the fetus can hear muffled versions of speaking from outside the womb. Moon, Cooper, and Fifer (1993) found that infants only two days old sucked harder on a pacifier when they heard their mothers' native language being spoken than when they heard a foreign language, even when strangers were speaking the languages. Babies are also aware of the patterns of their native language, showing surprise when they hear speech that has a different patterns of phonemes than those they are used to (Saffran, Aslin, & Newport, 2004).

During the first year or so after birth, and long before they speak their first words, infants are already learning language. One aspect of this learning is practice in producing speech. By the time they are six to eight weeks old, babies start making vowel sounds (ooohh, aaahh, goo) as well as a variety of cries and squeals to help them practice.

At about seven months, infants begin **babbling**, engaging in *intentional vocalizations that lack specific meaning*. Children babble as practice in creating specific sounds, and by the time they are one year old, the babbling uses primarily the sounds of the language that they are learning (de Boysson-Bardies, Sagart, & Durand, 1984). These vocalizations have a conversational tone that sounds meaningful even though it isn't. Babbling also helps children understand the social, communicative function of language (Figure 9.12, "Practising Language"). Children who are exposed to sign language babble in sign by making hand movements that represent real language (Petitto & Marentette, 1991).



Figure 9.12 Practising Language. Babies often engage in vocal exchanges to help them practise language.

At the same time that infants are practising their speaking skills by babbling, they are also learning to better understand sounds and eventually the words of language. One of the first words that children understand is their own name, usually by about six months,

followed by commonly used words like “bottle,” “mama,” and “doggie” by 10 to 12 months (Mandel, Jusczyk, & Pisoni, 1995).

The infant usually produces his or her first words at about one year of age. It is at this point that the child first understands that words are more than sounds — they refer to particular objects and ideas. By the time children are two years old, they have a vocabulary of several hundred words, and by kindergarten their vocabularies have increased to several thousand words. By Grade 5, most children know about 50,000 words and by the time they are in university, about 200,000.

The early utterances of children contain many errors, for instance, confusing /b/ and /d/, or /c/ and /z/. And the words that children create are often simplified, in part because they are not yet able to make the more complex sounds of the real language (Dobrich & Scarborough, 1992). Children may say “keekee” for kitty, “nana” for banana, and “vesketti” for spaghetti in part because it is easier. Often these early words are accompanied by gestures that may also be easier to produce than the words themselves. Children’s pronunciations become increasingly accurate between one and three years, but some problems may persist until school age.

Most of a child’s first words are nouns, and early sentences may include only the noun. “Ma” may mean “more milk please” and “da” may mean “look, there’s Fido.” Eventually the length of the utterances increases to two words (“mo ma” or “da bark”), and these primitive sentences begin to follow the appropriate syntax of the native language.

Because language involves the active categorization of sounds and words into higher level units, children make some mistakes in interpreting what words mean and how to use them. In particular, they often make **overextensions** of concepts, *which means they use a given word in a broader context than appropriate*. A child might at first call all adult men “daddy” or all animals “doggie.”

Children also use contextual information, particularly the cues that parents provide, to help them learn language. Infants are frequently more attuned to the tone of voice of the person speaking than to the content of the words themselves, and are aware of the target of speech. Werker, Pegg, and McLeod (1994) found that infants listened longer to a woman who was speaking to a baby than to a woman who was speaking to another adult.

Children learn that people are usually referring to things that they are looking at when they are speaking (Baldwin, 1993), and that that the speaker’s emotional expressions are related to the content of their speech. Children also use their knowledge of syntax to help them figure out what words mean. If a child hears an adult point to a strange object and say, “this is a dirb,” they will infer that a “dirb” is a thing, but if they hear them say, “this is a one of those dirb things” they will infer that it refers to the colour or other characteristic of the object. And if they hear the word “dirbing,” they will infer that “dirbing” is something that we do (Waxman, 1990).

How Children Learn Language: Theories of Language Acquisition

Psychological theories of language learning differ in terms of the importance they place on nature versus nurture. Yet it is clear that both matter. Children are not born knowing language; they learn to speak by hearing what happens around them. On the other hand, human brains, unlike those of any other animal, are prewired in a way that leads them, almost effortlessly, to learn language.

Perhaps the most straightforward explanation of language development is that it occurs through principles of learning, including association, reinforcement, and the observation of others (Skinner, 1965). There must be at least some truth to the idea that language is learned, because children learn the language that they hear spoken around them rather than some other language. Also supporting this idea is the gradual improvement of language skills with time. It seems that children modify their language through imitation, reinforcement, and shaping, as would be predicted by learning theories.

But language cannot be entirely learned. For one, children learn words too fast for them to be learned through reinforcement. Between the ages of 18 months and five years, children learn up to 10 new words every day (Anglin, 1993). More importantly, language is more *generative* than it is imitative. **Generativity** refers to *the fact that speakers of a language can compose sentences to represent new ideas that they have never before been exposed to*. Language is not a predefined set of ideas and sentences that we choose when we need them, but rather a system of rules and procedures that allows us to create an infinite number of statements, thoughts, and ideas, including those that have never previously occurred. When a child says that she “swimmed” in the pool, for instance, she is showing generativity. No adult speaker of English would ever say “swimmed,” yet it is easily generated from the normal system of producing language.

Other evidence that refutes the idea that all language is learned through experience comes from the observation that children may learn languages better than they ever hear them. Deaf children whose parents do not speak ASL very well nevertheless are able to learn it perfectly on their own, and may even make up their own language if they need to (Goldin-Meadow & Mylander, 1998). A group of deaf children in a school in Nicaragua, whose teachers could not sign, invented a way to communicate through made-up signs (Senghas, Senghas, & Pyers, 2005). The development of this new Nicaraguan Sign Language has continued and changed as new generations of students have come to the school and started using the language. Although the original system was not a real language, it is becoming closer and closer every year, showing the development of a new language in modern times.

The linguist Noam Chomsky is a believer in the **nature approach to language**, arguing that human brains contain a *language acquisition device* that includes a *universal grammar* that underlies all human language (Chomsky, 1965, 1972). According to this approach, each of the many languages spoken around the world (there are between 6,000 and 8,000) is an individual example of the same underlying set of procedures that are hardwired into human brains. Chomsky's account proposes that children are born with a knowledge of general rules of syntax that determine how sentences are constructed.

Chomsky differentiates between the **deep structure of an idea** — *how the idea is represented in the fundamental universal grammar that is common to all languages*, and the **surface structure of the idea** — *how it is expressed in any one language*. Once we hear or express a thought in surface structure, we generally forget exactly how it happened. At the end of a lecture, you will remember a lot of the deep structure (i.e., the ideas expressed by the instructor), but you cannot reproduce the surface structure (the exact words that the instructor used to communicate the ideas).

Although there is general agreement among psychologists that babies are genetically programmed to learn language, there is still debate about Chomsky's idea that there is a universal grammar that can account for all language learning. Evans and Levinson (2009) surveyed the world's languages and found that none of the presumed underlying features of the language acquisition device were entirely universal. In their search they found languages that did not have noun or verb phrases, that did not have tenses (e.g., past, present, future), and even some that did not have nouns or verbs at all, even though a basic assumption of a universal grammar is that all languages should share these features.

Bilingualism and Cognitive Development

Bilingualism (*the ability to speak two languages*) is becoming more and more frequent in the modern world. Nearly one-half of the world's population, including 17% of Canadian citizens, grows up bilingual.

In Canada, education is under provincial jurisdiction; however, the federal government has been a strong supporter of establishing Canada as a bilingual country and has helped pioneer the French immersion programs in the public education systems throughout the country. In contrast, many U.S. states have passed laws outlawing bilingual education in schools based on the idea that students will have a stronger identity with the school, the culture, and the government if they speak only English, and in part based on the idea that speaking two languages may interfere with cognitive development.

A variety of minority language immersion programs are now offered across the country depending on need and interest. In British Columbia, for instance, the city of Vancouver established a new bilingual Mandarin Chinese-English immersion program in 2002 at the elementary school level in order accommodate Vancouver's both historic and present strong ties to the Chinese-speaking world. Similar programs have been developed for both Hindi and Punjabi to serve the large South Asian cultural community in the city of Surrey. By default, most schools in British Columbia teach in English, with French immersion options available. In both English and French schools, one can study and take government exams in Japanese, Punjabi, Mandarin Chinese, French, Spanish, and German at the secondary level.

Some early psychological research showed that, when compared with monolingual children, bilingual children performed more slowly when processing language, and their verbal scores were lower. But these tests were frequently given in English, even when this was not the child's first language, and the children tested were often of lower socioeconomic status than the monolingual children (Andrews, 1982).

More current research that has controlled for these factors has found that, although bilingual children may, in some cases, learn language somewhat slower than do monolingual children (Oller & Pearson, 2002), bilingual and monolingual children do not significantly differ in the final depth of language learning, nor do they generally confuse the two languages (Nicoladis & Genesee, 1997). In fact, participants who speak two languages have been found to have better cognitive functioning, cognitive flexibility, and

analytic skills in comparison to monolinguals (Bialystok, 2009). Research (Figure 9.13, "Gray Matter in Bilinguals") has also found that learning a second language produces changes in the area of the brain in the left hemisphere that is involved in language, such that this area is denser and contains more neurons (Mechelli et al., 2004). Furthermore, the increased density is stronger in those individuals who are most proficient in their second language and who learned the second language earlier. Thus, rather than slowing language development, learning a second language seems to increase cognitive abilities.

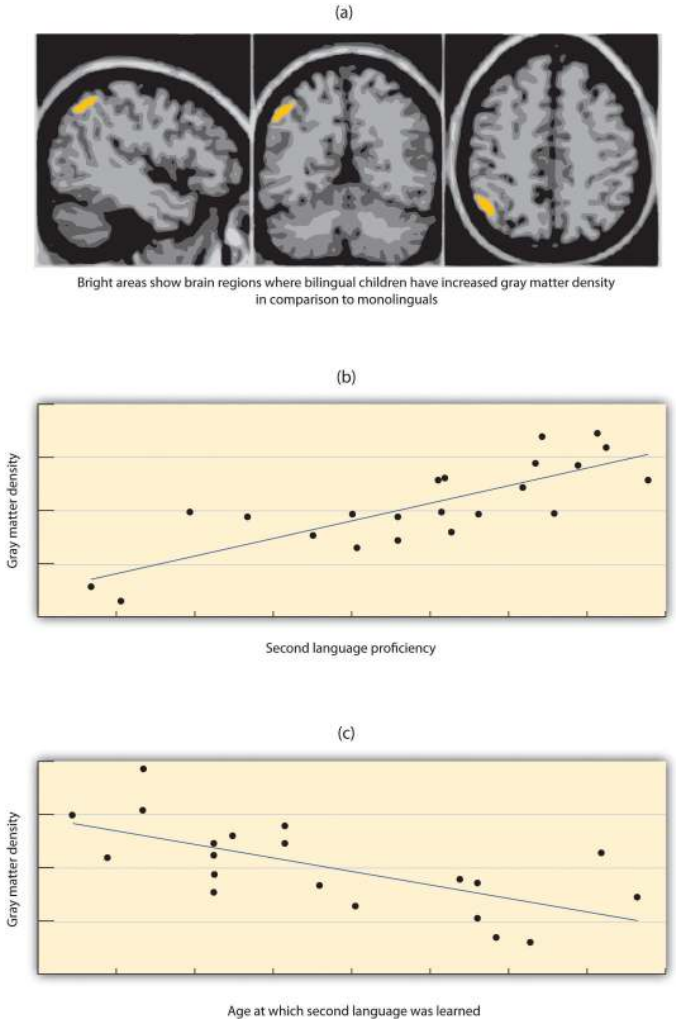


Figure 9.13 Gray Matter in Bilinguals. Andrea Mechelli and her colleagues (2004) found that children who were bilingual had increased gray matter density (i.e., more neurons) in cortical areas related to language in comparison to monolinguals (panel a), that gray matter density correlated positively with second language proficiency (panel b) and that gray matter density correlated negatively with the age at which the second language was learned (panel c).

Can Animals Learn Language?

Nonhuman animals have a wide variety of systems of communication. Some species communicate using scents; others use visual displays, such as baring the teeth, puffing up the fur, or flapping the wings; and still others use vocal sounds. Male songbirds, such as canaries and finches, sing songs to attract mates and to protect territory, and chimpanzees use a combination of facial expressions, sounds, and actions, such as slapping the ground, to convey aggression (de Waal, 1989). Honeybees use a waggle dance to direct other bees to the location of food sources (von Frisch, 1956). The language of vervet monkeys is relatively advanced in the sense that they use specific sounds to communicate specific meanings. Vervets make different calls to signify that they have seen either a leopard, a snake, or a hawk (Seyfarth & Cheney, 1997).

Despite their wide abilities to communicate, efforts to teach animals to use language have had only limited success. One of the early efforts was made by Catherine and Keith Hayes, who raised a chimpanzee named Viki in their home along with their own

children. But Viki learned little and could never speak (Hayes & Hayes, 1952). Researchers speculated that Viki's difficulties might have been in part because she could not create the words in her vocal cords, and so subsequent attempts were made to teach primates to speak using sign language or boards on which they can point to symbols.

Allen and Beatrix Gardner worked for many years to teach a chimpanzee named Washoe to sign using ASL. Washoe, who lived to be 42 years old, could label up to 250 different objects and make simple requests and comments, such as "please tickle" and "me sorry" (Fouts, 1997). Washoe's adopted daughter Loulis, who was never exposed to human signers, learned more than 70 signs simply by watching her mother sign.

The most proficient nonhuman language speaker is Kanzi, a bonobo who lives at the Language Learning Center at Georgia State University (Savage-Rumbaugh & Lewin, 1994). As you can see in the video clip "Language Recognition in Bonobos," Kanzi has a propensity for language that is in many ways similar to humans. He learned faster when he was younger than when he got older, he learns by observation, and he can use symbols to comment on social interactions, rather than simply for food treats. Kanzi can also create elementary syntax and understand relatively complex commands. Kanzi can make tools and can even play the video game Pac-Man.

Video: *Kanzi and Novel Sentences* [http://www.youtube.com/watch?v=2Dhc2zePJFE]. The bonobo Kanzi is the most proficient known nonhuman language speaker.



And yet even Kanzi does not have a true language in the same way that humans do. Human babies learn words faster and faster as they get older, but Kanzi does not. Each new word he learns is almost as difficult as the one before. Kanzi usually requires many trials to learn a new sign, whereas human babies can speak words after only one exposure. Kanzi's language is focused primarily on food and pleasure and only rarely on social relationships. Although he can combine words, he generates few new phrases and cannot master syntactic rules beyond the level of about a two-year-old human child (Greenfield & Savage-Rumbaugh, 1991).

In sum, although many animals communicate, none of them has a true language. With some exceptions, the information that can be communicated in nonhuman species is limited primarily to displays of liking or disliking, and related to basic motivations of aggression and mating. Humans also use this more primitive type of communication, in the form of *nonverbal behaviours* such as eye contact, touch, hand signs, and interpersonal distance, to communicate their like or dislike for others, but they (unlike animals) also supplant this more primitive communication with language. Although other animal brains share similarities to ours, only the

human brain is complex enough to create language. What is perhaps most remarkable is that although language never appears in nonhumans, language is universal in humans. All humans, unless they have a profound brain abnormality or are completely isolated from other humans, learn language.

Language and Perception

To this point in the chapter we have considered intelligence and language as if they are separate concepts. But what if language influences our thinking? *The idea that language and its structures influence and limit human thought* is called **linguistic relativity**.

The most frequently cited example of this possibility was proposed by Benjamin Whorf (1897-1941), a linguist who was particularly interested in Aboriginal languages. Whorf argued that the Inuit people of Canada had many words for snow, whereas English speakers have only one, and that this difference influenced how the different cultures perceived snow. Whorf argued that the Inuit perceived and categorized snow in finer details than English speakers possibly could, because the English language constrained perception. He is one of the namesakes of the **Sapir-Whorf Hypothesis,** which hypothesizes that the language that people use determines their thoughts.

Although the idea of linguistic relativism seemed reasonable, research has suggested that language has less influence on thinking than might be expected. For one, in terms of perceptions of snow, although it is true that the Inuit do make more distinctions among types of snow than English speakers do, the latter also make some distinctions (think powder, slush, whiteout, and so forth). And it is also possible that thinking about snow may influence language, rather than the other way around.

In a more direct test of the possibility that language influences thinking, Eleanor Rosch (1973) compared people from the Dani culture of New Guinea, who have only two terms for colour (dark and bright), with English speakers who use many more terms. Rosch hypothesized that if language constrains perception and categorization, then the Dani should have a harder time distinguishing colours than English speakers would. But her research found that when the Dani were asked to categorize colours using new categories, they did so in almost the same way that English speakers did. Similar results were found by Frank, Everett, Fedorenko, and Gibson (2008), who showed that the Amazonian tribe known as the Pirahã, who have no linguistic method for expressing exact quantities (not even the number one), were nevertheless able to perform matches with large numbers without problem.

Although these data led researchers to conclude that the language we use to describe colour and number does not influence our underlying understanding of the underlying sensation, another more recent study has questioned this assumption. Roberson, Davies, and Davidoff (2000) conducted another study with Dani participants and found that, at least for some colours, the names that they used to describe colours did influence their perceptions of the colours. Other researchers continue to test the possibility that our language influences our perceptions, and perhaps even our thoughts (Levinson, 1998), and yet the evidence for this possibility is, as of now, mixed.

Key Takeaways

- Language involves both the ability to comprehend spoken and written words and to speak and write. Some languages are sign languages, in which the communication is expressed by movements of the hands.
- Phonemes are the elementary sounds of our language, morphemes are the smallest units of meaningful language, syntax is the grammatical rules that control how words are put together, and contextual information is the elements of communication that help us understand its meaning.
- Recent research suggests that there is not a single critical period of language learning, but that language learning is simply better when it occurs earlier.
- Broca's area is responsible for language production. Wernicke's area is responsible for language comprehension.
- Language learning begins even before birth. An infant usually produces his or her first words at about one year of age.
- One explanation of language development is that it occurs through principles of learning, including association, reinforcement, and the observation of others.
- Noam Chomsky argues that human brains contain a language acquisition module that includes a universal grammar that underlies all human language. Chomsky differentiates between the deep structure and the surface structure of an idea.
- Although other animals communicate and may be able to express ideas, only the human brain is complex enough to create real language.

- Our language may have some influence on our thinking, but it does not affect our underlying understanding of concepts.

Exercises and Critical Thinking

1. What languages do you speak? Did you ever try to learn a new one? What problems did you have when you did this? Would you consider trying to learn a new language?
2. Some animals, such as Kanzi, display at least some language. Do you think that this means that they are intelligent?

Image Attributions:

Figure 9.9: Adapted from Wood, 1976.

Figure 9.10: Adapted from Hakuta, Bialystok, & Wiley, 2003.

Figure 9.12: "on the phone to mama" by Lars Plougmann (http://www.flickr.com/photos/crimina...nt/4310323032/) is licensed under CC BY-SA 2.0 license (http://creativecommons.org/licenses/...2.0/deed.en_CA)

Figure 9.13: Adapted from Mechelli, et al., 2004.

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9.5: Summary, Key Terms, and Self-Test

Charles Stangor, Jennifer Walinga, and Lee Sanders

Summary

Intelligence — the ability to think, to learn from experience, to solve problems, and to adapt to new situations — is more strongly related than any other individual difference variable to successful educational, occupational, economic, and social outcomes.

The French psychologist Alfred Binet and his colleague Henri Simon developed the first intelligence test in the early 1900s. Charles Spearman called the construct that the different abilities and skills measured on intelligence tests have in common the general intelligence factor, or simply "g."

There is also evidence for specific intelligences (s), measures of specific skills in narrow domains. Robert Sternberg has proposed a triarchic (three-part) theory of intelligence, and Howard Gardner has proposed that there are eight different specific intelligences.

Good intelligence tests both are reliable and have construct validity. Intelligence tests are the most accurate of all psychological tests. IQ tests are standardized, which allows calculation of mental age and the intelligence quotient (IQ),

The Wechsler Adult lntelligence Scale (WAIS) is the most widely used intelligence test for adults. Other intelligence tests include aptitude tests such as the Graduate Record Examination (GRE), and structured tests used for personnel selection.

People with higher IQs have somewhat larger brains, which operate more efficiently and faster than the brains of the less intelligent. Although intelligence is not located in a specific part of the brain, it is more prevalent in some brain areas than others.

Intelligence has both genetic and environmental causes, and between 40% and 80% of the variability in IQ is heritable. Social and economic deprivation, including poverty, can adversely affect IQ, and intelligence is improved by education.

Emotional intelligence refers to the ability to identify, assess, manage, and control one's emotions. However, tests of emotional intelligence are often unreliable, and emotional intelligence may be a part of a skill that can be applied in some specific work situations.

About 3% of the population score above an IQ of 130 (the threshold for giftedness), and about the same percentage score below an IQ of 70 (the threshold for mental retardation). Males are about 20% more common in these extremes than are women.

Women and men show overall equal intelligence, but there are sex differences on some types of tasks. There are also differences in which members of different racial and ethnic groups cluster along the IQ line. The causes of these differences are not completely known. These differences have at times led to malicious, misguided, and discriminatory attempts to try to correct for them, such as eugenics.

Language involves both the ability to comprehend spoken and written words and to create communication in real time when we speak or write. Language can be conceptualized in terms of sounds (phonemes), meaning (morphemes and syntax), and the environmental factors that help us understand it (contextual information).

Language is best learned during the critical period between three and seven years of age.

Broca's area, an area of the brain in front of the left hemisphere near the motor cortex, is responsible for language production, and Wernicke's area, an area of the brain next to the auditory cortex, is responsible for language comprehension.

Children learn language quickly and naturally, progressing through stages of babbling, first words, first sentences, and then a rapid increase in vocabulary. Children often make overextensions of concepts.

Some theories of language learning are based on principles of learning. Noam Chomsky argues that human brains contain a language acquisition device that includes a universal grammar that underlies all human language and that allows generativity. Chomsky differentiates between the deep structure and the surface structure of an idea.

Bilingualism is becoming more and more frequent in the modern world. Bilingual children may show more cognitive function and flexibility than monolingual children do.

Nonhuman animals have a wide variety of systems of communication. But efforts to teach animals to use human language have had only limited success. Although many animals communicate, none of them has a true language.

Key Terms

- Ability Model
- Anchoring
- Aphasia
- Aptitude tests
- Audience design
- Babbling
- Bias (i.e., test bias)
- Bilingualism
- Bounded awareness
- Bounded ethicality
- Bounded rationality
- Bounded self-interest
- Bounded willpower
- Broca's area
- Common ground
- Contextual information
- Construct validity
- Convergent thinking
- Critical period
- Crystallized intelligence
- Deep structure of an idea
- Divergent thinking
- Down syndrome
- Emotional intelligence (EI)
- Emotion regulationEugenics
- Fluid intelligence
- Flynn effect
- Four-Branch Model
- Framing
- General Intelligence Factor (g)
- Generativity
- Heuristics
- Human intelligence
- Ingroup
- Interpersonal intelligence
- Intrapersonal intelligence
- Job analysis
- Language
- Linguistic intergroup bias
- Linguistic relativity
- Mental retardation
- Mixed and Trait Models
- Morpheme
- Nature approach to language
- Normal distribution (or Bell curve)
- Outgroup
- Overconfident
- Overextensions
- Performance assessment
- Person' mental age
- Personal selection
- Phoneme
- Plasticity
- Primary mental abilities
- Priming
- Reliable
- Sapir-Whorf Hypothesis
- Self-report assessment
- Situation Model
- Social Brain Hypothesis
- Social and Emotional Learning (SEL)
- Social networks
- Specific Intelligence(s)
- Standardization
- Stanford-Binet Test
- Stereotype threat
- Surface structure of the idea
- Syntax
- System 1
- System 2
- Theory of Intelligence (Three Part or Triarchic)
- Wechsler Adult intelligence Scale (WAIS)

Self-Test

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CHAPTER OVERVIEW

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10.1: Introduction

Charles Stangor, Jennifer Walinga, and Lee Sanders

Warning: Discussions of violence and sexual assault in the following case study.

My Story of Post-traumatic Stress Disorder

It is a continuous challenge living with post-traumatic stress disorder (PTSD), and I've suffered from it for most of my life. I can look back now and gently laugh at all the people who thought I had the perfect life. I was young, beautiful, and talented, but unbeknownst to them, I was terrorized by an undiagnosed debilitating mental illness.

Having been properly diagnosed with PTSD at age 35, I know that there is not one aspect of my life that has gone untouched by this mental illness. My PTSD was triggered by several traumas, most importantly a sexual attack at knifepoint that left me thinking I would die. I would never be the same after that attack. For me there was no safe place in the world, not even my home. I went to the police and filed a report. Rape counselors came to see me while I was in the hospital, but I declined their help, convinced that I didn't need it. This would be the most damaging decision of my life.

For months after the attack, I couldn't close my eyes without envisioning the face of my attacker. I suffered horrific flashbacks and nightmares. For four years after the attack I was unable to sleep alone in my house. I obsessively checked windows, doors, and locks. By age 17, I'd suffered my first panic attack. Soon I became unable to leave my apartment for weeks at a time, ending my modeling career abruptly. This just became a way of life. Years passed when I had few or no symptoms at all, and I led what I thought was a fairly normal life, just thinking I had a "panic problem."

Then another traumatic event retriggered the PTSD. It was as if the past had evaporated, and I was back in the place of my attack, only now I had uncontrollable thoughts of someone entering my house and harming my daughter. I saw violent images every time I closed my eyes. I lost all ability to concentrate or even complete simple tasks. Normally social, I stopped trying to make friends or get involved in my community. I often felt disoriented, forgetting where, or who, I was. I would panic on the freeway and became unable to drive, again ending a career. I felt as if I had completely lost my mind. For a time, I managed to keep it together on the outside, but then I became unable to leave my house again.

Around this time I was diagnosed with PTSD. I cannot express to you the enormous relief I felt when I discovered my condition was real and treatable. I felt safe for the first time in 32 years. Taking medication and undergoing behavioural therapy marked the turning point in my regaining control of my life. I'm rebuilding a satisfying career as an artist, and I am enjoying my life. The world is new to me and not limited by the restrictive vision of anxiety. It amazes me to think back to what my life was like only a year ago, and just how far I've come.

For me there is no cure, no final healing. But there are things I can do to ensure that I never have to suffer as I did before being diagnosed with PTSD. I'm no longer at the mercy of my disorder, and I would not be here today had I not had the proper diagnosis and treatment. The most important thing to know is that it's never too late to seek help. (Philips, 2010)

The topic of this chapter is **learning** — *the relatively permanent change in knowledge or behaviour that is the result of experience*. Although you might think of learning in terms of what you need to do before an upcoming exam, the knowledge that you take away from your classes, or new skills that you acquire through practice, these changes represent only one component of learning. In fact, learning is a broad topic that is used to explain not only how we acquire new knowledge and behaviour but also how we acquire a wide variety of other psychological processes, including the development of both appropriate and inappropriate social behaviours, and even how a person may acquire a debilitating psychological disorder such as PTSD.



Figure 10.1 Skinner and Watson. B. F. Skinner (left) and John B. Watson (right) were champions of the behaviourist school of learning.

Learning is perhaps the most important human capacity. Learning allows us to create effective lives by being able to respond to changes. We learn to avoid touching hot stoves, to find our way home from school, and to remember which people have helped us in the past and which people have been unkind. Without the ability to learn from our experiences, our lives would be remarkably dangerous and inefficient. The principles of learning can also be used to explain a wide variety of social interactions, including social dilemmas in which people make important, and often selfish, decisions about how to behave by calculating the costs and benefits of different outcomes.

The study of learning is closely associated with the behaviourist school of psychology, in which it was seen as an alternative scientific perspective to the failure of introspection. The behaviourists, including John B. Watson and B. F. Skinner (Figure 10.1), focused their research entirely on behaviour, to the exclusion of any kinds of mental processes. For behaviourists, the fundamental aspect of learning is the process of **conditioning** — *the ability to connect* **stimuli** *(the changes that occur in the environment) with* **responses** *(behaviours or other actions)*.

But conditioning is just one type of learning. We will also consider other types, including learning through *insight*, as well as *observational learning* (also known as *modelling*). In each case we will see not only what psychologists have learned about the topics but also the important influence that learning has on many aspects of our everyday lives. And we will see that in some cases learning can be maladaptive — for instance, when a person like P. K. Philips continually experiences disruptive memories and emotional responses to a negative event.

Image Attributions

Figure 10.1: "B.F. Skinner" (http://commons.wikimedia.org/wiki/Fi...circa_1950.jpg) is licensed under the CC BY 3.0 license (http://creativecommons.org/licenses/by/3.0/deed.en). "John Broadus Watson" (http://en.wikipedia.org/wiki/File:Jo...dus_Watson.JPG) is in the public domain.

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10.2: Learning by Association- Classical Conditioning

Charles Stangor and Jennifer Walinga

Learning Objectives

- Describe how Pavlov's early work in classical conditioning influenced the understanding of learning.
- Review the concepts of classical conditioning, including unconditioned stimulus (US), conditioned stimulus (CS), unconditioned response (UR), and conditioned response (CR).
- Explain the roles that extinction, generalization, and discrimination play in conditioned learning.

Pavlov Demonstrates Conditioning in Dogs

In the early part of the 20th century, Russian physiologist Ivan Pavlov (1849-1936), shown in Figure 10.2, was studying the digestive system of dogs when he noticed an interesting behavioural phenomenon: the dogs began to salivate when the lab technicians who normally fed them entered the room, even though the dogs had not yet received any food. Pavlov realized that the dogs were salivating because they knew that they were about to be fed; the dogs had begun to associate the arrival of the technicians with the food that soon followed their appearance in the room.

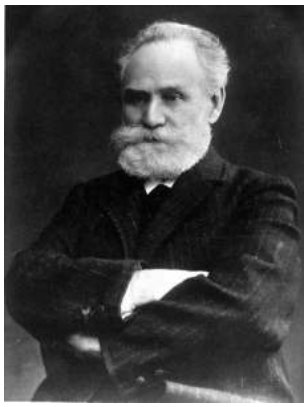


Figure 10.2 Ivan Pavlov.

With his team of researchers, Pavlov began studying this process in more detail. He conducted a series of experiments in which, over a number of trials, dogs were exposed to a sound immediately before receiving food. He systematically controlled the onset of the sound and the timing of the delivery of the food, and recorded the amount of the dogs' salivation. Initially the dogs salivated only when they saw or smelled the food, but after several pairings of the sound and the food, the dogs began to salivate as soon as they heard the sound. The animals had learned to associate the sound with the food that followed.

Pavlov had identified a fundamental associative learning process called classical conditioning. **Classical conditioning** refers to *learning that occurs when a neutral stimulus (e.g., a tone) becomes associated with a stimulus (e.g., food) that naturally produces a behaviour*. After the association is learned, the previously neutral stimulus is sufficient to produce the behaviour.

As you can see in Figure 10.3, "4-Panel Image of Whistle and Dog," psychologists use specific terms to identify the stimuli and the responses in classical conditioning. The **unconditioned stimulus (US)** is *something (such as food) that triggers a naturally occurring response*, and the **unconditioned response (UR)** is *the naturally occurring response (such as salivation) that follows the unconditioned stimulus*. The **conditioned stimulus (CS)** is *a neutral stimulus that, after being repeatedly presented prior to the unconditioned stimulus, evokes a similar response as the unconditioned stimulus*. In Pavlov's experiment, the sound of the tone served as the conditioned stimulus that, after learning, produced the **conditioned response (CR)**, which is *the acquired response to the formerly neutral stimulus*. Note that the UR and the CR are the same behaviour — in this case salivation — but they are given different names because they are produced by different stimuli (the US and the CS, respectively).

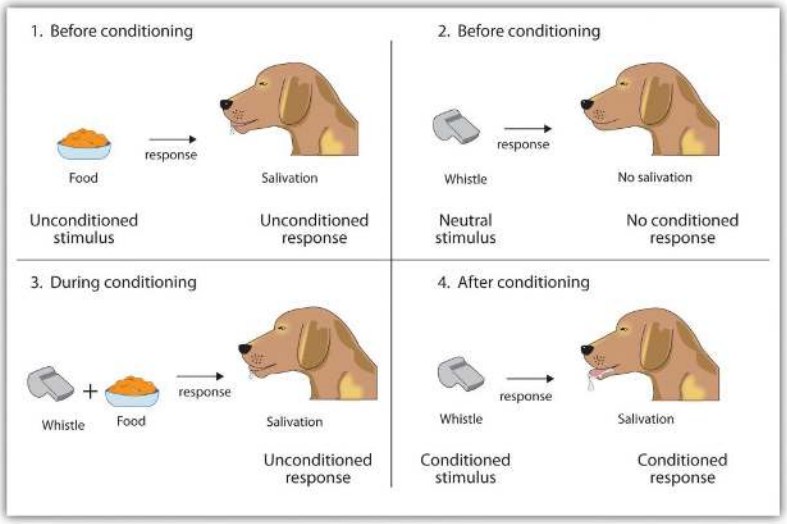


Figure 10.3 4-Panel Image of Whistle and Dog.

Conditioning is evolutionarily beneficial because it allows organisms to develop expectations that help them prepare for both good and bad events. Imagine, for instance, that an animal first smells a new food, eats it, and then gets sick. If the animal can learn to associate the smell (CS) with the food (US), it will quickly learn that the food creates the negative outcome and will not eat it the next time.

The Persistence and Extinction of Conditioning

After he had demonstrated that learning could occur through association, Pavlov moved on to study the variables that influenced the strength and the persistence of conditioning. In some studies, after the conditioning had taken place, Pavlov presented the sound repeatedly but without presenting the food afterward. Figure 10.4, "Acquisition, Extinction, and Spontaneous Recovery," shows what happened. As you can see, after the initial acquisition (learning) phase in which the conditioning occurred, when the CS was then presented alone, the behaviour rapidly decreased — the dogs salivated less and less to the sound, and eventually the sound did not elicit salivation at all. **Extinction** refers to *the reduction in responding that occurs when the conditioned stimulus is presented repeatedly without the unconditioned stimulus*.

Figure 10.4 Acquisition, Extinction, and Spontaneous Recovery. Acquisition: The CS and the US are repeatedly paired together and behaviour increases. Extinction: The CS is repeatedly presented alone, and the behaviour slowly decreases. Spontaneous recovery: After a pause, when the CS is again presented alone, the behaviour may again occur and then again show extinction.

Although at the end of the first extinction period the CS was no longer producing salivation, the effects of conditioning had not entirely disappeared. Pavlov found that, after a pause, sounding the tone again elicited salivation, although to a lesser extent than before extinction took place. *The increase in responding to the CS following a pause after extinction* is known as **spontaneous recovery**. When Pavlov again presented the CS alone, the behaviour again showed extinction until it disappeared again.

Although the behaviour has disappeared, extinction is never complete. If conditioning is again attempted, the animal will learn the new associations much faster than it did the first time.

Pavlov also experimented with presenting new stimuli that were similar, but not identical, to the original conditioned stimulus. For instance, if the dog had been conditioned to being scratched before the food arrived, the stimulus would be changed to being rubbed rather than scratched. He found that the dogs also salivated upon experiencing the similar stimulus, a process known as *generalization*. **Generalization** refers to *the tendency to respond to stimuli that resemble the original conditioned stimulus*. The ability to generalize has important evolutionary significance. If we eat some red berries and they make us sick, it would be a good idea to think twice before we eat some purple berries. Although the berries are not exactly the same, they nevertheless are similar and may have the same negative properties.

Lewicki (1985) conducted research that demonstrated the influence of stimulus generalization and how quickly and easily it can happen. In his experiment, high school students first had a brief interaction with a female experimenter who had short hair and glasses. The study was set up so that the students had to ask the experimenter a question, and (according to random assignment) the experimenter responded either in a negative way or a neutral way toward the students. Then the students were told to go into a second room in which two experimenters were present and to approach either one of them. However, the researchers arranged it so that one of the two experimenters looked a lot like the original experimenter, while the other one did not (she had longer hair and no glasses). The students were significantly more likely to avoid the experimenter who looked like the earlier experimenter when that experimenter had been negative to them than when she had treated them more neutrally. The participants showed stimulus generalization such that the new, similar-looking experimenter created the same negative response in the participants as had the experimenter in the prior session.

The flip side of generalization is **discrimination** — *the tendency to respond differently to stimuli that are similar but not identical*. Pavlov's dogs quickly learned, for example, to salivate when they heard the specific tone that had preceded food, but not upon hearing similar tones that had never been associated with food. Discrimination is also useful — if we do try the purple berries, and if they do not make us sick, we will be able to make the distinction in the future. And we can learn that although two people in our class, Courtney and Sarah, may look a lot alike, they are nevertheless different people with different personalities.

In some cases, *an existing conditioned stimulus can serve as an unconditioned stimulus for a pairing with a new conditioned stimulus* — a process known as **second-order conditioning**. In one of Pavlov's studies, for instance, he first conditioned the dogs to salivate to a sound and then repeatedly paired a new CS, a black square, with the sound. Eventually he found that the dogs would salivate at the sight of the black square alone, even though it had never been directly associated with the food. Secondary conditioners in everyday life include our attractions to things that stand for or remind us of something else, such as when we feel good on a Friday because it has become associated with the paycheque that we receive on that day, which itself is a conditioned stimulus for the pleasures that the paycheque buys us.

The Role of Nature in Classical Conditioning

As we have seen in Chapter 1, "Introducing Psychology," scientists associated with the behaviourist school argued that all learning is driven by experience, and that nature plays no role. Classical conditioning, which is based on learning through experience, represents an example of the importance of the environment. But classical conditioning cannot be understood entirely in terms of experience. Nature also plays a part, as our evolutionary history has made us better able to learn some associations than others.

Clinical psychologists make use of classical conditioning to explain the learning of a **phobia** — *a strong and irrational fear of a specific object, activity, or situation*. For example, driving a car is a neutral event that would not normally elicit a fear response in most people. But if a person were to experience a panic attack in which he or she suddenly experienced strong negative emotions while driving, that person may learn to associate driving with the panic response. The driving has become the CS that now creates the fear response.

Psychologists have also discovered that people do not develop phobias to just anything. Although people may in some cases develop a driving phobia, they are more likely to develop phobias toward objects (such as snakes and spiders) or places (such as high locations and open spaces) that have been dangerous to people in the past. In modern life, it is rare for humans to be bitten by spiders or snakes, to fall from trees or buildings, or to be attacked by a predator in an open area. Being injured while riding in a car or being cut by a knife are much more likely. But in our evolutionary past, the potential for being bitten by snakes or spiders, falling out of a tree, or being trapped in an open space were important evolutionary concerns, and therefore humans are still evolutionarily prepared to learn these associations over others (Öhman & Mineka, 2001; LoBue & DeLoache, 2010).

Another evolutionarily important type of conditioning is conditioning related to food. In his important research on food conditioning, John Garcia and his colleagues (Garcia, Kimeldorf, & Koelling, 1955; Garcia, Ervin, & Koelling, 1966) attempted to condition rats by presenting either a taste, a sight, or a sound as a neutral stimulus before the rats were given drugs (the US) that made them nauseous. Garcia discovered that taste conditioning was extremely powerful — the rat learned to avoid the taste associated with illness, even if the illness occurred several hours later. But conditioning the behavioural response of nausea to a sight or a sound was much more difficult. These results contradicted the idea that conditioning occurs entirely as a result of environmental events, such that it would occur equally for any kind of unconditioned stimulus that followed any kind of conditioned stimulus. Rather, Garcia's research showed that genetics matters — organisms are evolutionarily prepared to learn some associations more easily than others. You can see that the ability to associate smells with illness is an important survival mechanism, allowing the organism to quickly learn to avoid foods that are poisonous.

Classical conditioning has also been used to help explain the experience of *post-traumatic stress disorder (PTSD)*, as in the case of P. K. Philips described in the chapter opener. **PTSD** is *a severe anxiety disorder that can develop after exposure to a fearful event, such as the threat of death* (American Psychiatric Association, 2000). PTSD occurs when the individual develops a strong association between the situational factors that surrounded the traumatic event (e.g., military uniforms or the sounds or smells of war) and the US (the fearful trauma itself). As a result of the conditioning, being exposed to or even thinking about the situation in which the trauma occurred (the CS) becomes sufficient to produce the CR of severe anxiety (Keane, Zimering, & Caddell, 1985).

PTSD develops because the emotions experienced during the event have produced neural activity in the amygdala and created strong conditioned learning. In addition to the strong conditioning that people with PTSD experience, they also show slower extinction in classical conditioning tasks (Milad et al., 2009). In short, people with PTSD have developed very strong associations with the events surrounding the trauma and are also slow to show extinction to the conditioned stimulus.

Key Takeaways

- In classical conditioning, a person or animal learns to associate a neutral stimulus (the conditioned stimulus, or CS) with a stimulus (the unconditioned stimulus, or US) that naturally produces a behaviour (the unconditioned response, or UR). As a result of this association, the previously neutral stimulus comes to elicit the same response (the conditioned response, or CR).
- Extinction occurs when the CS is repeatedly presented without the US, and the CR eventually disappears, although it may reappear later in a process known as spontaneous recovery.
- Stimulus generalization occurs when a stimulus that is similar to an already-conditioned stimulus begins to produce the same response as the original stimulus does.
- Stimulus discrimination occurs when the organism learns to differentiate between the CS and other similar stimuli.
- In second-order conditioning, a neutral stimulus becomes a CS after being paired with a previously established CS.
- Some stimuli — response pairs, such as those between smell and food — are more easily conditioned than others because they have been particularly important in our evolutionary past.

Exercises and Critical Thinking

1. A teacher places gold stars on the chalkboard when the students are quiet and attentive. Eventually, the students start becoming quiet and attentive whenever the teacher approaches the chalkboard. Can you explain the students' behaviour in terms of classical conditioning?
2. Recall a time in your life, perhaps when you were a child, when your behaviours were influenced by classical conditioning. Describe in detail the nature of the unconditioned and conditioned stimuli and the response, using the appropriate psychological terms.
3. If post-traumatic stress disorder (PTSD) is a type of classical conditioning, how might psychologists use the principles of classical conditioning to treat the disorder?

Image Attributions

Figure 10.2: Ivan Pavlov (http://commons.wikimedia.org/wiki/Fi...avlov_LIFE.jpg) is in the public domain.

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10.3: Changing Behaviour through Reinforcement and Punishment- Operant Conditioning

Charles Stangor and Jennifer Walinga

Learning Objectives

- Outline the principles of operant conditioning.
- Explain how learning can be shaped through the use of reinforcement schedules and secondary reinforcers.

In classical conditioning the organism learns to associate new stimuli with natural biological responses such as salivation or fear. The organism does not learn something new but rather begins to perform an existing behaviour in the presence of a new signal. **Operant conditioning**, on the other hand, is *learning that occurs based on the consequences of behaviour* and can involve the learning of new actions. Operant conditioning occurs when a dog rolls over on command because it has been praised for doing so in the past, when a schoolroom bully threatens his classmates because doing so allows him to get his way, and when a child gets good grades because her parents threaten to punish her if she doesn't. In operant conditioning the organism learns from the consequences of its own actions.

How Reinforcement and Punishment Influence Behaviour: The Research of Thorndike and Skinner

Psychologist Edward L. Thorndike (1874-1949) was the first scientist to systematically study operant conditioning. In his research Thorndike (1898) observed cats who had been placed in a "puzzle box" from which they tried to escape ("Video Clip: Thorndike's Puzzle Box"). At first the cats scratched, bit, and swatted haphazardly, without any idea of how to get out. But eventually, and accidentally, they pressed the lever that opened the door and exited to their prize, a scrap of fish. The next time the cat was constrained within the box, it attempted fewer of the ineffective responses before carrying out the successful escape, and after several trials the cat learned to almost immediately make the correct response.

Observing these changes in the cats' behaviour led Thorndike to develop his **law of effect**, *the principle that responses that create a typically pleasant outcome in a particular situation are more likely to occur again in a similar situation, whereas responses that produce a typically unpleasant outcome are less likely to occur again in the situation* (Thorndike, 1911). The essence of the law of effect is that successful responses, because they are pleasurable, are "stamped in" by experience and thus occur more frequently. Unsuccessful responses, which produce unpleasant experiences, are "stamped out" and subsequently occur less frequently.

Video: *Thorndike's Puzzle Box* [http://www.youtube.com/watch?v=BDujDOLre-8]. When Thorndike placed his cats in a puzzle box, he found that they learned to engage in the important escape behaviour faster after each trial. Thorndike described the learning that follows reinforcement in terms of the law of effect.



The influential behavioural psychologist B. F. Skinner (1904-1990) expanded on Thorndike's ideas to develop a more complete set of principles to explain operant conditioning. Skinner created specially designed environments known as *operant chambers* (usually called *Skinner boxes*) to systematically study learning. **A Skinner box** (operant chamber) is *a structure that is big enough to fit a rodent or bird and that contains a bar or key that the organism can press or peck to release food or water. It also contains a device to record the animal's responses* (Figure 10.5).

The most basic of Skinner's experiments was quite similar to Thorndike's research with cats. A rat placed in the chamber reacted as one might expect, scurrying about the box and sniffing and clawing at the floor and walls. Eventually the rat chanced upon a lever, which it pressed to release pellets of food. The next time around, the rat took a little less time to press the lever, and on successive trials, the time it took to press the lever became shorter and shorter. Soon the rat was pressing the lever as fast as it could eat the food that appeared. As predicted by the law of effect, the rat had learned to repeat the action that brought about the food and cease the actions that did not.

Skinner studied, in detail, how animals changed their behaviour through reinforcement and punishment, and he developed terms that explained the processes of operant learning (Table 10.1, "How Positive and Negative Reinforcement and Punishment Influence Behaviour"). Skinner used the term **reinforcer** to refer to *any event that strengthens or increases the likelihood of a behaviour,* and the term **punisher** to refer to *any event that weakens or decreases the likelihood of a behaviour*. And he used the terms *positive* and *negative* to refer to whether a reinforcement was presented or removed, respectively. Thus, **positive reinforcement** *strengthens a response by presenting something pleasant after the response*, and **negative reinforcement** *strengthens a response by reducing or removing something unpleasant*. For example, giving a child praise for completing his homework represents positive reinforcement, whereas taking Aspirin to reduce the pain of a headache represents negative reinforcement. In both cases, the reinforcement makes it more likely that behaviour will occur again in the future.

Figure 10.5 Skinner Box. B. F. Skinner used a Skinner box to study operant learning. The box contains a bar or key that the organism can press to receive food and water, and a device that records the organism's responses.

Table 10.1 How Positive and Negative Reinforcement and Punishment Influence Behaviour.

Operant conditioning term	Description	Outcome	Example
Positive reinforcement	Add or increase a pleasant stimulus	Behaviour is strengthened	Giving a student a prize after he or she gets an A on a test
Negative reinforcement	Reduce or remove an unpleasant stimulus	Behaviour is strengthened	Taking painkillers that eliminate pain increases the likelihood that you will take painkillers again
Positive punishment	Present or add an unpleasant stimulus	Behaviour is weakened	Giving a student extra homework after he or she misbehaves in class
Negative punishment	Reduce or remove a pleasant stimulus	Behaviour is weakened	Taking away a teen's computer after he or she misses curfew

Reinforcement, either positive or negative, works by increasing the likelihood of a behaviour. **Punishment**, on the other hand, refers to *any event that weakens or reduces the likelihood of a behaviour*. **Positive punishment** *weakens a response by presenting something unpleasant after the response*, whereas **negative punishment** *weakens a response by reducing or removing something pleasant*. A child who is grounded after fighting with a sibling (positive punishment) or who loses out on the opportunity to go to recess after getting a poor grade (negative punishment) is less likely to repeat these behaviours.

Although the distinction between reinforcement (which increases behaviour) and punishment (which decreases it) is usually clear, in some cases it is difficult to determine whether a reinforcer is positive or negative. On a hot day a cool breeze could be seen as a positive reinforcer (because it brings in cool air) or a negative reinforcer (because it removes hot air). In other cases, reinforcement can be both positive and negative. One may smoke a cigarette both because it brings pleasure (positive reinforcement) and because it eliminates the craving for nicotine (negative reinforcement).

It is also important to note that reinforcement and punishment are not simply opposites. The use of positive reinforcement in changing behaviour is almost always more effective than using punishment. This is because positive reinforcement makes the person or animal feel better, helping create a positive relationship with the person providing the reinforcement. Types of positive reinforcement that are effective in everyday life include verbal praise or approval, the awarding of status or prestige, and direct financial payment. Punishment, on the other hand, is more likely to create only temporary changes in behaviour because it is based on coercion and typically creates a negative and adversarial relationship with the person providing the reinforcement. When the person who provides the punishment leaves the situation, the unwanted behaviour is likely to return.

Creating Complex Behaviours through Operant Conditioning

Perhaps you remember watching a movie or being at a show in which an animal — maybe a dog, a horse, or a dolphin — did some pretty amazing things. The trainer gave a command and the dolphin swam to the bottom of the pool, picked up a ring on its nose, jumped out of the water through a hoop in the air, dived again to the bottom of the pool, picked up another ring, and then took both of the rings to the trainer at the edge of the pool. The animal was trained to do the trick, and the principles of operant conditioning were used to train it. But these complex behaviours are a far cry from the simple stimulus-response relationships that we have considered thus far. How can reinforcement be used to create complex behaviours such as these?

One way to expand the use of operant learning is to modify the schedule on which the reinforcement is applied. To this point we have only discussed a **continuous reinforcement schedule**, in which *the desired response is reinforced every time it occurs*; whenever the dog rolls over, for instance, it gets a biscuit. Continuous reinforcement results in relatively fast learning but also rapid extinction of the desired behaviour once the reinforcer disappears. The problem is that because the organism is used to receiving the reinforcement after every behaviour, the responder may give up quickly when it doesn't appear.

Most real-world reinforcers are not continuous; they occur on a **partial (or intermittent) reinforcement schedule** — *a schedule in which the responses are sometimes reinforced and sometimes not*. In comparison to continuous reinforcement, partial reinforcement schedules lead to slower initial learning, but they also lead to greater resistance to extinction. Because the reinforcement does not appear after every behaviour, it takes longer for the learner to determine that the reward is no longer coming, and thus extinction is slower. The four types of partial reinforcement schedules are summarized in Table 10.2, "Reinforcement Schedules."

Table 10.2 Reinforcement Schedules.

Reinforcement schedule	Explanation	Real-world example
Fixed-ratio	Behaviour is reinforced after a specific number of responses.	Factory workers who are paid according to the number of products they produce
Variable-ratio	Behaviour is reinforced after an average, but unpredictable, number of responses.	Payoffs from slot machines and other games of chance
Fixed-interval	Behaviour is reinforced for the first response after a specific amount of time has passed.	People who earn a monthly salary
Variable-interval	Behaviour is reinforced for the first response after an average, but unpredictable, amount of time has passed.	Person who checks email for messages

Partial reinforcement schedules are determined by whether the reinforcement is presented on the basis of the time that elapses between reinforcement (interval) or on the basis of the number of responses that the organism engages in (ratio), and by whether the reinforcement occurs on a regular (fixed) or unpredictable (variable) schedule. In a **fixed-interval schedule**, *reinforcement occurs for the first response made after a specific amount of time has passed*. For instance, on a one-minute fixed-interval schedule the animal receives a reinforcement every minute, assuming it engages in the behaviour at least once during the minute. As you can see in Figure 10.6, "Examples of Response Patterns by Animals Trained under Different Partial Reinforcement Schedules," animals under fixed-interval schedules tend to slow down their responding immediately after the reinforcement but then increase the behaviour again as the time of the next reinforcement gets closer. (Most students study for exams the same way.) In a **variable-interval schedule**, *the reinforcers appear on an interval schedule, but the timing is varied around the average interval, making the actual appearance of the reinforcer unpredictable*. An example might be checking your email: you are reinforced by receiving messages that come, on average, say, every 30 minutes, but the reinforcement occurs only at random times. Interval reinforcement schedules tend to produce slow and steady rates of responding.

Figure 10.6 Examples of Response Patterns by Animals Trained under Different Partial Reinforcement Schedules. Schedules based on the number of responses (ratio types) induce greater response rate than do schedules based on elapsed time (interval types). Also, unpredictable schedules (variable types) produce stronger responses than do predictable schedules (fixed types).

In a **fixed-ratio schedule**, *a behaviour is reinforced after a specific number of responses*. For instance, a rat's behaviour may be reinforced after it has pressed a key 20 times, or a salesperson may receive a bonus after he or she has sold 10 products. As you can see in Figure 10.6, "Examples of Response Patterns by Animals Trained under Different Partial Reinforcement Schedules," once the organism has learned to act in accordance with the fixed-ratio schedule, it will pause only briefly when reinforcement occurs

before returning to a high level of responsiveness. A **variable-ratio schedule** *provides reinforcers after a specific but average number of responses*. Winning money from slot machines or on a lottery ticket is an example of reinforcement that occurs on a variable-ratio schedule. For instance, a slot machine (see Figure 10.7, "Slot Machine") may be programmed to provide a win every 20 times the user pulls the handle, on average. Ratio schedules tend to produce high rates of responding because reinforcement increases as the number of responses increases.



Figure 10.7 Slot Machine. Slot machines are examples of a variable-ratio reinforcement schedule.

Complex behaviours are also created through **shaping**, *the process of guiding an organism's behaviour to the desired outcome through the use of successive approximation to a final desired behaviour*. Skinner made extensive use of this procedure in his boxes. For instance, he could train a rat to press a bar two times to receive food, by first providing food when the animal moved near the bar. When that behaviour had been learned, Skinner would begin to provide food only when the rat touched the bar. Further shaping limited the reinforcement to only when the rat pressed the bar, to when it pressed the bar and touched it a second time, and finally to only when it pressed the bar twice. Although it can take a long time, in this way operant conditioning can create chains of behaviours that are reinforced only when they are completed.

Reinforcing animals if they correctly discriminate between similar stimuli allows scientists to test the animals' ability to learn, and the discriminations that they can make are sometimes remarkable. Pigeons have been trained to distinguish between images of Charlie Brown and the other Peanuts characters (Cerella, 1980), and between different styles of music and art (Porter & Neuringer, 1984; Watanabe, Sakamoto & Wakita, 1995).

Behaviours can also be trained through the use of *secondary reinforcers*. Whereas a **primary reinforcer** includes *stimuli that are naturally preferred or enjoyed by the organism, such as food, water, and relief from pain*, a **secondary reinforcer** (sometimes called *conditioned reinforcer*) is a *neutral event that has become associated with a primary reinforcer through classical conditioning*. An example of a secondary reinforcer would be the whistle given by an animal trainer, which has been associated over time with the primary reinforcer, food. An example of an everyday secondary reinforcer is money. We enjoy having money, not so much for the stimulus itself, but rather for the primary reinforcers (the things that money can buy) with which it is associated.

Key Takeaways

- Edward Thorndike developed the law of effect: the principle that responses that create a typically pleasant outcome in a particular situation are more likely to occur again in a similar situation, whereas responses that produce a typically unpleasant outcome are less likely to occur again in the situation.
- B. F. Skinner expanded on Thorndike's ideas to develop a set of principles to explain operant conditioning.
- Positive reinforcement strengthens a response by presenting something that is typically pleasant after the response, whereas negative reinforcement strengthens a response by reducing or removing something that is typically unpleasant.
- Positive punishment weakens a response by presenting something typically unpleasant after the response, whereas negative punishment weakens a response by reducing or removing something that is typically pleasant.
- Reinforcement may be either partial or continuous. Partial reinforcement schedules are determined by whether the reinforcement is presented on the basis of the time that elapses between reinforcements (interval) or on the basis of the number of responses that the organism engages in (ratio), and by whether the reinforcement occurs on a regular (fixed) or unpredictable (variable) schedule.

- Complex behaviours may be created through shaping, the process of guiding an organism's behaviour to the desired outcome through the use of successive approximation to a final desired behaviour.

Exercises and Critical Thinking

1. Give an example from daily life of each of the following: positive reinforcement, negative reinforcement, positive punishment, negative punishment.
2. Consider the reinforcement techniques that you might use to train a dog to catch and retrieve a Frisbee that you throw to it.
3. Watch the following two videos from current television shows. Can you determine which learning procedures are being demonstrated?
   a. *The Office*: http://www.break.com/usercontent/200...office-altoid- experiment-1499823
   b. *The Big Bang Theory* [YouTube]: http://www.youtube.com/watch?v=JA96Fba-WHk

Image Attributions

Figure 10.5: "Skinner box" (http://en.wikipedia.org/wiki/File:Sk...x_photo_02.jpg) is licensed under the CC BY SA 3.0 license (http://creativecommons.org/licenses/by-sa/3.0/deed.en). "Skinner box scheme" by Andreas1 (http://en.wikipedia.org/wiki/File:Sk..._scheme_01.png) is licensed under the CC BY SA 3.0 license (http://creativecommons.org/licenses/by-sa/3.0/deed.en)

Figure 10.6: Adapted from Kassin (2003).

Figure 10.7: "Slot Machines in the Hard Rock Casino" by Ted Murpy (http://commons.wikimedia.org/wiki/Fi...otMachines.jpg) is licensed under CC BY 2.0. (http://creativecommons.org/licenses/by/2.0/deed.en).

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10.4: Learning by Insight and Observation

Charles Stangor and Jennifer Walinga

Learning Objectives

- Understand the principles of learning by insight and observation.

John B. Watson and B. F. Skinner were behaviourists who believed that all learning could be explained by the processes of conditioning — that is, that associations, and associations alone, influence learning. But some kinds of learning are very difficult to explain using only conditioning. Thus, although classical and operant conditioning play a key role in learning, they constitute only a part of the total picture.

One type of learning that is not determined only by conditioning occurs when we suddenly find the solution to a problem, as if the idea just popped into our head. This type of learning is known as **insight**, *the sudden understanding of a solution to a problem*. The German psychologist Wolfgang Köhler (1925) carefully observed what happened when he presented chimpanzees with a problem that was not easy for them to solve, such as placing food in an area that was too high in the cage to be reached. He found that the chimps first engaged in trial-and-error attempts at solving the problem, but when these failed they seemed to stop and contemplate for a while. Then, after this period of contemplation, they would suddenly seem to know how to solve the problem: for instance, by using a stick to knock the food down or by standing on a chair to reach it. Köhler argued that it was this flash of insight, not the prior trial-and-error approaches, which were so important for conditioning theories, that allowed the animals to solve the problem.

Edward Tolman studied the behaviour of three groups of rats that were learning to navigate through mazes (Tolman & Honzik, 1930). The first group always received a reward of food at the end of the maze. The second group never received any reward, and the third group received a reward, but only beginning on the 11th day of the experimental period. As you might expect when considering the principles of conditioning, the rats in the first group quickly learned to negotiate the maze, while the rats of the second group seemed to wander aimlessly through it. The rats in the third group, however, although they wandered aimlessly for the first 10 days, quickly learned to navigate to the end of the maze as soon as they received food on day 11. By the next day, the rats in the third group had caught up in their learning to the rats that had been rewarded from the beginning.

It was clear to Tolman that the rats that had been allowed to experience the maze, even without any reinforcement, had nevertheless learned something, and Tolman called this *latent learning*. **Latent learning** refers to *learning that is not reinforced and not demonstrated until there is motivation to do so*. Tolman argued that the rats had formed a "cognitive map" of the maze but did not demonstrate this knowledge until they received reinforcement.

Observational Learning: Learning by Watching

The idea of latent learning suggests that animals, and people, may learn simply by experiencing or watching. **Observational learning (modelling)** is *learning by observing the behaviour of others*. To demonstrate the importance of observational learning in children, Bandura, Ross, and Ross (1963) showed children a live image of either a man or a woman interacting with a Bobo doll, a filmed version of the same events, or a cartoon version of the events. As you can see in "Video Clip: Bandura Discussing Clips From His Modelling Studies," the Bobo doll is an inflatable balloon with a weight in the bottom that makes it bob back up when you knock it down. In all three conditions, the model violently punched the clown, kicked the doll, sat on it, and hit it with a hammer.



Video: *Bandura Discussing Clips from His Modelling Studies* [http://www.youtube.com/watch?v=jWsxfoJEwQQ&feature=youtu.be]. Take a moment to see how Albert Bandura explains his research into the modelling of aggression in children.



The researchers first let the children view one of the three types of modelling, and then let them play in a room in which there were some really fun toys. To create some frustration in the children, Bandura let the children play with the fun toys for only a couple of minutes before taking them away. Then Bandura gave the children a chance to play with the Bobo doll.

If you guessed that most of the children imitated the model, you would be correct. Regardless of which type of modelling the children had seen, and regardless of the sex of the model or the child, the children who had seen the model behaved aggressively — just as the model had done. They also punched, kicked, sat on the doll, and hit it with the hammer. Bandura and his colleagues had demonstrated that these children had learned new behaviours simply by observing and imitating others.

Observational learning is useful for animals and for people because it allows us to learn without having to actually engage in what might be a risky behaviour. Monkeys that see other monkeys respond with fear to the sight of a snake learn to fear the snake themselves, even if they have been raised in a laboratory and have never actually seen a snake (Cook & Mineka, 1990). As Bandura put it,

> the prospects for [human] survival would be slim indeed if one could learn only by suffering the consequences of trial and error. For this reason, one does not teach children to swim, adolescents to drive automobiles, and novice medical students to perform surgery by having them discover the appropriate behaviour through the consequences of their successes and failures. The more costly and hazardous the possible mistakes, the heavier is the reliance on observational learning from competent learners. (Bandura, 1977, p. 212)

Although modelling is normally adaptive, it can be problematic for children who grow up in violent families. These children are not only the victims of aggression, but they also see it happening to their parents and siblings. Because children learn how to be parents in large part by modelling the actions of their own parents, it is no surprise that there is a strong correlation between family violence in childhood and violence as an adult. Children who witness their parents being violent or who are themselves abused are more likely as adults to inflict abuse on intimate partners or their children, and to be victims of intimate violence (Heyman & Slep, 2002). In turn, their children are more likely to interact violently with each other and to aggress against their parents (Patterson, Dishion, & Bank, 1984).

Research Focus: The Effects of Violent Video Games on Aggression

The average North American child watches more than four hours of television every day, and two out of three of the programs they watch contain aggression. It has been estimated that by the age of 12, the average North American child has seen more than 8,000 murders and 100,000 acts of violence. At the same time, children are also exposed to violence in movies, video games, and virtual reality games, as well as in music videos that include violent lyrics and imagery (Henry J. Kaiser Family Foundation, 2003; Schulenburg, 2007; Coyne & Archer, 2005).

It might not surprise you to hear that these exposures to violence have an effect on aggressive behaviour. The evidence is impressive and clear: the more media violence that people, including children, view, the more aggressive they are likely to be (Anderson et al., 2003; Cantor et al., 2001). The relationship between viewing television violence and aggressive behaviour is about as strong as the relationship between smoking and cancer or between studying and academic grades. People who watch more violence become more aggressive than those who watch less violence.

It is clear that watching television violence can increase aggression, but what about violent video games? These games are more popular than ever, and also more graphically violent. Youths spend countless hours playing these games, many of which involve engaging in extremely violent behaviours. The games often require the player to take the role of a violent person, to identify with the character, to select victims, and of course to kill the victims. These behaviours are reinforced by winning points and moving on to higher levels, and are repeated over and over.

Again, the answer is clear — playing violent video games leads to aggression. A recent meta-analysis by Anderson and Bushman (2001) reviewed 35 research studies that had tested the effects of playing violent video games on aggression. The studies included both experimental and correlational studies, with both male and female participants in both laboratory and field settings. They found that exposure to violent video games is significantly linked to increases in aggressive thoughts, aggressive feelings, psychological arousal (including blood pressure and heart rate), as well as aggressive behaviour. Furthermore, playing more video games was found to relate to less altruistic behaviour.

In one experiment, Bushman and Anderson (2002) assessed the effects of viewing violent video games on aggressive thoughts and behaviour. Participants were randomly assigned to play either a violent or a nonviolent video game for 20 minutes. Each participant played one of four violent video games (Carmageddon, Duke Nukem, Mortal Kombat, or Future Cop) or one of four nonviolent video games (Glider Pro, 3D Pinball, Austin Powers, or Tetra Madness).

Participants then read a story — for instance, this one about Todd — and were asked to list 20 thoughts, feelings, and actions they would have if they were Todd:

Todd was on his way home from work one evening when he had to brake quickly for a yellow light. The person in the car behind him must have thought Todd was going to run the light because he crashed into the back of Todd's car, causing a lot of damage to both vehicles. Fortunately, there were no injuries. Todd got out of his car and surveyed the damage. He then walked over to the other car.

As you can see in Figure 10.8, "Results From Bushman and Anderson, 2002," the students who had played one of the violent video games responded much more aggressively to the story than did those who played the nonviolent games. In fact, their responses were often extremely aggressive. They said things like "Call the guy an idiot," "Kick the other driver's car," "This guy's dead meat!" and "What a dumbass!"

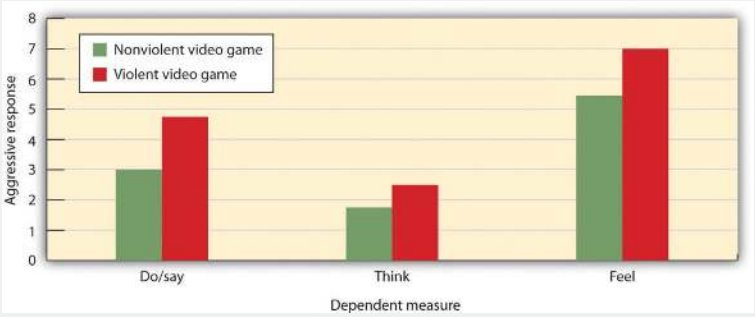


Figure 10.8 Researchers found that undergraduate students who had just played a violent video game expressed significantly more violent responses to a story than did those who had just played a nonviolent video game. [Long Description] Adapted from Bushman & Anderson (2002).

However, although modelling can increase violence, it can also have positive effects. Research has found that, just as children learn to be aggressive through observational learning, they can also learn to be altruistic in the same way (Seymour, Yoshida, & Dolan, 2009).

Key Takeaways

- Not all learning can be explained through the principles of classical and operant conditioning.
- Insight is the sudden understanding of the components of a problem that makes the solution apparent.
- Latent learning refers to learning that is not reinforced and not demonstrated until there is motivation to do so.
- Observational learning occurs by viewing the behaviours of others.
- Both aggression and altruism can be learned through observation.

Exercises and Critical Thinking

1. Describe a time when you learned something by insight. What do you think led to your learning?
2. Imagine that you had a 12-year-old brother who spent many hours a day playing violent video games. Basing your answer on the material covered in this chapter, do you think that your parents should limit his exposure to the games? Why or why not?
3. How might we incorporate principles of observational learning to encourage acts of kindness and selflessness in our society?

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Long Descriptions

Figure 10.8 long description: Effect of Violent and Non-violent Video Games

	Non-violent video game	Violent video game
Do/say	3.0	4.8
Think	1.8	2.5
Feel	5.5	7.0

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10.5: Using the Principles of Learning to Understand Everyday Behaviour

Charles Stangor and Jennifer Walinga

Learning Objectives

- Review the ways that learning theories can be applied to understanding and modifying everyday behaviour.
- Describe the situations under which reinforcement may make people *less* likely to enjoy engaging in a behaviour.
- Explain how principles of reinforcement are used to understand social dilemmas, such as the prisoner's dilemma, and why people are likely to make competitive choices in them.

The principles of learning are some of the most general and most powerful in all of psychology. It would be fair to say that these principles account for more behaviour using fewer principles than any other set of psychological theories. The principles of learning are applied in numerous ways in everyday settings. For example, operant conditioning has been used to motivate employees, to improve athletic performance, to increase the functioning of those suffering from developmental disabilities, and to help parents successfully toilet train their children (Azrin & Foxx, 1974; McGlynn, 1990; Pedalino & Gamboa, 1974; Simek & O'Brien, 1981). In this section we will consider how learning theories are used in advertising, in education, and in understanding competitive relationships between individuals and groups.

Using Classical Conditioning in Advertising

Classical conditioning has long been, and continues to be, an effective tool in marketing and advertising (Hawkins, Best, & Coney, 1998). The general idea is to create an advertisement that has positive features such that the ad creates enjoyment in the person exposed to it. The enjoyable ad serves as the unconditioned stimulus (US), and the enjoyment is the unconditioned response (UR). Because the product being advertised is mentioned in the ad, it becomes associated with the US, and then becomes the conditioned stimulus (CS). In the end, if everything has gone well, seeing the product online or in the store will then create a positive response in the buyer, leading him or her to be more likely to purchase the product.

A similar strategy is used by corporations that sponsor teams or events. For instance, if people enjoy watching a university basketball team playing basketball, and if that team is sponsored by a product, such as Pepsi, then people may end up experiencing positive feelings when they view a can of Pepsi. Of course, the sponsor wants to sponsor only good teams and good athletes because these create more pleasurable responses.

Advertisers use a variety of techniques to create positive advertisements, including enjoyable music, cute babies, attractive models, and funny spokespeople. In one study, Gorn (1982) showed research participants pictures of different writing pens of different colours, but paired one of the pens with pleasant music and the other with unpleasant music. When given a choice as a free gift, more people chose the pen colour associated with the pleasant music. And Schemer, Matthes, Wirth, and Textor (2008) found that people were more interested in products that had been embedded in music videos of artists that they liked and less likely to be interested when the products were in videos featuring artists that they did not like.

Another type of ad that is based on principles of classical conditioning is one that associates fear with the use of a product or behaviour, such as those that show pictures of deadly automobile accidents to encourage seatbelt use or images of lung cancer surgery to discourage smoking. These ads have also been found to be effective (Das, de Wit, & Stroebe, 2003; Perloff, 2003; Witte & Allen, 2000), due in large part to conditioning. When we see a cigarette and the fear of dying has been associated with it, we are hopefully less likely to light up.

Taken together then, there is ample evidence of the utility of classical conditioning, using both positive as well as negative stimuli, in advertising. This does not, however, mean that we are always influenced by these ads. The likelihood of conditioning being successful is greater for products that we do not know much about, where the differences between products are relatively minor, and when we do not think too carefully about the choices (Schemer et al., 2008).

John B. Watson and B. F. Skinner believed that all learning was the result of reinforcement, and thus that reinforcement could be used to educate children. For instance, Watson wrote in his book on behaviourism,

> Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select — doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. I am going beyond my facts and I admit it, but so have the advocates of the contrary and they have been doing it for many thousands of years (Watson, 1930, p. 82).

Skinner promoted the use of **programmed instruction**, *an educational tool that consists of self-teaching with the aid of a specialized textbook or teaching machine that presents material in a logical sequence* (Skinner, 1965). Programmed instruction allows students to progress through a unit of study at their own rate, checking their own answers and advancing only after answering correctly. Programmed instruction is used today in many classes — for instance, to teach computer programming (Emurian, 2009).

Although reinforcement can be effective in education, and teachers make use of it by awarding gold stars, good grades, and praise, there are also substantial limitations to using reward to improve learning. To be most effective, rewards must be contingent on appropriate behaviour. In some cases teachers may distribute rewards indiscriminately — for instance, by giving praise or good grades to children whose work does not warrant it — in the hope that students will "feel good about themselves" and that this self-esteem will lead to better performance. Studies indicate, however, that high self-esteem alone does not improve academic performance (Baumeister, Campbell, Krueger, & Vohs, 2003). When rewards are not earned, they become meaningless and no longer provide motivation for improvement.

Another potential limitation of rewards is that they may teach children that the activity should be performed for the reward, rather than for one's own interest in the task. If rewards are offered too often, the task itself becomes less appealing. Mark Lepper and his colleagues (Lepper, Greene, & Nisbett, 1973) studied this possibility by leading some children to think that they engaged in an activity for a reward, rather than because they simply enjoyed it. First, they placed some fun felt-tipped markers in the classroom of the children they were studying. The children loved the markers and played with them right away. Then the markers were taken out of the classroom, and the children were given a chance to play with the markers individually at an experimental session with the researcher. At the research session, the children were randomly assigned to one of three experimental groups. One group of children (the *expected reward* condition) was told that if they played with the markers they would receive a good drawing award. A second group (the *unexpected reward* condition) also played with the markers, and also got the award — but they were not told ahead of time that they would be receiving the award; it came as a surprise after the session. The third group (the *no reward* group) played with the markers too, but got no award.

Then the researchers placed the markers back in the classroom and observed how much the children in each of the three groups played with them. As you can see in Figure 10.9, "Undermining Intrinsic Interest," the children who had been led to expect a reward for playing with the markers during the experimental session played with the markers less at the second session than they had at the first session. The idea is that, when the children had to choose whether or not to play with the markers when the markers reappeared in the classroom, they based their decision on their own prior behaviour. The children in the no reward group and the children in the unexpected reward group realized that they played with the markers because they liked them. Children in the expected award condition, however, remembered that they were promised a reward for the activity the last time they played with the markers. These children, then, were more likely to draw the inference that they play with the markers only for the external reward, and because they did not expect to get an award for playing with the markers in the classroom, they determined that they didn't like them. Expecting to receive the award at the session had undermined their initial interest in the markers.

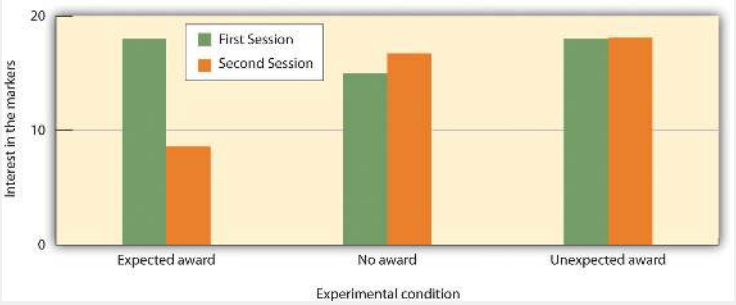


Figure 10.9 Undermining Intrinsic Interest. Mark Lepper and his colleagues (1973) found that giving rewards for playing with markers, which the children naturally enjoyed, could reduce their interest in the activity. [Long Description]

This research suggests that, although receiving a reward may in many cases lead us to perform an activity more frequently or with more effort, a reward may not always increase our liking for the activity. In some cases a reward may actually make us like an activity less than we did before we were rewarded for it. This outcome is particularly likely when the reward is perceived as an obvious attempt on the part of others to get us to do something. When children are given money by their parents to get good grades in school, they may improve their school performance to gain the reward. But at the same time their liking for school may decrease. On the other hand, rewards that are seen as more internal to the activity, such as rewards that praise us, remind us of our achievements in the domain, and make us feel good about ourselves as a result of our accomplishments, are more likely to be effective in increasing not only the performance of, but also the liking of, the activity (Hulleman, Durik, Schweigert, & Harackiewicz, 2008; Ryan & Deci, 2002).Other research findings also support the general principle that punishment is generally less effective than reinforcement in changing behaviour. In a recent meta-analysis, Gershoff (2002) found that although children who were spanked by their parents were more likely to immediately comply with the parents' demands, they were also more aggressive, showed less ability to control aggression, and had poorer mental health in the long term than children who were not spanked. The problem seems to be that children who are punished for bad behaviour are likely to change their behaviour only to avoid the punishment, rather than by internalizing the norms of being good for its own sake. Punishment also tends to generate anger, defiance, and a desire for revenge. Moreover, punishment models the use of aggression and ruptures the important relationship between the teacher and the learner (Kohn, 1993).

Reinforcement in Social Dilemmas

The basic principles of reinforcement, reward, and punishment have been used to help understand a variety of human behaviours (Bandura, 1977; Miller & Dollard, 1941; Rotter, 1945). The general idea is that, as predicted by principles of operant learning and the law of effect, people act in ways that maximize their *outcomes*, where **outcomes** are defined as *the presence of reinforcers and the absence of punishers*.

Consider, for example, a situation known as the *commons dilemma*, as proposed by the ecologist Garrett Hardin (1968). Hardin noted that in many European towns there was at one time a centrally located pasture, known as the commons, which was shared by the inhabitants of the village to graze their livestock. But the commons was not always used wisely. The problem was that each individual who owned livestock wanted to be able to use the commons to graze his or her own animals. However, when each group member took advantage of the commons by grazing many animals, the commons became overgrazed, the pasture died, and the commons was destroyed.

Although Hardin focused on the particular example of the commons, the basic dilemma of individual desires versus the benefit of the group as a whole can also be found in many contemporary public goods issues, including the use of limited natural resources, air pollution, and public land. In large cities, most people may prefer the convenience of driving their own car to work each day rather than taking public transportation. Yet this behaviour uses up public goods (the space on limited roadways, crude oil reserves, and clean air). People are lured into the dilemma by short-term rewards, seemingly without considering the potential long-term costs of the behaviour, such as air pollution and the necessity of building even more highways.

A **social dilemma** such as the commons dilemma is *a situation in which the behaviour that creates the most positive outcomes for the individual may in the long term lead to negative consequences for the group as a whole*. The dilemmas are arranged in such a way that it is easy to be selfish, because the personally beneficial choice (such as using water during a water shortage or driving to

work alone in one's own car) produces reinforcements for the individual. Furthermore, social dilemmas tend to work on a type of time delay. The problem is that, because the long-term negative outcome (the extinction of fish species or dramatic changes in the earth's climate) is far away in the future and the individual benefits are occurring right now, it is difficult for an individual to see how many costs there really are. The paradox, of course, is that if everyone takes the personally selfish choice in an attempt to maximize his or her own outcomes, the long-term result is poorer outcomes for every individual in the group. Each individual prefers to make use of the public goods for himself or herself, whereas the best outcome for the group as a whole is to use the resources more slowly and wisely.

One method of understanding how individuals and groups behave in social dilemmas is to create such situations in the laboratory and observe how people react to them. The best known of these laboratory simulations is called the **prisoner's dilemma game** (Poundstone, 1992). This game *represents a social dilemma in which the goals of the individual compete with the goals of another individual (or sometimes with a group of other individuals)*. Like all social dilemmas, the prisoner's dilemma assumes that individuals will generally try to maximize their own outcomes in their interactions with others.

In the prisoner's dilemma game, the participants are shown a **payoff matrix** in which *numbers are used to express the potential outcomes for each of the players in the game, given the decisions each player makes*. The payoffs are chosen beforehand by the experimenter to create a situation that models some real-world outcome. Furthermore, in the prisoner's dilemma game, the payoffs are normally arranged as they would be in a typical social dilemma, such that each individual is better off acting in his or her immediate self-interest, and yet if all individuals act according to their self-interests, then everyone will be worse off.

In its original form, the prisoner's dilemma game involves a situation in which two prisoners (we'll call them Frank and Malik) have been accused of committing a crime. The police believe that the two worked together on the crime, but they have only been able to gather enough evidence to convict each of them of a more minor offence. In an attempt to gain more evidence, and thus be able to convict the prisoners of the larger crime, each of the prisoners is interrogated individually, with the hope that he will confess to having been involved in the more major crime in return for a promise of a reduced sentence if he confesses first. Each prisoner can make either the *cooperative choice* (which is to not confess) or the *competitive choice* (which is to confess).

The incentives for either confessing or not confessing are expressed in a payoff matrix such as the one shown in Figure 10.10, "The Prisoner's Dilemma." The top of the matrix represents the two choices that Malik might make (to either confess that he did the crime or not confess), and the side of the matrix represents the two choices that Frank might make (also to either confess or not confess). The payoffs that each prisoner receives, given the choices of each of the two prisoners, are shown in each of the four squares.

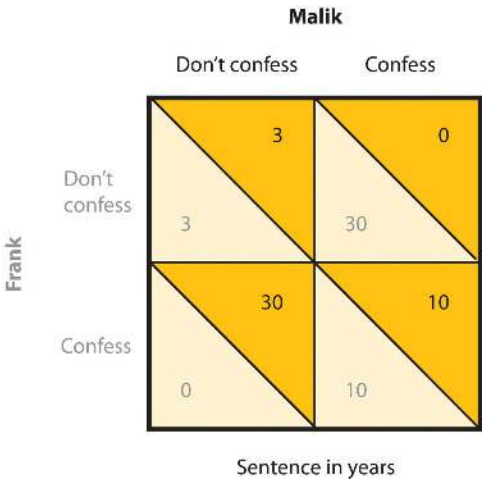


Figure 10.10 The Prisoner's Dilemma. In the prisoner's dilemma game, two suspected criminals are interrogated separately. The matrix indicates the outcomes for each prisoner, measured as the number of years each is sentenced to prison, as a result of each combination of cooperative (don't confess) and competitive (confess) decisions. Outcomes for Malik are in black and outcomes for Frank are in grey. [Long Description]

If both prisoners take the cooperative choice by not confessing (the situation represented in the upper left square of the matrix), there will be a trial, the limited available information will be used to convict each prisoner, and they each will be sentenced to a

relatively short prison term of three years. However, if either of the prisoners confesses, turning “state’s evidence” against the other prisoner, then there will be enough information to convict the other prisoner of the larger crime, and that prisoner will receive a sentence of 30 years, whereas the prisoner who confesses will get off free. These outcomes are represented in the lower left and upper right squares of the matrix. Finally, it is possible that both players confess at the same time. In this case there is no need for a trial, and in return the prosecutors offer a somewhat reduced sentence (of 10 years) to each of the prisoners.

The prisoner’s dilemma has two interesting characteristics that make it a useful model of a social dilemma. For one, the prisoner’s dilemma is arranged in such a way that a positive outcome for one player does not necessarily mean a negative outcome for the other player. If you consider again the matrix in Figure 8.10, “The Prisoner’s Dilemma,” you can see that if one player takes the cooperative choice (to not confess) and the other takes the competitive choice (to confess), then the prisoner who cooperates loses, whereas the other prisoner wins. However, if both prisoners make the cooperative choice, each remaining quiet, then neither gains more than the other, and both prisoners receive a relatively light sentence. In this sense, both players can win at the same time.

Second, the prisoner’s dilemma matrix is arranged so that each individual player is motivated to take the competitive choice because this choice leads to a higher payoff regardless of what the other player does. Imagine for a moment that you are Malik, and you are trying to decide whether to cooperate (don’t confess) or to compete (confess). And imagine that you are not really sure what Frank is going to do. Remember the goal of the individual is to maximize outcomes. The values in the matrix make it clear that if you think that Frank is going to confess, you should confess yourself (to get 10 rather than 30 years in prison). And it is also clear that if you think Frank is not going to confess, you should still confess (to get no time in prison rather than three years). So the matrix is arranged so that the “best” alternative for each player, at least in the sense of pure reward and self-interest, is to make the competitive choice, even though in the end both players would prefer the combination in which both players cooperate to the one in which they both compete.

Although initially specified in terms of the two prisoners, similar payoff matrices can be used to predict behaviour in many different types of dilemmas involving two or more parties and including choices of helping and not helping, working and loafing, and paying and not paying debts. For instance, we can use the prisoner’s dilemma to help us understand roommates living together in a house who might not want to contribute to the housework. Each of them would be better off if they relied on the other to clean the house. Yet if neither of them makes an effort to clean the house (the cooperative choice), the house becomes a mess and they will both be worse off.

Key Takeaways

- Learning theories have been used to change behaviours in many areas of everyday life.
- Some advertising uses classical conditioning to associate a pleasant response with a product.
- Rewards are frequently and effectively used in education but must be carefully designed to be contingent on performance and to avoid undermining interest in the activity.
- Social dilemmas, such as the prisoner’s dilemma, can be understood in terms of a desire to maximize one’s outcomes in a competitive relationship.

Exercises and Critical Thinking

1. Find and share with your class some examples of advertisements that make use of classical conditioning to create positive attitudes toward products.
2. Should parents use both punishment as well as reinforcement to discipline their children? On what principles of learning do you base your opinion?
3. Think of a social dilemma other than one that has been discussed in this chapter, and explain people’s behaviour in it in terms of principles of learning.

Image Attributions

Figure 10.9: Adapted from Lepper, Greene, & Nisbett (1973).

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Long Descriptions

Figure 10.9 long description: Undermining intrinsic interest.

	First Session	Second Session
Expected award	17	8
No award	15	16
Unexpected award	17	17

Figure 10.10 long description: The prisoner's Dilemma. If both Malik and Frank don't confess, they each get three years in prison. If only one of them confesses, the confessor gets no years in prison while the person who did not confess gets 30 years in prison. If they both confess, they each get 10 years in prison.

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10.6: Summary, Key Terms, and Self-Test

Charles Stangor, Jennifer Walinga, and Lee Sanders

Summary

Classical conditioning was first studied by physiologist Ivan Pavlov. In classical conditioning, a person or animal learns to associate a neutral stimulus (the conditioned stimulus, or CS) with a stimulus (the unconditioned stimulus, or US) that naturally produces a behaviour (the unconditioned response, or UR). As a result of this association, the previously neutral stimulus comes to elicit the same or similar response (the conditioned response, or CR).

Classically conditioned responses show extinction if the CS is repeatedly presented without the US. The CR may reappear later in a process known as spontaneous recovery.

Organisms may show stimulus generalization, in which stimuli similar to the CS may produce similar behaviours, or stimulus discrimination, in which the organism learns to differentiate between the CS and other similar stimuli.

Second-order conditioning occurs when a second CS is conditioned to a previously established CS.

Psychologist Edward Thorndike developed the law of effect: the idea that responses that are reinforced are “stamped in” by experience and thus occur more frequently, whereas responses that are punished are “stamped out” and subsequently occur less frequently.

B. F. Skinner expanded on Thorndike’s ideas to develop a set of principles to explain operant conditioning.

Positive reinforcement strengthens a response by presenting something pleasant after the response, and negative reinforcement strengthens a response by reducing or removing something unpleasant. Positive punishment weakens a response by presenting something unpleasant after the response, whereas negative punishment weakens a response by reducing or removing something pleasant.

Shaping is the process of guiding an organism’s behaviour to the desired outcome through the use of reinforcers.

Reinforcement may be either partial or continuous. Partial-reinforcement schedules are determined by whether the reward is presented on the basis of the time that elapses between rewards (interval) or on the basis of the number of responses that the organism engages in (ratio), and by whether the reinforcement occurs on a regular (fixed) or unpredictable (variable) schedule.

Not all learning can be explained through the principles of classical and operant conditioning. Insight is the sudden understanding of the components of a problem that makes the solution apparent, and latent learning refers to learning that is not reinforced and not demonstrated until there is motivation to do so.

Learning by observing the behaviour of others and the consequences of those behaviours is known as observational learning. Aggression, altruism, and many other behaviours are learned through observation.

Learning theories can be and have been applied to change behaviours in many areas of everyday life. Some advertising uses classical conditioning to associate a pleasant response with a product.

Rewards are frequently and effectively used in education but must be carefully designed to be contingent on performance and to avoid undermining interest in the activity.

Social dilemmas, such as the prisoner’s dilemma, can be understood in terms of a desire to maximize one’s outcomes in a competitive relationship.

Key Terms

- Basic-level category
- Blocking
- Categorize
- Category
- Chunk
- Classical conditioning
- Concept
- Conditioned compensatory response
- Conditioned response (CR)
- Conditioned stimulus (CS)
- Context
- Discriminative stimulus
- Encoding
- Exemplar
- Extinction
- Fear conditioning
- Goal-directed behavior
- Habit
- Habituation
- Implicit learning
- Implicit memory
- Incidental learning
- Instrumental conditioning
- Intentional learning
- Law of Effect
- Metacognition
- Nonassociative learning
- Observational learning
- Operant
- Operant conditioning
- Pavlovian conditioning
- Perceptual learning
- Prediction error
- Preparedness
- Psychological essentialism
- Punisher
- Quantitative Law of Effect
- Reinforcer
- Reinforcer devaluation effect
- Renewal effect
- Sensitization
- Social Learning Theory
- Social models
- Spontaneous recovery
- Stimulus control
- Taste aversion conditioning (learning)
- Transfer-appropriate processing
- Typicality
- Unconditioned response (UR)
- Unconditioned stimulus (US)
- Vicarious reinforcement
- Working memory

Self-Test

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CHAPTER OVERVIEW

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11.1: Introduction

Charles Stangor, Jennifer Walinga, and Jorden A. Cummings

Grace Under Pressure

On June 27, 2014, 13-year-old Gavin England saved his grandfather from drowning when their prawning boat took on water and sank off the Saanich Peninsula on Vancouver Island (CTV, 2014). Gavin's grandfather Vern was not a strong swimmer, and though both were wearing life jackets, they would not have survived for long in the cold Pacific ocean waters 300 meters from shore.

Gavin recounted the event, explaining how he suffered sharp cuts to his bare feet when climbing the embankment where he had dragged his grandfather. He attributed his ability to overcome the pain of the cuts to adrenalin. Upon finding an old truck with keys in the ignition, and despite the high emotions he was experiencing, he then had the wherewithal to learn to drive on the spot and make it up a three-kilometer hill to get help. Gavin explained that his knowledge of driving a dirt bike served him well: "I knew that clutch in meant drive." Vern described the young boy as "tenacious" and calm throughout the event. He was giving his grandfather words of encouragement as he pulled him to shore.

Stories such as Gavin's are rare and unpredictable. We hope we will act with the same clear-headed tenacity in emergency situations, but the heroic response is not assured. Gavin's ability to abate panic, and recognize and regulate his emotions was central to his actions in this emergency situation.

The topic of this chapter is **affect**, defined as *the experience of feeling or emotion*. Affect is an essential part of the study of psychology because it plays such an important role in everyday life. As we will see, affect guides behaviour, helps us make decisions, and has a major impact on our mental and physical health.

The two fundamental components of affect are *emotions* and *motivation*. Both of these words have the same underlying Latin root, meaning "to move." In contrast to cognitive processes that are calm, collected, and frequently rational, emotions and motivations involve **arousal**, or *our experiences of the bodily responses created by the sympathetic division of the autonomic nervous system (ANS)*. Because they involve arousal, emotions and motivations are "hot" — they "charge," "drive," or "move" our behaviour.

When we experience emotions or strong motivations, we *feel* the experiences. When we become aroused, the sympathetic nervous system provides us with energy to respond to our environment. The liver puts extra sugar into the bloodstream, the heart pumps more blood, our pupils dilate to help us see better, respiration increases, and we begin to perspire to cool the body. The stress hormones *epinephrine* and *norepinephrine* are released. We experience these responses as arousal.

American pilot Captain"Sully" Sullenberger (Figure 11.1, "Captain Sullenberger and His Plane on the Hudson River") was 915 metres up in the air when the sudden loss of power in his airplane put his life, as well as the lives of 150 passengers and crew members, in his hands. Both of the engines on flight 1539 had shut down, and his options for a safe landing were limited.

Sully kept flying the plane and alerted the control tower to the situation: "This is Cactus 1539…hit birds. We lost thrust in both engines. We're turning back toward La Guardia."

When the tower gave him the compass setting and runway for a possible landing, Sullenberger's extensive experience allowed him to give a calm response: "I'm not sure if we can make any runway…Anything in New Jersey?"

Captain Sullenberger was not just any pilot in a crisis, but a former U.S. Air Force fighter pilot with 40 years of flight experience. He had served both as a flight instructor and the safety chairman for the Airline Pilots Association. Training had quickened his mental processes in assessing the threat, allowing him to maintain what tower operators later called an "eerie calm." He knew the capabilities of his plane.

When the tower suggested a runway in New Jersey, Sullenberger calmly replied: "We're unable. We may end up in the Hudson."



Figure 11.1 Captain Sullenberger and His Plane on the Hudson River. Imagine that you are on a plane that you know is going to crash. What emotions would you experience, and how would you respond to them? Would the rush of fear cause you to panic, or could you control your emotions like Captain Sullenberger did, as he calmly calculated the heading, position, thrust, and elevation of the plane, and then landed it on the Hudson River?

The last communication from Captain Sullenberger to the tower advised of the eventual outcome: “We’re going to be in the Hudson.”

He calmly set the plane down on the water. Passengers reported that the landing was like landing on a rough runway. The crew kept the passengers calm as women, children, and then the rest of the passengers were evacuated onto the rescue boats that had quickly arrived. Captain Sullenberger then calmly walked the aisle of the plane to be sure that everyone was out before joining the 150 other rescued survivors (Levin, 2009; National Transportation Safety Board, 2009).

Some called it “grace under pressure,” and others called it the “miracle on the Hudson.” But psychologists see it as the ultimate in *emotion regulation* — the ability to control and productively use one’s emotions.

An **emotion** is *a mental and physiological feeling state that directs our attention and guides our behaviour*. Whether it is the thrill of a roller-coaster ride that elicits an unexpected scream, the flush of embarrassment that follows a public mistake, or the horror of a potential plane crash that creates an exceptionally brilliant response in a pilot, emotions move our actions. Emotions normally serve an adaptive role: We care for infants because of the love we feel for them, we avoid making a left turn onto a crowded highway because we fear that a speeding truck may hit us, and we are particularly nice to Mandy because we are feeling guilty that we did not go to her party. But emotions may also be destructive, such as when a frustrating experience leads us to lash out at others who do not deserve it.

The Surrey School District in British Columbia has incorporated “emotional regulation” into the curriculum (Wells, 2013). In six schools, educators are piloting a program that helps teachers look for what may be stressing children, making them unable to pay attention, lethargic, hyperactive, or out of control. The children may be impacted by too much noise in the classroom, too little sleep, or too much junk food in their lunch. The teachers help the children recognize what they need to do to make themselves calm and productive in class. The program ultimately places the motivation for behavioural control within the hands of the children.

Motivations are closely related to emotions. A **motivation** is *a driving force that initiates and directs behaviour*. Some motivations are biological, such as the motivation for food, water, and sex. But there are a variety of other personal and social motivations that can influence behaviour, including the motivations for social approval and acceptance, the motivation to achieve, and the motivation to take, or to avoid taking, risks (Morsella, Bargh, & Gollwitzer, 2009). In each case we follow our motivations because they are rewarding. As predicted by basic theories of operant learning, motivations lead us to engage in particular behaviours because doing so makes us feel good.

Motivations are often considered in psychology in terms of *drives*, which are internal states that are activated when the physiological characteristics of the body are out of balance, and *goals*, which are desired end states that we strive to attain. Motivation can thus be conceptualized as a series of behavioural responses that lead us to attempt to reduce drives and to attain goals by comparing our current state with a desired end state (Lawrence, Carver, & Scheier, 2002). Like a thermostat on an air conditioner, the body tries to maintain *homeostasis*, the natural state of the body’s systems, with goals, drives, and arousal in balance. When a drive or goal is aroused—for instance, when we are hungry—the thermostat turns on and we start to behave in a way that attempts to reduce the drive or meet the goal (in this case to seek food). As the body works toward the desired end state, the thermostat continues to check whether or not the end state has been reached. Eventually, the need or goal is satisfied (we eat),

and the relevant behaviours are turned off. The body's thermostat continues to check for homeostasis and is always ready to react to future needs.

In addition to more basic motivations such as hunger, a variety of other personal and social motivations can also be conceptualized in terms of drives or goals. When the goal of studying for an exam is hindered because we take a day off from our schoolwork, we may work harder on our studying on the next day to move us toward our goal. When we are dieting, we may be more likely to have a big binge on a day when the scale says that we have met our prior day's goals. And when we are lonely, the motivation to be around other people is aroused and we try to socialize. In many, if not most cases, our emotions and motivations operate out of our conscious awareness to guide our behaviour (Freud, 1922; Hassin, Bargh, & Zimerman, 2009; Williams, Bargh, Nocera, & Gray, 2009).

We begin this chapter by considering the role of affect on behaviour, discussing the most important psychological theories of emotions. Then we will consider how emotions influence our mental and physical health. We will discuss the various functions that emotions serve. We will discuss positive emotions and how they help us respond to stress and influence our experience of happiness. We'll then turn to discussing drives states, or affective experiences that influence our thoughts and behaviours, and how we fulfill goals that are important to our survival and our motivation to pursue more personal goals.

Image Attributions

Figure 11.1: Sully Sullenberger by Ingrid Taylar (http://www.flickr.com/photos/taylar/435061088) used under CC BY 2.0 license (https://creativecommons.org/licenses/by/2.0/); Plane crash into Hudson River by Greg L., (http://commons.wikimedia.org/wiki/Fi...ivercroped.jpg) used under CC BY 2.0 license (http://creativecommons.org/licenses/by/2.0/deed.en).

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11.2: The Experience of Emotion

Charles Stangor and Jennifer Walinga

Learning Objectives

- Explain the biological experience of emotion.
- Summarize the psychological theories of emotion.
- Give examples of the ways that emotion is communicated.

The most fundamental emotions, known as the basic emotions, are those of *anger, disgust, fear, happiness, sadness, and surprise*. The basic emotions have a long history in human evolution, and they have developed in large part to help us make rapid judgments about stimuli and to quickly guide appropriate behaviour (LeDoux, 2000). The basic emotions are determined in large part by one of the oldest parts of our brain, the limbic system, including the amygdala, the hypothalamus, and the thalamus. Because they are primarily evolutionarily determined, the basic emotions are experienced and displayed in much the same way across cultures (Ekman, 1992; Elfenbein & Ambady, 2002; Fridland, Ekman, & Oster, 1987), and people are quite accurate at judging the facial expressions of people from different cultures. View the video "Are there universal expressions of emotion? – Sophie Zadeh," to see a demonstration of the basic emotions.

Video: *Are there universal expressions of emotion? – Sophie Zadeh* [https://www.youtube.com/watch?v=-hr58Yu0yDs]. View this video to see a demonstration of the basic emotions.



Not all of our emotions come from the old parts of our brain; we also interpret our experiences to create a more complex array of emotional experiences. For instance, the amygdala may sense fear when it senses that the body is falling, but that fear may be interpreted completely differently (perhaps even as excitement) when we are falling on a roller-coaster ride than when we are falling from the sky in an airplane that has lost power. The *cognitive interpretations that accompany emotions* — known as **cognitive appraisal** — allow us to experience a much larger and more complex set of *secondary emotions*, as shown in Figure 11.2, "The Secondary Emotions." Although they are in large part cognitive, our experiences of the secondary emotions are determined in part by arousal (on the vertical axis of Figure 11.2, "The Secondary Emotions") and in part by their *valence* — that is, whether they are pleasant or unpleasant feelings (on the horizontal axis of Figure 11.2, "The Secondary Emotions"),

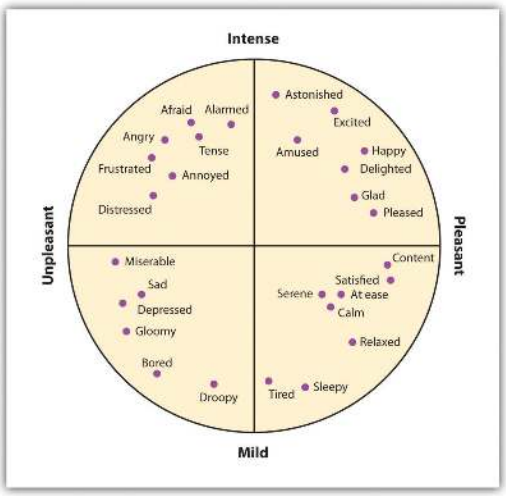


Figure 11.2 The Secondary Emotions. The secondary emotions are those that have a major cognitive component. They are determined by both their level of arousal (mild to intense) and their valence (pleasant to unpleasant). [Long Description]

When you succeed in reaching an important goal, you might spend some time enjoying your secondary emotions, perhaps the experience of joy, satisfaction, and contentment. But when your close friend wins a prize that you thought you had deserved, you might also experience a variety of secondary emotions (in this case, the negative ones) — for instance, feeling angry, sad, resentful, and ashamed. You might mull over the event for weeks or even months, experiencing these negative emotions each time you think about it (Martin & Tesser, 2006).

The distinction between the primary and the secondary emotions is paralleled by two brain pathways: a fast pathway and a slow pathway (Damasio, 2000; LeDoux, 2000; Ochsner, Bunge, Gross, & Gabrieli, 2002). The thalamus acts as the major gatekeeper in this process (Figure 11.3, “Slow and Fast Emotional Pathways”). Our response to the basic emotion of fear, for instance, is primarily determined by the fast pathway through the limbic system. When a car pulls out in front of us on the highway, the thalamus activates and sends an immediate message to the amygdala. We quickly move our foot to the brake pedal. Secondary emotions are more determined by the slow pathway through the frontal lobes in the cortex. When we stew in jealousy over the loss of a partner to a rival or recollect our win in the big tennis match, the process is more complex. Information moves from the thalamus to the frontal lobes for cognitive analysis and integration, and then from there to the amygdala. We experience the arousal of emotion, but it is accompanied by a more complex cognitive appraisal, producing more refined emotions and behavioural responses.

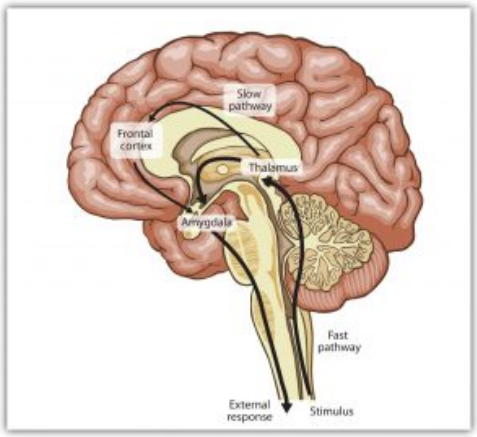


Figure 11.3 Slow and Fast Emotional Pathways. There are two emotional pathways in the brain (one slow and one fast), both of which are controlled by the thalamus.

Although emotions might seem to you to be more frivolous or less important in comparison to our more rational cognitive processes, both emotions and cognitions can help us make effective decisions. In some cases we take action after rationally processing the costs and benefits of different choices, but in other cases we rely on our emotions. Emotions become particularly important in guiding decisions when the alternatives between many complex and conflicting alternatives present us with a high degree of uncertainty and ambiguity, making a complete cognitive analysis difficult. In these cases we often rely on our emotions to make decisions, and these decisions may in many cases be more accurate than those produced by cognitive processing (Damasio, 1994; Dijksterhuis, Bos, Nordgren, & van Baaren, 2006; Nordgren & Dijksterhuis, 2009; Wilson & Schooler, 1991).

The Cannon-Bard and James-Lange Theories of Emotion

Recall for a moment a situation in which you have experienced an intense emotional response. Perhaps you woke up in the middle of the night in a panic because you heard a noise that made you think that someone had broken into your house or apartment. Or maybe you were calmly cruising down a street in your neighbourhood when another car suddenly pulled out in front of you, forcing you to slam on your brakes to avoid an accident. I'm sure that you remember that your emotional reaction was in large part physical. Perhaps you remember being flushed, your heart pounding, feeling sick to your stomach, or having trouble breathing. You were experiencing the physiological part of emotion — arousal — and I'm sure you have had similar feelings in other situations, perhaps when you were in love, angry, embarrassed, frustrated, or very sad.

If you think back to a strong emotional experience, you might wonder about the order of the events that occurred. Certainly you experienced arousal, but did the arousal come before, after, or along with the experience of the emotion? Psychologists have proposed three different theories of emotion, which differ in terms of the hypothesized role of arousal in emotion (Figure 11.4, "Three Theories of Emotion").

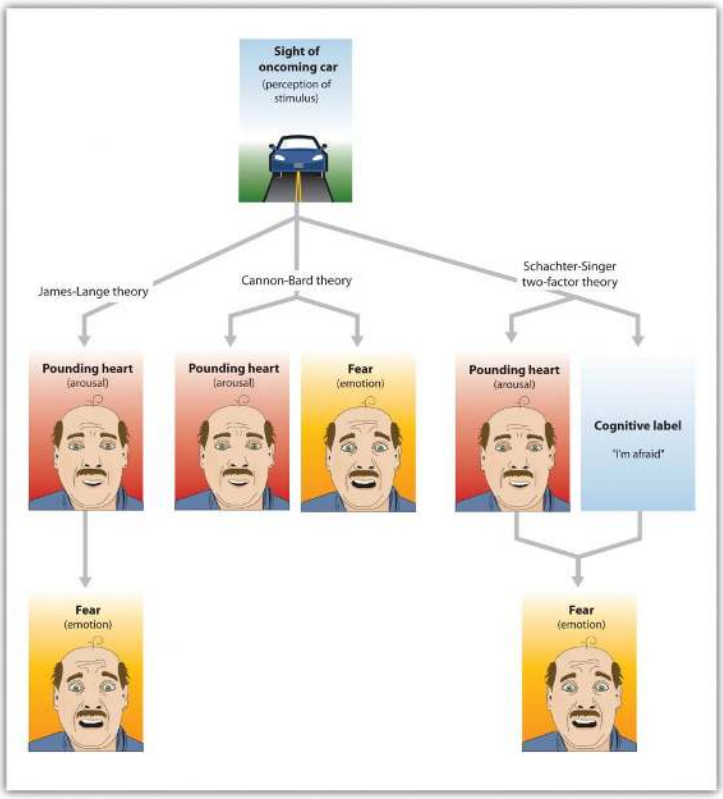


Figure 11.4 Three Theories of Emotion. The Cannon-Bard theory proposes that emotions and arousal occur at the same time. The James-Lange theory proposes the emotion is the result of arousal. Schachter and Singer's two-factor model proposes that arousal and cognition combine to create emotion.

If your experiences are like mine, as you reflected on the arousal that you have experienced in strong emotional situations, you probably thought something like, "I was afraid and my heart started beating like crazy." At least some psychologists agree with this

interpretation. According to the theory of emotion proposed by Walter Cannon and Philip Bard, the experience of the emotion (in this case, “I’m afraid”) occurs alongside the experience of the arousal (“my heart is beating fast”). According to the **Cannon-Bard theory of emotion**, *the experience of an emotion is accompanied by physiological arousal*. Thus, according to this model of emotion, as we become aware of danger, our heart rate also increases.

Although the idea that the experience of an emotion occurs alongside the accompanying arousal seems intuitive to our everyday experiences, the psychologists William James and Carl Lange had another idea about the role of arousal. According to the **James-Lange theory of emotion**, *our experience of an emotion is the result of the arousal that we experience*. This approach proposes that the arousal and the emotion are not independent, but rather that the emotion depends on the arousal. The fear does not occur along with the racing heart but occurs *because of* the racing heart. As William James put it, “We feel sorry because we cry, angry because we strike, afraid because we tremble” (James, 1884, p. 190). A fundamental aspect of the James-Lange theory is that different patterns of arousal may create different emotional experiences.

There is research evidence to support each of these theories. The operation of the fast emotional pathway (Figure 11.4, “Slow and Fast Emotional Pathways”) supports the idea that arousal and emotions occur together. The emotional circuits in the limbic system are activated when an emotional stimulus is experienced, and these circuits quickly create corresponding physical reactions (LeDoux, 2000). The process happens so quickly that it may feel to us as if emotion is simultaneous with our physical arousal.

On the other hand, and as predicted by the James-Lange theory, our experiences of emotion are weaker without arousal. Patients who have spinal injuries that reduce their experience of arousal also report decreases in emotional responses (Hohmann, 1966). There is also at least some support for the idea that different emotions are produced by different patterns of arousal. People who view fearful faces show more amygdala activation than those who watch angry or joyful faces (Whalen et al., 2001; Witvliet & Vrana, 1995), we experience a red face and flushing when we are embarrassed but not when we experience other emotions (Leary, Britt, Cutlip, & Templeton, 1992), and different hormones are released when we experience compassion than when we experience other emotions (Oatley, Keltner, & Jenkins, 2006).

The Two-Factor Theory of Emotion

Whereas the James-Lange theory proposes that each emotion has a different pattern of arousal, the *two-factor theory* of emotion takes the opposite approach, arguing that the arousal that we experience is basically the same in every emotion, and that all emotions (including the basic emotions) are differentiated only by our cognitive appraisal of the source of the arousal. The **two-factor theory of emotion** asserts that *the experience of emotion is determined by the intensity of the arousal we are experiencing, but that the cognitive appraisal of the situation determines what the emotion will be*. Because both arousal and appraisal are necessary, we can say that emotions have two factors: an arousal factor and a cognitive factor (Schachter & Singer, 1962):

emotion = arousal + cognition

In some cases it may be difficult for a person who is experiencing a high level of arousal to accurately determine which emotion he or she is experiencing. That is, the person may be certain that he or she is feeling arousal, but the meaning of the arousal (the cognitive factor) may be less clear. Some romantic relationships, for instance, have a very high level of arousal, and the partners alternatively experience extreme highs and lows in the relationship. One day they are madly in love with each other and the next they are in a huge fight. In situations that are accompanied by high arousal, people may be unsure what emotion they are experiencing. In the high arousal relationship, for instance, the partners may be uncertain whether the emotion they are feeling is love, hate, or both at the same time. *The tendency for people to incorrectly label the source of the arousal that they are experiencing* is known as the **misattribution of arousal**.



Figure 11.5 Capilano Suspension Bridge. Arousal caused by the height of this bridge was misattributed as attraction by the men who were interviewed by an attractive woman as they crossed it.

In one interesting field study by Dutton and Aron (1974), an attractive young woman approached individual young men as they crossed a wobbly, long suspension walkway hanging more than 200 feet above a river in British Columbia (Figure 11.5, "Capilano Suspension Bridge"). The woman asked each man to help her fill out a class questionnaire. When he had finished, she wrote her name and phone number on a piece of paper, and invited him to call if he wanted to hear more about the project. More than half of the men who had been interviewed on the bridge later called the woman. In contrast, men approached by the same woman on a low, solid bridge, or who were interviewed on the suspension bridge by men, called significantly less frequently. The idea of misattribution of arousal can explain this result — the men were feeling arousal from the height of the bridge, but they misattributed it as romantic or sexual attraction to the woman, making them more likely to call her.

Research Focus: Misattributing Arousal

If you think a bit about your own experiences of different emotions, and if you consider the equation that suggests that emotions are represented by both arousal and cognition, you might start to wonder how much was determined by each. That is, do we know what emotion we are experiencing by monitoring our feelings (arousal) or by monitoring our thoughts (cognition)? The bridge study you just read about might begin to provide you with an answer: The men seemed to be more influenced by their perceptions of how they should be feeling (their cognition) rather than by how they actually were feeling (their arousal).

Stanley Schachter and Jerome Singer (1962) directly tested this prediction of the two-factor theory of emotion in a well-known experiment. Schachter and Singer believed that the cognitive part of the emotion was critical — in fact, they believed that the arousal that we experience could be interpreted as any emotion, provided we had the right label for it. Thus they hypothesized that if an individual is experiencing arousal for which there is no immediate explanation, that individual will "label" this state in terms of the cognitions that are created in his or her environment. On the other hand, they argued that people who already have a clear label for their arousal would have no need to search for a relevant label, and therefore should not experience an emotion.

In the research, male participants were told that they would be participating in a study on the effects of a new drug, called suproxin, on vision. On the basis of this cover story, the men were injected with a shot of the neurotransmitter epinephrine, a drug that normally creates feelings of tremors, flushing, and accelerated breathing in people. The idea was to give all the participants the experience of arousal.

Then, according to random assignment to conditions, the men were told that the drug would make them feel certain ways. The men in the *epinephrine informed* condition were told the truth about the effects of the drug — that they would likely experience tremors, their hands would start to shake, their hearts would start to pound, and their faces might get warm and flushed. The participants in the *epinephrine-uninformed* condition, however, were told something untrue — that their feet would feel numb, they would have an itching sensation over parts of their body, and they might get a slight headache. The idea

was to make some of the men think that the arousal they were experiencing was caused by the drug (the *informed condition*), whereas others would be unsure where the arousal came from (the *uninformed condition*).

Then the men were left alone with a confederate who they thought had received the same injection. While they were waiting for the experiment (which was supposedly about vision) to begin, the confederate behaved in a wild and crazy manner (Schachter and Singer called it a “euphoric” manner). He wadded up spitballs, flew paper airplanes, and played with a hula-hoop. He kept trying to get the participant to join in with his games. Then right before the vision experiment was to begin, the participants were asked to indicate their current emotional states on a number of scales. One of the emotions they were asked about was euphoria.

If you are following the story, you will realize what was expected: The men who had a label for their arousal (the *informed* group) would not be experiencing much emotion because they already had a label available for their arousal. The men in the *misinformed* group, on the other hand, were expected to be unsure about the source of the arousal. They needed to find an explanation for their arousal, and the confederate provided one. As you can see in Figure 11.6 ,”Results from Schachter and Singer, 1962″ (left side), this is just what they found. The participants in the misinformed condition were more likely to experience euphoria (as measured by their behavioural responses with the confederate) than were those in the informed condition.

Then Schachter and Singer conducted another part of the study, using new participants. Everything was exactly the same except for the behaviour of the confederate. Rather than being euphoric, he acted angry. He complained about having to complete the questionnaire he had been asked to do, indicating that the questions were stupid and too personal. He ended up tearing up the questionnaire that he was working on, yelling, “I don’t have to tell them that!” Then he grabbed his books and stormed out of the room.

What do you think happened in this condition? The answer is the same thing: the misinformed participants experienced more anger (again as measured by the participant’s behaviours during the waiting period) than did the informed participants. (Figure 11.6, “Results from Schachter and Singer, 1962”, right side). The idea is that because cognitions are such strong determinants of emotional states, the same state of physiological arousal could be labelled in many different ways, depending entirely on the label provided by the social situation. As Schachter and Singer put it: “Given a state of physiological arousal for which an individual has no immediate explanation, he will ‘label’ this state and describe his feelings in terms of the cognitions available to him” (Schachter & Singer, 1962, p. 381).

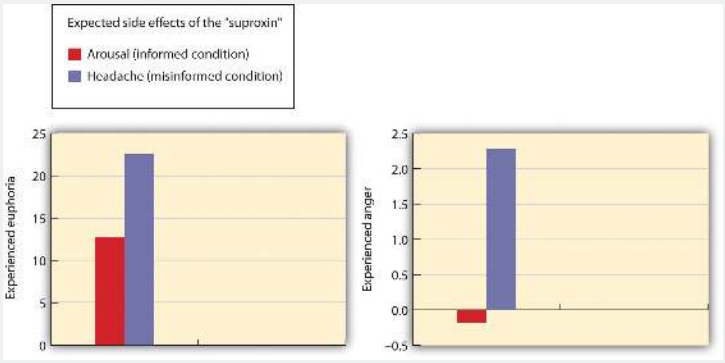


Figure 11.6 Results from Schachter and Singer, 1962. Results of the study by Schachter and Singer (1962) support the two-factor theory of emotion. The participants who did not have a clear label for their arousal took on the emotion of the confederate.

Because it assumes that arousal is constant across emotions, the two-factor theory also predicts that emotions may transfer or spill over from one highly arousing event to another. My university basketball team recently won a basketball championship, but after the final victory some students rioted in the streets near the campus, lighting fires and burning cars. This seems to be a very strange reaction to such a positive outcome for the university and the students, but it can be explained through the spillover of the arousal caused by happiness to destructive behaviours. The principle of **excitation transfer** refers to *the phenomenon that occurs when people who are already experiencing arousal from one event tend to also experience unrelated emotions more strongly*.

In sum, each of the three theories of emotion has something to support it. In terms of Cannon-Bard, emotions and arousal generally are subjectively experienced together, and the spread is very fast. In support of the James-Lange theory, there is at least some evidence that arousal is necessary for the experience of emotion, and that the patterns of arousal are different for different emotions. And in line with the two-factor model, there is also evidence that we may interpret the same patterns of arousal differently in different situations.

Communicating Emotion

In addition to experiencing emotions internally, we also express our emotions to others, and we learn about the emotions of others by observing them. This communication process has evolved over time and is highly adaptive. One way that we perceive the emotions of others is through their **nonverbal communication**, that is, *communication, primarily of liking or disliking, that does not involve words* (Ambady & Weisbuch, 2010; Andersen, 2007). Nonverbal communication includes our tone of voice, gait, posture, touch, and facial expressions, and we can often accurately detect the emotions that other people are experiencing through these channels. Table 11.1, "Some Common Nonverbal Communicators," shows some of the important nonverbal behaviours that we use to express emotion and some other information (particularly liking or disliking, and dominance or submission).

Table 11.1 Some Common Nonverbal Communicators.

Nonverbal cue	Description	Examples
Proxemics	Rules about the appropriate use of personal space	Standing nearer to someone can express liking or dominance.
Body appearance	Expressions based on alterations to our body	Body building, breast augmentation, weight loss, piercings, and tattoos are often used to appear more attractive to others.
Body positioning and movement	Expressions based on how our body appears	A more "open" body position can denote liking; a faster walking speed can communicate dominance.
Gestures	Behaviours and signs made with our hands or faces	The peace sign communicates liking; the "finger" communicates disrespect.
Facial expressions	The variety of emotions that we express, or attempt to hide, through our face	Smiling or frowning and staring or avoiding looking at the other can express liking or disliking, as well as dominance or submission.
Paralanguage	Clues to identity or emotions contained in our voices	Pronunciation, accents, and dialect can be used to communicate identity and liking.

Just as there is no universal spoken language, there is no universal nonverbal language. For instance, in Canada we express disrespect by showing the middle finger (the finger or the bird). But in Britain, Ireland, Australia, and New Zealand, the V sign (made with back of the hand facing the recipient) serves a similar purpose. In countries where Spanish, Portuguese, or French are spoken, a gesture in which a fist is raised and the arm is slapped on the bicep is equivalent to the finger, and in Russia, Indonesia, Turkey, and China a sign in which the hand and fingers are curled and the thumb is thrust between the middle and index fingers is used for the same purpose.

The most important communicator of emotion is the face. The face contains 43 different muscles that allow it to make more than 10,000 unique configurations and to express a wide variety of emotions. For example, happiness is expressed by smiles, which are created by two of the major muscles surrounding the mouth and the eyes, and anger is created by lowered brows and firmly pressed lips.

In addition to helping us express our emotions, the face also helps us feel emotion. The **facial feedback hypothesis** proposes that *the movement of our facial muscles can trigger corresponding emotions*. Fritz Strack and his colleagues (1988) asked their research participants to hold a pen in their teeth (mimicking the facial action of a smile) or between their lips (similar to a frown), and then

had them rate the funniness of a cartoon. They found that the cartoons were rated as more amusing when the pen was held in the smiling position — the subjective experience of emotion was intensified by the action of the facial muscles.

These results, and others like them, show that our behaviours, including our facial expressions, both influence and are influenced by our affect. We may smile because we are happy, but we are also happy because we are smiling. And we may stand up straight because we are proud, but we are proud because we are standing up straight (Stepper & Strack, 1993).

Key Takeaways

- Emotions are the normally adaptive mental and physiological feeling states that direct our attention and guide our behaviour.
- Emotional states are accompanied by arousal, our experiences of the bodily responses created by the sympathetic division of the autonomic nervous system.
- Motivations are forces that guide behaviour. They can be biological, such as hunger and thirst; personal, such as the motivation for achievement; or social, such as the motivation for acceptance and belonging.
- The most fundamental emotions, known as the basic emotions, are those of anger, disgust, fear, happiness, sadness, and surprise.
- Cognitive appraisal also allows us to experience a variety of secondary emotions.
- According to the Cannon-Bard theory of emotion, the experience of an emotion is accompanied by physiological arousal.
- According to the James-Lange theory of emotion, our experience of an emotion is the result of the arousal that we experience.
- According to the two-factor theory of emotion, the experience of emotion is determined by the intensity of the arousal we are experiencing, and the cognitive appraisal of the situation determines what the emotion will be.
- When people incorrectly label the source of the arousal that they are experiencing, we say that they have misattributed their arousal.
- We express our emotions to others through nonverbal behaviours, and we learn about the emotions of others by observing them.

Exercises and Critical Thinking

1. Consider the three theories of emotion that we have discussed and provide an example of a situation in which a person might experience each of the three proposed patterns of arousal and emotion.
2. Describe a time when you used nonverbal behaviours to express your emotions or to detect the emotions of others. What specific nonverbal techniques did you use to communicate?

Image Attributions

Figure 11.2: Adapted from Russell, 1980.
Figure 11.5: Capilano suspension bridge by Goobiebilly (http://commons.wikimedia.org/wiki/Fi..._bridge_-g.jpg) used under CC-BY 2.0 (http://creativecommons.org/licenses/by/2.0/deed.en).

Figure 11.6: Adapted from Schachter & Singer, 1962.

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Long Descriptions

Figure 11.2 long description: The Secondary Emotions

Level of Arousal	Unpleasant	Pleasant
Mild	• Miserable • Sad • Depressed • Gloomy • Bored • Droopy	• Content • Satisfied • At ease • Serene • Calm • Relaxed • Sleepy • Tired
Intense	• Alarmed • Afraid • Angry • Intense • Annoyed • Frustrated • Distressed	• Astonished • Excited • Amused • Happy • Delighted • Glad Pleased

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11.3: Functions of Emotions

Hyisung Hwang and David Matsumoto

Emotions play a crucial role in our lives because they have important functions. This module describes those functions, dividing the discussion into three areas: the intrapersonal, the interpersonal, and the social and cultural functions of emotions. The section on the intrapersonal functions of emotion describes the roles that emotions play within each of us individually; the section on the interpersonal functions of emotion describes the meanings of emotions to our relationships with others; and the section on the social and cultural functions of emotion describes the roles and meanings that emotions have to the maintenance and effective functioning of our societies and cultures at large. All in all we will see that emotions are a crucially important aspect of our psychological composition, having meaning and function to each of us individually, to our relationships with others in groups, and to our societies as a whole.

Learning Objectives

- Gain an appreciation of the importance of emotion in human life.
- Understand the functions and meanings of emotion in three areas of life: the intrapersonal, interpersonal, and social–cultural.
- Give examples of the role and function of emotion in each of the three areas described.

Introduction



Figure 11.7 Emotions help us navigate the complex social landscape of our lives.

It is impossible to imagine life without emotion. We treasure our feelings—the joy at a ball game, the pleasure of the touch of a loved one, or the fun with friends on a night out. Even negative emotions are important, such as the sadness when a loved one dies, the anger when violated, the fear that overcomes us in a scary or unknown situation, or the guilt or shame toward others when our sins are made public. Emotions color life experiences and give those experiences meaning and flavor.

In fact, emotions play many important roles in people's lives and have been the topic of scientific inquiry in psychology for well over a century (Cannon, 1927; Darwin, 1872; James, 1890). This module explores why we have emotions and why they are important. Doing so requires us to understand the function of emotions, and this module does so below by dividing the discussion into three sections. The first concerns the **intrapersonal functions of emotion**, which refer to the role that emotions play within each of us individually. The second concerns the **interpersonal functions of emotion**, which refer to the role emotions play between individuals within a group. The third concerns the **social and cultural functions of emotion**, which refer to the role that emotions play in the maintenance of social order within a society. All in all, we will see that emotions inform us of who we are, what our relationships with others are like, and how to behave in social interactions. Emotions give meaning to events; without emotions, those events would be mere facts. Emotions help coordinate interpersonal relationships. And emotions play an important role in the cultural functioning of keeping human societies together.

Intrapersonal Functions of Emotion

Emotions Help us Act Quickly with Minimal Conscious Awareness

Emotions are rapid information-processing systems that help us act with minimal thinking (Tooby & Cosmides, 2008). Problems associated with birth, battle, death, and seduction have occurred throughout evolutionary history and emotions evolved to aid humans in adapting to those problems rapidly and with minimal conscious cognitive intervention. If we did not have emotions, we could not make rapid decisions concerning whether to attack, defend, flee, care for others, reject food, or approach something useful, all of which were functionally adaptive in our evolutionary history and helped us to survive. For instance, drinking spoiled milk or eating rotten eggs has negative consequences for our welfare. The emotion of disgust, however, helps us immediately take action by not ingesting them in the first place or by vomiting them out. This response is adaptive because it aids, ultimately, in our survival and allows us to act immediately without much thinking. In some instances, taking the time to sit and rationally think about what to do, calculating cost–benefit ratios in one's mind, is a luxury that might cost one one's life. Emotions evolved so that we can act without that depth of thinking.

Emotions Prepare the Body for Immediate Action



Figure 11.8 The emotion of disgust serves to protect us from toxins and contamination, of the physical and moral variety.

Emotions prepare us for behavior. When triggered, emotions orchestrate systems such as perception, attention, inference, learning, memory, goal choice, motivational priorities, physiological reactions, motor behaviors, and behavioral decision making (Cosmides & Tooby, 2000; Tooby & Cosmides, 2008). Emotions simultaneously activate certain systems and deactivate others in order to prevent the chaos of competing systems operating at the same time, allowing for coordinated responses to environmental stimuli (Levenson, 1999). For instance, when we are afraid, our bodies shut down temporarily unneeded digestive processes, resulting in saliva reduction (a dry mouth); blood flows disproportionately to the lower half of the body; the visual field expands; and air is breathed in, all preparing the body to flee. Emotions initiate a system of components that includes subjective experience, expressive behaviors, physiological reactions, action tendencies, and cognition, all for the purposes of specific actions; the term "emotion" is, in reality, a metaphor for these reactions.

One common misunderstanding many people have when thinking about emotions, however, is the belief that emotions must always directly produce action. This is not true. Emotion certainly *prepares* the body for action; but whether people actually engage in action is dependent on many factors, such as the context within which the emotion has occurred, the target of the emotion, the perceived consequences of one's actions, previous experiences, and so forth (Baumeister, Vohs, DeWall, & Zhang, 2007; Matsumoto & Wilson, 2008). Thus, emotions are just one of many determinants of behavior, albeit an important one.

Emotions Influence Thoughts

Emotions are also connected to thoughts and memories. Memories are not just facts that are encoded in our brains; they are colored with the emotions felt at those times the facts occurred (Wang & Ross, 2007). Thus, emotions serve as the neural glue that connects those disparate facts in our minds. That is why it is easier to remember happy thoughts when happy, and angry times when angry. Emotions serve as the affective basis of many attitudes, values, and beliefs that we have about the world and the people around us; without emotions those attitudes, values, and beliefs would be just statements without meaning, and emotions give those statements meaning. Emotions influence our thinking processes, sometimes in constructive ways, sometimes not. It is difficult to think critically and clearly when we feel intense emotions, but easier when we are not overwhelmed with emotions (Matsumoto, Hirayama, & LeRoux, 2006).

Emotions Motivate Future Behaviors

Because emotions prepare our bodies for immediate action, influence thoughts, and can be felt, they are important motivators of future behavior. Many of us strive to experience the feelings of satisfaction, joy, pride, or triumph in our accomplishments and achievements. At the same time, we also work very hard to avoid strong negative feelings; for example, once we have felt the emotion of disgust when drinking the spoiled milk, we generally work very hard to avoid having those feelings again (e.g., checking the expiration date on the label before buying the milk, smelling the milk before drinking it, watching if the milk curdles in one's coffee before drinking it). Emotions, therefore, not only influence immediate actions but also serve as an important motivational basis for future behaviors.

Interpersonal Functions of Emotion



Figure 11.9 Emotions can act as signals to our friends and partners, conveying information about the quality of the relationship.

Emotions are expressed both verbally through words and nonverbally through facial expressions, voices, gestures, body postures, and movements. We are constantly expressing emotions when interacting with others, and others can reliably judge those emotional expressions (Elfenbein & Ambady, 2002; Matsumoto, 2001); thus, emotions have signal value to others and influence others and our social interactions. Emotions and their expressions communicate information to others about our feelings, intentions, relationship with the target of the emotions, and the environment. Because emotions have this communicative signal value, they help solve social problems by evoking responses from others, by signaling the nature of interpersonal relationships, and by providing incentives for desired social behavior (Keltner, 2003).

Emotional Expressions Facilitate Specific Behaviors in Perceivers

Because facial expressions of emotion are universal social signals, they contain meaning not only about the expressor's psychological state but also about that person's intent and subsequent behavior. This information affects what the perceiver is likely to do. People observing fearful faces, for instance, are more likely to produce approach-related behaviors, whereas people who observe angry faces are more likely to produce avoidance-related behaviors (Marsh, Ambady, & Kleck, 2005). Even subliminal presentation of smiles produces increases in how much beverage people pour and consume and how much they are willing to pay for it; presentation of angry faces decreases these behaviors (Winkielman, Berridge, & Wilbarger, 2005). Also, emotional displays evoke specific, complementary emotional responses from observers; for example, anger evokes fear in others (Dimberg & Ohman, 1996; Esteves, Dimberg, & Ohman, 1994), whereas distress evokes sympathy and aid (Eisenberg et al., 1989).

Emotional Expressions Signal the Nature of Interpersonal Relationships

Emotional expressions provide information about the nature of the relationships among interactants. Some of the most important and provocative set of findings in this area come from studies involving married couples (Gottman & Levenson, 1992; Gottman, Levenson, & Woodin, 2001). In this research, married couples visited a laboratory after having not seen each other for 24 hours, and then engaged in intimate conversations about daily events or issues of conflict. Discrete expressions of contempt, especially by the men, and disgust, especially by the women, predicted later marital dissatisfaction and even divorce.

Emotional Expressions Provide Incentives for Desired Social Behavior

Facial expressions of emotion are important regulators of social interaction. In the developmental literature, this concept has been investigated under the concept of **social referencing** (Klinnert, Campos, & Sorce, 1983); that is, the process whereby infants seek out information from others to clarify a situation and then use that information to act. To date, the strongest demonstration of social

referencing comes from work on the visual cliff. In the first study to investigate this concept, Campos and colleagues (Sorce, Emde, Campos, & Klinnert, 1985) placed mothers on the far end of the "cliff" from the infant. Mothers first smiled to the infants and placed a toy on top the safety glass to attract them; infants invariably began crawling to their mothers. When the infants were in the center of the table, however, the mother then posed an expression of fear, sadness, anger, interest, or joy. The results were clearly different for the different faces; no infant crossed the table when the mother showed fear; only 6% did when the mother posed anger, 33% crossed when the mother posed sadness, and approximately 75% of the infants crossed when the mother posed joy or interest.

Other studies provide similar support for facial expressions as regulators of social interaction. In one study (Bradshaw, 1986), experimenters posed facial expressions of neutral, anger, or disgust toward babies as they moved toward an object and measured the amount of inhibition the babies showed in touching the object. The results for 10- and 15-month olds were the same: anger produced the greatest inhibition, followed by disgust, with neutral the least. This study was later replicated (Hertenstein & Campos, 2004) using joy and disgust expressions, altering the method so that the infants were not allowed to touch the toy (compared with a distractor object) until one hour after exposure to the expression. At 14 months of age, significantly more infants touched the toy when they saw joyful expressions, but fewer touched the toy when the infants saw disgust.

Social and Cultural Functions of Emotion



Figure 11.10 Although there are cultural differences in the display of emotion, almost all infants start showing emotion such as smiling or reacting to their caretaker as early as 6 weeks after their birth.

If you stop to think about many things we take for granted in our daily lives, we cannot help but come to the conclusion that modern human life is a colorful tapestry of many groups and individual lives woven together in a complex yet functional way. For example, when you're hungry, you might go to the local grocery store and buy some food. Ever stop to think about how you're able to do that? You might buy a banana that was grown in a field in southeast Asia being raised by farmers there, where they planted the tree, cared for it, and picked the fruit. They probably handed that fruit off to a distribution chain that allowed multiple people somewhere to use tools such as cranes, trucks, cargo bins, ships or airplanes (that were also created by multiple people somewhere) to bring that banana to your store. The store had people to care for that banana until you came and got it and to barter with you for it (with your money). You may have gotten to the store riding a vehicle that was produced somewhere else in the world by others, and you were probably wearing clothes produced by some other people somewhere else.

Thus, human social life is complex. Individuals are members of multiple groups, with multiple social roles, norms, and expectations, and people move rapidly in and out of the multiple groups of which they are members. Moreover, much of human social life is unique because it revolves around cities, where many people of disparate backgrounds come together. This creates the enormous potential for social chaos, which can easily occur if individuals are not coordinated well and relationships not organized systematically.

One of the important functions of culture is to provide this necessary coordination and organization. Doing so allows individuals and groups to negotiate the social complexity of human social life, thereby maintaining social order and preventing social chaos. Culture does this by providing a meaning and information system to its members, which is shared by a group and transmitted across generations, that allows the group to meet basic needs of survival, pursue happiness and well-being, and derive meaning from life (Matsumoto & Juang, 2013). Culture is what allowed the banana from southeast Asia to appear on your table.

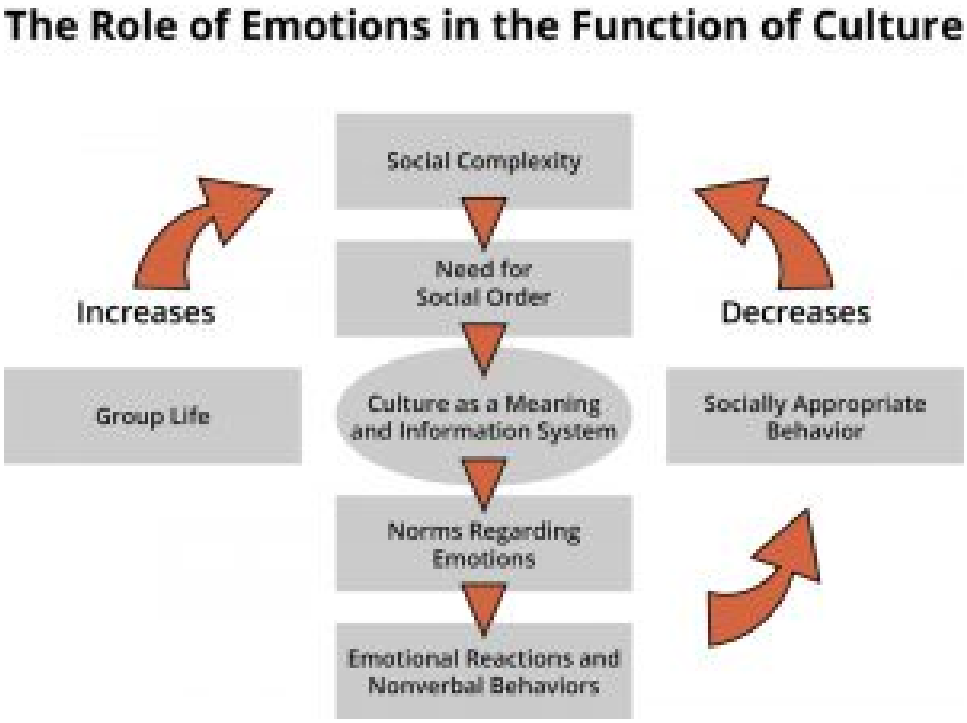


Figure 11.11 The Role of Emotions in the Function of Culture

Cultural transmission of the meaning and information system to its members is, therefore, a crucial aspect of culture. One of the ways this transmission occurs is through the development of worldviews (including attitudes, values, beliefs, and norms) related to emotions (Matsumoto & Hwang, 2013; Matsumoto et al., 2008). Worldviews related to emotions provide guidelines for desirable emotions that facilitate norms for regulating individual behaviors and interpersonal relationships. Our cultural backgrounds tell us which emotions are ideal to have, and which are not (Tsai, Knutson, & Fung, 2006). The cultural transmission of information related to emotions occurs in many ways, from childrearers to children, as well as from the cultural products available in our world, such as books, movies, ads, and the like (Schönpflug, 2009; Tsai, Louie, Chen, & Uchida, 2007).



Figure 11.12 Cultural display rules teach us how to manage our emotions. For example, in many Asian countries children are taught to mute their emotions, especially negative emotions like anger.

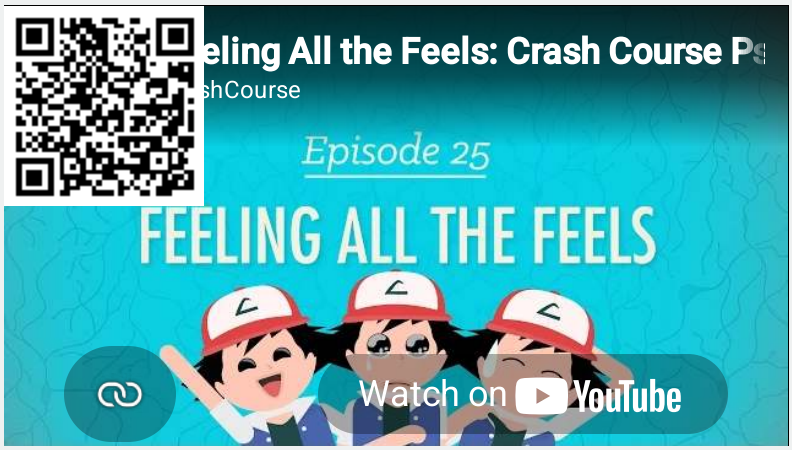
Cultures also inform us about what to do with our emotions—that is, how to manage or modify them—when we experience them. One of the ways in which this is done is through the management of our emotional expressions through **cultural display rules** (Friesen, 1972). These are rules that are learned early in life that specify the management and modification of our emotional expressions according to social circumstances. Thus, we learn that “big boys don’t cry” or to laugh at the boss’s jokes even though they’re not funny. By affecting how individuals express their emotions, culture also influences how people experience them as well.

Because one of the major functions of culture is to maintain social order in order to ensure group efficiency and thus survival, cultures create worldviews, rules, guidelines, and norms concerning emotions because emotions have important intra- and

interpersonal functions, as described above, and are important motivators of behavior. Norms concerning emotion and its regulation in all cultures serve the purpose of maintaining social order. Cultural worldviews and norms help us manage and modify our emotional reactions (and thus behaviors) by helping us to have certain kinds of emotional experiences in the first place and by managing our reactions and subsequent behaviors once we have them. By doing so, our culturally moderated emotions can help us engage in socially appropriate behaviors, as defined by our cultures, and thus reduce social complexity and increase social order, avoiding social chaos. All of this allows us to live relatively harmonious and constructive lives in groups. If cultural worldviews and norms about emotions did not exist, people would just run amok having all kinds of emotional experiences, expressing their emotions and then behaving in all sorts of unpredictable and potentially harmful ways. If that were the case, it would be very difficult for groups and societies to function effectively, and even for humans to survive as a species, if emotions were not regulated in culturally defined ways for the common, social good. Thus, emotions play a critical role in the successful functioning of any society and culture.

Outside Resources

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NPR News: Science Of Sadness And Joy: 'Inside Out' Gets Childhood Emotions Righthttp://www.npr.org/sections/health-shots/2015/06/13/413980258/science-of-sadness-and-joy-inside-out-gets-childhood-emotions-right

Online Psychology Laboratory: Motivation and Emotion resourceshttp://opl.apa.org/Resources.aspx#Motivation

Web: See how well you can read other people's facial expressions of emotionhttp://www.humintell.com/free-demos/

Discussion Questions

1. When emotions occur, why do they simultaneously activate certain physiological and psychological systems in the body and deactivate others?
2. Why is it difficult for people to act rationally and think happy thoughts when they are angry? Conversely, why is it difficult to remember sad memories or have sad thoughts when people are happy?
3. You're walking down a deserted street when you come across a stranger who looks scared. What would you say? What would you do? Why?

4. You're walking down a deserted street when you come across a stranger who looks angry. What would you say? What would you do? Why?
5. Think about the messages children receive from their environment (such as from parents, mass media, the Internet, Hollywood movies, billboards, and storybooks). In what ways do these messages influence the kinds of emotions that children should and should not feel?

Image Attributions

Figure 11.7: Gwenaël Piase, https://goo.gl/d4EDKS, CC BY-NC-SA 2.0, https://goo.gl/hSpkVI

Figure 11.8: Runs with Scissors, https://goo.gl/FQRxGa, CC BY-NC 2.0, https://goo.gl/tgFydH

Figure 11.9: mynameisharsha, https://goo.gl/HY2XgV, CC BY-SA 2.0, https://goo.gl/rxiUsF

Figure 11.10: vgm8383, https://goo.gl/jgfRDN, CC BY-NC 2.0, https://goo.gl/VnKlK8

Figure 11.12: john.gillespie, https://goo.gl/gTdPYb, CC BY-SA 3.0, https://goo.gl/eLCn2O

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11.4: Positive Emotions- The Power of Happiness

Charles Stangor and Jennifer Walinga

Learning Objectives

- Understand the important role of positive emotions and happiness in responding to stress.
- Understand the factors that increase, and do not increase, happiness.

Although stress is an emotional response that can kill us, our emotions can also help us cope with and protect ourselves from it. The stress of the Monday through Friday grind can be offset by the fun that we can have on the weekend, and the concerns that we have about our upcoming chemistry exam can be offset by a positive attitude toward school, life, and other people. Put simply, the best antidote for stress is a happy one: think positively, have fun, and enjoy the company of others.

You have probably heard about the power of positive thinking — the idea that thinking positively helps people meet their goals and keeps them healthy, happy, and able to effectively cope with the negative events that occur to them. It turns out that positive thinking really works. People who think positively about their future, who believe that they can control their outcomes, and who are willing to open up and share with others are healthier people (Seligman, & Csikszentmihalyi, 2000).

The power of positive thinking comes in different forms, but they are all helpful. Some researchers have focused on **optimism**, *a general tendency to expect positive outcomes*, finding that optimists are happier and have less stress (Carver & Scheier, 2009). Others have focused on **self-efficacy**, *the belief in our ability to carry out actions that produce desired outcomes*. People with high self-efficacy respond to environmental and other threats in an active, constructive way — by getting information, talking to friends, and attempting to face and reduce the difficulties they are experiencing. These people too are better able to ward off their stresses in comparison to people with less self-efficacy (Thompson, 2009).

Self-efficacy helps in part because it leads us to perceive that we can control the potential stressors that may affect us. Workers who have control over their work environment (e.g., by being able to move furniture and control distractions) experience less stress, as do patients in nursing homes who are able to choose their everyday activities (Rodin, 1986). Glass, Reim, and Singer (1971) found that participants who believed that they could stop a loud noise experienced less stress than those who did not think that they could, even though the people who had the option never actually used it. The ability to control our outcomes may help explain why animals and people who have higher status live longer (Sapolsky, 2005).

Suzanne Kobasa and her colleagues (Kobasa, Maddi, & Kahn, 1982) have argued that the tendency to be less affected by life's stressors can be characterized as an individual difference measure that has a relationship to both optimism and self-efficacy known as *hardiness*. Hardy individuals are those who are more positive overall about potentially stressful life events, who take more direct action to understand the causes of negative events, and who attempt to learn from them what may be of value for the future. Hardy individuals use effective coping strategies, and they take better care of themselves.

Taken together, these various coping skills, including optimism, self-efficacy, and hardiness, have been shown to have a wide variety of positive effects on our health. Optimists make faster recoveries from illnesses and surgeries (Carver et al., 2005). People with high self-efficacy have been found to be better able to quit smoking and lose weight and are more likely to exercise regularly (Cohen & Pressman, 2006). And hardy individuals seem to cope better with stress and other negative life events (Dolbier, Smith, & Steinhardt, 2007). The positive effects of positive thinking are particularly important when stress is high. Baker (2007) found that in periods of low stress, positive thinking made little difference in responses to stress, but that during stressful periods optimists were less likely to smoke on a day-to-day basis and to respond to stress in more productive ways, such as by exercising.

It is possible to learn to think more positively, and doing so can be beneficial. Antoni and colleagues (2001) found that pessimistic cancer patients who were given training in optimism reported more optimistic outlooks after the training and were less fatigued after their treatments. And Maddi, Kahn, and Maddi (1998) found that a hardiness training program that included focusing on ways to effectively cope with stress was effective in increasing satisfaction and decreasing self-reported stress.

The benefits of taking positive approaches to stress can last a lifetime. Christopher Peterson and his colleagues (Peterson, Seligman, Yurko, Martin, & Friedman, 1998) found that the level of optimism reported by people who had first been interviewed when they were in university during the years between 1936 and 1940 predicted their health over the next 50 years. Students who

had a more positive outlook on life in university were less likely to have died up to 50 years later of all causes, and they were particularly likely to have experienced fewer accidental and violent deaths, in comparison to students who were less optimistic. Similar findings were found for older adults. After controlling for loneliness, marital status, economic status, and other correlates of health, Levy and Myers found that older adults with positive attitudes and higher self-efficacy had better health and lived on average almost eight years longer than their more negative peers (Levy & Myers, 2005; Levy, Slade, & Kasl, 2002). And Diener, Nickerson, Lucas, and Sandvik (2002) found that people who had cheerier dispositions earlier in life had higher income levels and less unemployment when they were assessed 19 years later.

Finding Happiness through Our Connections with Others

Happiness is determined in part by genetic factors, such that some people are naturally happier than others (Braungart, Plomin, DeFries, & Fulker, 1992; Lykken, 2000), but also in part by the situations that we create for ourselves. Psychologists have studied hundreds of variables that influence happiness, but there is one that is by far the most important. People who report that they *have positive social relationships with others* — the **perception of social support** — also report being happier than those who report having less social support (Diener, Suh, Lucas, & Smith, 1999; Diener, Tamir, & Scollon, 2006). Married people report being happier than unmarried people (Pew, 2006), and people who are connected with and accepted by others suffer less depression, higher self-esteem, and less social anxiety and jealousy than those who feel more isolated and rejected (Leary, 1990).

Social support also helps us better cope with stressors. Koopman, Hermanson, Diamond, Angell, and Spiegel (1998) found that women who reported higher social support experienced less depression when adjusting to a diagnosis of cancer, and Ashton and colleagues (2005) found a similar buffering effect of social support for AIDS patients. People with social support are less depressed overall, recover faster from negative events, and are less likely to commit suicide (Au, Lau, & Lee, 2009; Bertera, 2007; Compton, Thompson, & Kaslow, 2005; Skärsäter, Langius, Ågren, Häagström, & Dencker, 2005).

Social support buffers us against stress in several ways. For one, *having people we can trust and rely on helps us directly* by allowing us to share favours when we need them. These are the **direct effects** of social support. But *having people around us also makes us feel good about ourselves*. These are the **appreciation effects** of social support. Gençöz and Özlale (2004) found that students with more friends felt less stress and reported that their friends helped them, but they also reported that having friends made them feel better about themselves. Again, you can see that the tend-and-befriend response, so often used by women, is an important and effective way to reduce stress.

What Makes Us Happy?

One difficulty that people face when trying to improve their happiness is that they may not always know what will make them happy. As one example, many of us think that if we just had more money we would be happier. While it is true that we do need money to afford food and adequate shelter for ourselves and our families, after this minimum level of wealth is reached, more money does not generally buy more happiness (Easterlin, 2005). For instance, as you can see in Figure 11.13, “Income and Happiness,” even though income and material success has improved dramatically in many countries over the past decades, happiness has not. Despite tremendous economic growth in France, Japan, and Canada between 1946 and 1990, there was no increase in reports of well-being by the citizens of these countries. People today have about three times the buying power they had in the 1950s, and yet overall happiness has not increased. The problem seems to be that we never seem to have enough money to make us really happy. Csikszentmihalyi (1999) reported that people who earned $30,000 per year felt that they would be happier if they made $50,000 per year, but that people who earned $100,000 per year said that they would need $250,000 per year to make them happy.

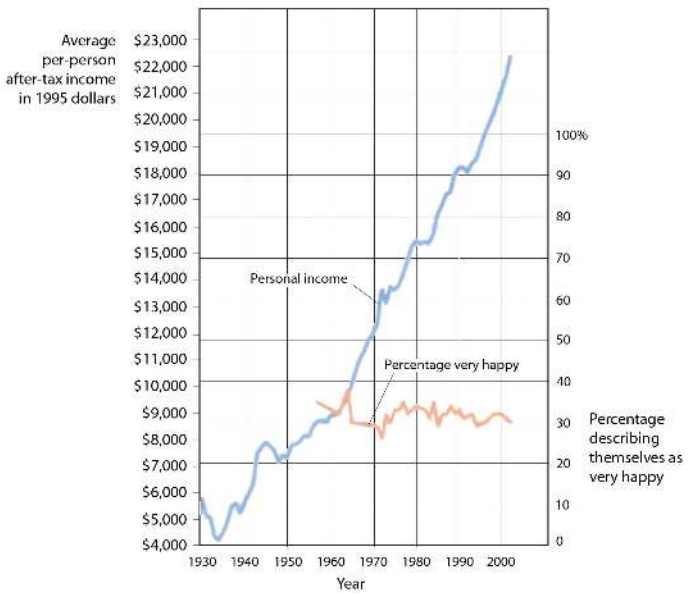


Figure 11.13 Income and Happiness. Although personal income keeps rising, happiness does not.

These findings might lead us to conclude that we don't always know what does or what might make us happy, and this seems to be at least partially true. For instance, Jean Twenge and her colleagues (Twenge, Campbell & Foster, 2003) have found in several studies that although people with children frequently claim that having children makes them happy, couples who do not have children actually report being happier than those who do.

Psychologists have found that people's ability to predict their future emotional states is not very accurate (Wilson & Gilbert, 2005). For one, people overestimate their emotional reactions to events. Although people think that positive and negative events that might occur to them will make a huge difference in their lives, and although these changes do make at least some difference in life satisfaction, they tend to be less influential than we think they are going to be. Positive events tend to make us feel good, but their effects wear off pretty quickly, and the same is true for negative events. For instance, Brickman, Coates, and Janoff-Bulman (1978) interviewed people who had won more than $50,000 in a lottery and found that they were not happier than they had been in the past, and were also not happier than a control group of similar people who had not won the lottery. On the other hand, the researchers found that individuals who were paralyzed as a result of accidents were not as unhappy as might be expected.

How can this possibly be? There are several reasons. For one, people are resilient; they bring their coping skills to play when negative events occur, and this makes them feel better. Secondly, most people do not continually experience very positive, or very negative, affect over a long period of time, but rather adapt to their current circumstances. Just as we enjoy the second chocolate bar we eat less than we enjoy the first, as we experience more and more positive outcomes in our daily lives we habituate to them and our life satisfaction returns to a more moderate level (Small, Zatorre, Dagher, Evans, & Jones-Gotman, 2001).

Another reason that we may mispredict our happiness is that our social comparisons change when our own status changes as a result of new events. People who are wealthy compare themselves to other wealthy people, people who are poor tend to compare with other poor people, and people who are ill tend to compare with other ill people. When our comparisons change, our happiness levels are correspondingly influenced. And when people are asked to predict their future emotions, they may focus only on the positive or negative event they are asked about, and forget about all the other things that won't change. Wilson, Wheatley, Meyers, Gilbert, and Axsom (2000) found that when people were asked to focus on all the more regular things that they will still be doing in the future (working, going to church, socializing with family and friends, and so forth), their predictions about how something really good or bad would influence them were less extreme.

If pleasure is fleeting, at least misery shares some of the same quality. We might think we cannot be happy if something terrible, such as the loss of a partner or child, were to happen to us, but after a period of adjustment most people find that happiness levels return to prior levels (Bonnano et al., 2002). Health concerns tend to put a damper on our feeling of well-being, and those with a serious disability or illness show slightly lowered mood levels. But even when health is compromised, levels of misery are lower

than most people expect (Lucas, 2007; Riis et al., 2005). For instance, although disabled individuals have more concern about health, safety, and acceptance in the community, they still experience overall positive happiness levels (Marinić & Brkljačić, 2008). Taken together, it has been estimated that our wealth, health, and life circumstances account for only 15% to 20% of life satisfaction scores (Argyle, 1999). Clearly the main ingredient in happiness lies beyond, or perhaps beneath, external factors.

Key Takeaways

- Positive thinking can be beneficial to our health.
- Optimism, self-efficacy, and hardiness all relate to positive health outcomes.
- Happiness is determined in part by genetic factors, but also by the experience of social support.
- People may not always know what will make them happy.
- Material wealth plays only a small role in determining happiness.

Exercises and Critical Thinking

1. Are you a happy person? Can you think of ways to increase your positive emotions?
2. Do you know what will make you happy? Do you believe that material wealth is not as important as you might have thought it would be?

Image Attributions

Figure 11.13: Layard, 2005.

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11.5: Drive States

Sudeep Bhatia and George Loewenstein

Our thoughts and behaviors are strongly influenced by affective experiences known as drive states. These drive states motivate us to fulfill goals that are beneficial to our survival and reproduction. This module provides an overview of key drive states, including information about their neurobiology and their psychological effects.

Learning Objectives

- Identify the key properties of drive states
- Describe biological goals accomplished by drive states
- Give examples of drive states
- Outline the neurobiological basis of drive states such as hunger and arousal
- Discuss the main moderators and determinants of drive states such as hunger and arousal

Introduction



Figure 11.14 Hunger is among our most basic motivators.

What is the longest you've ever gone without eating? A couple of hours? An entire day? How did it feel? Humans rely critically on food for nutrition and energy, and the absence of food can create drastic changes, not only in physical appearance, but in thoughts and behaviors. If you've ever fasted for a day, you probably noticed how hunger can take over your mind, directing your attention to foods you could be eating (a cheesy slice of pizza, or perhaps some sweet, cold ice cream), and motivating you to obtain and consume these foods. And once you have eaten and your hunger has been satisfied, your thoughts and behaviors return to normal.

Hunger is a **drive state**, an affective experience (something you feel, like the sensation of being tired or hungry) that motivates organisms to fulfill goals that are generally beneficial to their survival and reproduction. Like other drive states, such as thirst or sexual arousal, hunger has a profound impact on the functioning of the mind. It affects psychological processes, such as perception, attention, emotion, and motivation, and influences the behaviors that these processes generate.

Key Properties of Drive States

Drive states differ from other affective or emotional states in terms of the biological functions they accomplish. Whereas all affective states possess valence (i.e., they are positive or negative) and serve to motivate approach or avoidance behaviors (Zajonc, 1998), drive states are unique in that they generate behaviors that result in specific benefits for the body. For example, hunger directs individuals to eat foods that increase blood sugar levels in the body, while thirst causes individuals to drink fluids that increase water levels in the body.

Different drive states have different triggers. Most drive states respond to both internal and external cues, but the combinations of internal and external cues, and the specific types of cues, differ between drives. Hunger, for example, depends on internal, visceral signals as well as sensory signals, such as the sight or smell of tasty food. Different drive states also result in different cognitive and emotional states, and are associated with different behaviors. Yet despite these differences, there are a number of properties common to all drive states.



Figure 11.15 The body needs homeostasis and motivates us – through both pleasure and pain – to stay in balance.

Humans, like all organisms, need to maintain a stable state in their various physiological systems. For example, the excessive loss of body water results in dehydration, a dangerous and potentially fatal state. However, too much water can be damaging as well. Thus, a moderate and stable level of body fluid is ideal. The tendency of an organism to maintain this stability across all the different physiological systems in the body is called **homeostasis**.

Homeostasis is maintained via two key factors. First, the state of the system being regulated must be monitored and compared to an ideal level, or a **set point**. Second, there need to be mechanisms for moving the system back to this set point—that is, to restore homeostasis when deviations from it are detected. To better understand this, think of the thermostat in your own home. It detects when the current temperature in the house is different than the temperature you have it set at (i.e., the set point). Once the thermostat recognizes the difference, the heating or air conditioning turns on to bring the overall temperature back to the designated level.

Many homeostatic mechanisms, such as blood circulation and immune responses, are automatic and nonconscious. Others, however, involve deliberate action. Most drive states motivate action to restore homeostasis using both “punishments” and “rewards.” Imagine that these homeostatic mechanisms are like molecular parents. When you behave poorly by departing from the set point (such as not eating or being somewhere too cold), they raise their voice at you. You experience this as the bad feelings, or “punishments,” of hunger, thirst, or feeling too cold or too hot. However, when you behave well (such as eating nutritious foods when hungry), these homeostatic parents reward you with the pleasure that comes from any activity that moves the system back toward the set point. For example, when body temperature declines below the set point, any activity that helps to restore homeostasis (such as putting one’s hand in warm water) feels pleasurable; and likewise, when body temperature rises above the set point, anything that cools it feels pleasurable.

The Narrowing of Attention

As drive states intensify, they direct attention toward elements, activities, and forms of consumption that satisfy the biological needs associated with the drive. Hunger, for example, draws attention toward food. Outcomes and objects that are not related to satisfying hunger lose their value (Easterbrook, 1959). For instance, has anyone ever invited you to do a fun activity while you were hungry? Likely your response was something like: “I’m not doing anything until I eat first.” Indeed, at a sufficient level of intensity, individuals will sacrifice almost any quantity of goods that do not address the needs signaled by the drive state. For example, cocaine addicts, according to Gawin (1991:1581), “report that virtually all thoughts are focused on cocaine during binges; nourishment, sleep, money, loved ones, responsibility, and survival lose all significance.”

Drive states also produce a second form of attention-narrowing: a collapsing of time-perspective toward the present. That is, they make us impatient. While this form of attention-narrowing is particularly pronounced for the outcomes and behaviors directly related to the biological function being served by the drive state at issue (e.g., “I need food now”), it applies to general concerns for the future as well. Ariely and Loewenstein (2006), for example, investigated the impact of sexual arousal on the thoughts and behaviors of a sample of male undergraduates. These undergraduates were lent laptop computers that they took to their private residences, where they answered a series of questions, both in normal states and in states of high sexual arousal. Ariely and Loewenstein found that being sexually aroused made people extremely impatient for both sexual outcomes and for outcomes in

other domains, such as those involving money. In another study Giordano et al. (2002) found that heroin addicts were more impatient with respect to heroin when they were craving it than when they were not. More surprisingly, they were also more impatient toward money (they valued delayed money less) when they were actively craving heroin.

Yet a third form of attention-narrowing involves thoughts and outcomes related to the self versus others. Intense drive states tend to narrow one's focus inwardly and to undermine altruism—or the desire to do good for others. People who are hungry, in pain, or craving drugs tend to be selfish. Indeed, popular interrogation methods involve depriving individuals of sleep, food, or water, so as to trigger intense drive states leading the subject of the interrogation to divulge information that may betray comrades, friends, and family (Biderman, 1960).

Current Controversy

In 2005, the American Psychological Association (APA) issued a report concluding that psychologists could ethically play a role in the interrogation of people captured in Afghanistan and elsewhere. In 2014, following critical media publicity documenting the APA's involvement in torture, the APA commissioned a law firm to independently investigate APA involvement in interrogation. The firm's report was damaging to the APA because it suggested that APA leaders colluded with the Department of Defense, CIA, and and other government officials not only to aid in interrogation itself, but to provide justification for government guidelines that defined torture (which is banned by international treaties signed by the U.S.) in a narrow fashion that excluded, for example, so-called "stress positions" and sleep deprivation.

Critical Questions

1. Do you think that manipulating drive states, such as the need for sleep, constitutes torture?
2. How do you think research on drive states should inform the definition of "torture" and our definition of ethical interrogation techniques?

See the full Hoffman Report here – http://www.apa.org/independent-review/APA-FINAL-Report-7.2.15.pdf

For more coverage – http://www.nytimes.com/2015/07/11/us/psychologists-shielded-us-torture-program-report-finds.html

Two Illustrative Drive States

Thus far we have considered drive states abstractly. We have discussed the ways in which they relate to other affective and motivational mechanisms, as well as their main biological purpose and general effects on thought and behavior. Yet, despite serving the same broader goals, different drive states are often remarkably different in terms of their specific properties. To understand some of these specific properties, we will explore two different drive states that play very important roles in determining behavior, and in ensuring human survival: hunger and sexual arousal.

Hunger



Figure 11.16 External cues, like the sight and smell of food, can ignite feelings of hunger.

Hunger is a classic example of a drive state, one that results in thoughts and behaviors related to the consumption of food. Hunger is generally triggered by low glucose levels in the blood (Rolls, 2000), and behaviors resulting from hunger aim to restore homeostasis regarding those glucose levels. Various other internal and external cues can also cause hunger. For example, when fats are broken down in the body for energy, this initiates a chemical cue that the body should search for food (Greenberg, Smith, &

Gibbs, 1990). External cues include the time of day, estimated time until the next feeding (hunger increases immediately prior to food consumption), and the sight, smell, taste, and even touch of food and food-related stimuli. Note that while hunger is a generic feeling, it has nuances that can provoke the eating of specific foods that correct for nutritional imbalances we may not even be conscious of. For example, a couple who was lost adrift at sea found they inexplicably began to crave the eyes of fish. Only later, after they had been rescued, did they learn that fish eyes are rich in vitamin C—a very important nutrient that they had been depleted of while lost in the ocean (Walker, 2014).The **hypothalamus** (located in the lower, central part of the brain) plays a very important role in eating behavior. It is responsible for synthesizing and secreting various hormones. The lateral hypothalamus (LH) is concerned largely with hunger and, in fact, lesions (i.e., damage) of the LH can eliminate the desire for eating entirely—to the point that animals starve themselves to death unless kept alive by force feeding (Anand & Brobeck, 1951). Additionally, artificially stimulating the LH, using electrical currents, can generate eating behavior if food is available (Andersson, 1951).Activation of the LH can not only increase the desirability of food but can also reduce the desirability of nonfood-related items. For example, Brendl, Markman, and Messner (2003) found that participants who were given a handful of popcorn to trigger hunger not only had higher ratings of food products, but also had lower ratings of nonfood products—compared with participants whose appetites were not similarly primed. That is, because eating had become more important, other non-food products lost some of their value.Hunger is only part of the story of when and why we eat. A related process, **satiation**, refers to the decline of hunger and the eventual termination of eating behavior. Whereas the feeling of hunger gets you to start eating, the feeling of satiation gets you to stop. Perhaps surprisingly, hunger and satiation are two distinct processes, controlled by different circuits in the brain and triggered by different cues. Distinct from the LH, which plays an important role in hunger, the ventromedial hypothalamus (VMH) plays an important role in satiety. Though lesions of the VMH can cause an animal to overeat to the point of obesity, the relationship between the LH and the VMB is quite complicated. Rats with VMH lesions can also be quite finicky about their food (Teitelbaum, 1955).

Other brain areas, besides the LH and VMH, also play important roles in eating behavior. The sensory cortices (visual, olfactory, and taste), for example, are important in identifying food items. These areas provide informational value, however, not hedonic evaluations. That is, these areas help tell a person what is good or safe to eat, but they don't provide the pleasure (or hedonic) sensations that *actually* eating the food produces. While many sensory functions are roughly stable across different psychological states, other functions, such as the detection of food-related stimuli, are enhanced when the organism is in a hungry drive state.

After identifying a food item, the brain also needs to determine its **reward value**, which affects the organism's motivation to consume the food. The reward value ascribed to a particular item is, not surprisingly, sensitive to the level of hunger experienced by the organism. The hungrier you are, the greater the reward value of the food. Neurons in the areas where reward values are processed, such as the orbitofrontal cortex, fire more rapidly at the sight or taste of food when the organism is hungry relative to if it is satiated.

Sexual Arousal



Figure 11.17 Unlike other drive states the mechanisms that trigger sexual arousal are not the same for men and women.

A second drive state, especially critical to reproduction, is sexual arousal. Sexual arousal results in thoughts and behaviors related to sexual activity. As with hunger, it is generated by a large range of internal and external mechanisms that are triggered either after the extended absence of sexual activity or by the immediate presence and possibility of sexual activity (or by cues commonly associated with such possibilities). Unlike hunger, however, these mechanisms can differ substantially between males and females,

indicating important evolutionary differences in the biological functions that sexual arousal serves for different sexes.Sexual arousal and pleasure in males, for example, is strongly related to the **preoptic area**, a region in the anterior hypothalamus (or the front of the hypothalamus). If the preoptic area is damaged, male sexual behavior is severely impaired. For example, rats that have had prior sexual experiences will still seek out sexual partners after their preoptic area is lesioned. However, once having secured a sexual partner, rats with lesioned preoptic areas will show no further inclination to actually initiate sex.For females, though, the preoptic area fulfills different roles, such as functions involved with eating behaviors. Instead, there is a different region of the brain, the ventromedial hypothalamus (the lower, central part) that plays a similar role for females as the preoptic area does for males. Neurons in the ventromedial hypothalamus determine the excretion of estradiol, an estrogen hormone that regulates sexual receptivity (or the willingness to accept a sexual partner). In many mammals, these neurons send impulses to the periaqueductal gray (a region in the midbrain) which is responsible for defensive behaviors, such as freezing immobility, running, increases in blood pressure, and other motor responses. Typically, these defensive responses might keep the female rat from interacting with the male one. However, during sexual arousal, these defensive responses are weakened and lordosis behavior, a physical sexual posture that serves as an invitation to mate, is initiated (Kow and Pfaff, 1998). Thus, while the preoptic area encourages males to engage in sexual activity, the ventromedial hypothalamus fulfills that role for females.Other differences between males and females involve overlapping functions of neural modules. These neural modules often provide clues about the biological roles played by sexual arousal and sexual activity in males and females. Areas of the brain that are important for male sexuality overlap to a great extent with areas that are also associated with aggression. In contrast, areas important for female sexuality overlap extensively with those that are also connected to nurturance (Panksepp, 2004).

One region of the brain that seems to play an important role in sexual pleasure for both males and females is the septal nucleus, an area that receives reciprocal connections from many other brain regions, including the hypothalamus and the amygdala (a region of the brain primarily involved with emotions). This region shows considerable activity, in terms of rhythmic spiking, during sexual orgasm. It is also one of the brain regions that rats will most reliably voluntarily self-stimulate (Olds & Milner, 1954). In humans, placing a small amount of acetylcholine into this region, or stimulating it electrically, has been reported to produce a feeling of imminent orgasm (Heath, 1964).

Conclusion

Drive states are evolved motivational mechanisms designed to ensure that organisms take self-beneficial actions. In this module, we have reviewed key properties of drive states, such as homeostasis and the narrowing of attention. We have also discussed, in some detail, two important drive states—hunger and sexual arousal—and explored their underlying neurobiology and the ways in which various environmental and biological factors affect their properties.

There are many drive states besides hunger and sexual arousal that affect humans on a daily basis. Fear, thirst, exhaustion, exploratory and maternal drives, and drug cravings are all drive states that have been studied by researchers (see e.g., Buck, 1999; Van Boven & Loewenstein, 2003). Although these drive states share some of the properties discussed in this module, each also has unique features that allow it to effectively fulfill its evolutionary function.

One key difference between drive states is the extent to which they are triggered by internal as opposed to external stimuli. Thirst, for example, is induced both by decreased fluid levels and an increased concentration of salt in the body. Fear, on the other hand, is induced by perceived threats in the external environment. Drug cravings are triggered both by internal homeostatic mechanisms and by external visual, olfactory, and contextual cues. Other drive states, such as those pertaining to maternity, are triggered by specific events in the organism's life. Differences such as these make the study of drive states a scientifically interesting and important endeavor. Drive states are rich in their diversity, and many questions involving their neurocognitive underpinnings, environmental determinants, and behavioral effects, have yet to be answered.

One final thing to consider, not discussed in this module, relates to the real-world consequences of drive states. Hunger, sexual arousal, and other drive states are all psychological mechanisms that have evolved gradually over millions of years. We share these drive states not only with our human ancestors but with other animals, such as monkeys, dogs, and rats. It is not surprising then that these drive states, at times, lead us to behave in ways that are ill-suited to our modern lives. Consider, for example, the obesity epidemic that is affecting countries around the world. Like other diseases of affluence, obesity is a product of drive states that are too easily fulfilled: homeostatic mechanisms that once worked well when food was scarce now backfire when meals rich in fat and sugar are readily available. Unrestricted sexual arousal can have similarly perverse effects on our well-being. Countless politicians

have sacrificed their entire life's work (not to mention their marriages) by indulging adulterous sexual impulses toward colleagues, staffers, prostitutes, and others over whom they have social or financial power. It not an overstatement to say that many problems of the 21st century, from school massacres to obesity to drug addiction, are influenced by the mismatch between our drive states and our uniquely modern ability to fulfill them at a moment's notice.

Outside Resources

Web: An open textbook chapter on homeostasis http://en.wikibooks.org/wiki/Human_Physiology/Homeostasis

Web: Motivation and emotion in psychology http://allpsych.com/psychology101/motivation_emotion.html

Web: The science of sexual arousal http://www.apa.org/monitor/apr03/arousal.aspx

Discussion Questions

1. The ability to maintain homeostasis is important for an organism's survival. What are the ways in which homeostasis ensures survival? Do different drive states accomplish homeostatic goals differently?
2. Drive states result in the narrowing of attention toward the present and toward the self. Which drive states lead to the most pronounced narrowing of attention toward the present? Which drive states lead to the most pronounced narrowing of attention toward the self?
3. What are important differences between hunger and sexual arousal, and in what ways do these differences reflect the biological needs that hunger and sexual arousal have been evolved to address?
4. Some of the properties of sexual arousal vary across males and females. What other drives states affect males and females differently? Are there drive states that vary with other differences in humans (e.g., age)?

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11.6: Motives and Goals

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Your decisions and behaviors are often the result of a goal or motive you possess. This module provides an overview of the main theories and findings on goals and motivation. We address the origins, manifestations, and types of goals, and the various factors that influence motivation in goal pursuit. We further address goal conflict and, specifically, the exercise of self-control in protecting long-term goals from momentary temptations.

Learning Objectives

- Define the basic terminology related to goals, motivation, self-regulation, and self-control.
- Describe the antecedents and consequences of goal activation.
- Describe the factors that influence motivation in the course of goal pursuit.
- Explain the process underlying goal activation, self-regulation, and self-control.
- Give examples of goal activation effects, self-regulation processes, and self-control processes.

Introduction

Every New Year, many people make resolutions—or goals—that go unsatisfied: eat healthier; pay better attention in class; lose weight. As much as we know our lives would improve if we actually achieved these goals, people quite often don't follow through. But what if that didn't have to be the case? What if every time we made a goal, we actually accomplished it? Each day, our behavior is the result of countless goals—maybe not goals in the way we think of them, like getting that beach body or being the first person to land on Mars. But even with "mundane" goals, like getting food from the grocery store, or showing up to work on time, we are often enacting the same psychological processes involved with achieving loftier dreams. To understand how we can better attain our goals, let's begin with defining what a goal is and what underlies it, psychologically.



Figure 11.18 Goals are fundamental guides for human behavior. Some are biological in origin, some are cultural in nature and some are unique to the individual.

A **goal** is the cognitive representation of a desired state, or, in other words, our mental idea of how we'd like things to turn out (Fishbach & Ferguson 2007; Kruglanski, 1996). This desired end state of a goal can be clearly defined (e.g., stepping on the surface of Mars), or it can be more abstract and represent a state that is never fully completed (e.g., eating healthy). Underlying all of these goals, though, is **motivation**, or the psychological driving force that enables action in the pursuit of that goal (Lewin, 1935). Motivation can stem from two places. First, it can come from the benefits associated with the process of pursuing a goal (**intrinsic motivation**). For example, you might be driven by the desire to have a fulfilling experience while working on your Mars mission. Second, motivation can also come from the benefits associated with achieving a goal (**extrinsic motivation**), such as the fame and fortune that come with being the first person on Mars (Deci & Ryan, 1985). One easy way to consider intrinsic and extrinsic motivation is through the eyes of a student. Does the student work hard on assignments because the act of learning is pleasing (intrinsic motivation)? Or does the student work hard to get good grades, which will help land a good job (extrinsic motivation)?

Social psychologists recognize that goal pursuit and the motivations that underlie it do not depend solely on an individual's personality. Rather, they are products of personal characteristics and situational factors. Indeed, cues in a person's immediate environment—including images, words, sounds, and the presence of other people—can activate, or **prime**, a goal. This activation can be **conscious**, such that the person is aware of the environmental cues influencing his/her pursuit of a goal. However, this activation can also occur outside a person's awareness, and lead to **nonconscious** goal pursuit. In this case, the person is unaware of why s/he is pursuing a goal and may not even realize that s/he is pursuing it.

In this module, we review key aspects of goals and motivation. First, we discuss the origins and manifestation of goals. Then, we review factors that influence individuals' motivation in the course of pursuing a goal (**self-regulation**). Finally, we discuss what motivates individuals to keep following their goals when faced with other conflicting desires—for example, when a tempting opportunity to socialize on Facebook presents itself in the course of studying for an exam (**self-control**).

The Origins and Manifestation of Goals

Goal Adoption

What makes us commit to a goal? Researchers tend to agree that commitment stems from the sense that a goal is both valuable and attainable, and that we adopt goals that are highly likely to bring positive outcomes (i.e., one's *commitment* = the *value* of the goal × the *expectancy* it will be achieved) (Fishbein & Ajzen, 1974; Liberman & Förster, 2008). This process of committing to a goal can occur without much conscious deliberation. For example, people infer value and attainability, and will nonconsciously determine their commitment based on those factors, as well as the outcomes of past goals. Indeed, people often learn about themselves the same way they learn about other people—by observing their behaviors (in this case, their own) and drawing inferences about their preferences. For example, after taking a kickboxing class, you might infer from your efforts that you are indeed committed to staying physically fit (Fishbach, Zhang, & Koo, 2009).

Goal Priming

We don't always act on our goals in every context. For instance, sometimes we'll order a salad for lunch, in keeping with our dietary goals, while other times we'll order only dessert. So, what makes people adhere to a goal in any given context? Cues in the immediate environment (e.g., objects, images, sounds—anything that primes a goal) can have a remarkable influence on the pursuit of goals to which people are already committed (Bargh, 1990; Custers, Aarts, Oikawa, & Elliot, 2009; Förster, Liberman, & Friedman, 2007). How do these cues work? In memory, goals are organized in associative networks. That is, each goal is connected to other goals, concepts, and behaviors. Particularly, each goal is connected to corresponding **means**—activities and objects that help us attain the goal (Kruglanski et al., 2002). For example, the goal to stay physically fit may be associated with several means, including a nearby gym, one's bicycle, or even a training partner. Cues related to the goal or means (e.g., an ad for running shoes, a comment about weight loss) can activate or prime the pursuit of that goal. For example, the presence of one's training partner, or even seeing the word "workout" in a puzzle, can activate the goal of staying physically fit and, hence, increase a person's motivation to exercise. Soon after goal priming, the motivation to act on the goal peaks then slowly declines, after some delay, as the person moves away from the primer or after s/he pursues the goal (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trotschel, 2001).

Consequences of Goal Activation



Figure 11-19 What does this image represent to you, a number or a letter? Training to run the Boston Marathon? Need to pass 13 credit hours to graduate this semester? The details of your goals may influence how you interpret the world around you.

The activation of a goal and the accompanying increase in motivation can influence many aspects of behavior and judgment, including how people perceive, evaluate, and feel about the world around them. Indeed, motivational states can even alter something as fundamental as visual perception. For example, Balcetis and Dunning (2006) showed participants an ambiguous figure (e.g., "I3") and asked them whether they saw the letter B or the number 13. The researchers found that when participants had the goal of seeing a letter (e.g., because seeing a number required the participants to drink a gross tasting juice), they in fact *saw* a B. It wasn't that the participants were simply lying, either; their goal literally changed how they perceived the world!

Goals can also exert a strong influence on how people evaluate the objects (and people) around them. When pursuing a goal such as quenching one's thirst, people evaluate goal-relevant objects (e.g., a glass) more positively than objects that are not relevant to the goal (e.g., a pencil). Furthermore, those with the goal of quenching their thirst rate the glass more positively than people who are not pursuing the goal (Ferguson & Bargh, 2004). As discussed earlier, priming a goal can lead to behaviors like this (consistent with the goal), even though the person isn't necessarily aware of why (i.e., the source of the motivation). For example, after research participants saw words related to achievement (in the context of solving a word search), they automatically performed better on a subsequent achievement test—without being at all aware that the achievement words had influenced them (Bargh & Chartrand, 1999; Srull & Wyer, 1979).

Self-Regulation in Goal Pursuit

Many of the behaviors we like to engage in are inconsistent with achieving our goals. For example, you may want to be physically fit, but you may also really like German chocolate cake. Self-regulation refers to the process through which individuals alter their perceptions, feelings, and actions in the pursuit of a goal. For example, filling up on fruits at a dessert party is one way someone might alter his or her actions to help with goal attainment. In the following section, we review the main theories and findings on self-regulation.

From Deliberation to Implementation

Self-regulation involves two basic stages, each with its own distinct mindset. First, a person must decide which of many potential goals to pursue at a given point in time (**deliberative phase**). While in the deliberative phase, a person often has a mindset that fosters an effective assessment of goals. That is, one tends to be open-minded and realistic about available goals to pursue. However, such scrutiny of one's choices sometimes hinders action. For example, in the deliberative phase about how to spend time, someone might consider improving health, academic performance, or developing a hobby. At the same time, though, this deliberation involves considering realistic obstacles, such as one's busy schedule, which may discourage the person from believing the goals can likely be achieved (and thus, doesn't work toward any of them).

However, after deciding which goal to follow, the second stage involves planning specific actions related to the goal (**implemental phase**). In the implemental phase, a person tends to have a mindset conducive to the effective implementation of a goal through immediate action—i.e., with the planning done, we're ready to jump right into attaining our goal. Unfortunately, though, this mindset often leads to closed-mindedness and unrealistically positive expectations about the chosen goal (Gollwitzer, Heckhausen, & Steller, 1990; Kruglanski et al., 2000; Thaler & Shefrin, 1981). For example, in order to follow a health goal, a person might register for a gym membership and start exercising. In doing so, s/he assumes this is all that's needed to achieve the goal (closed-mindedness), and after a few weeks, it should be accomplished (unrealistic expectations).



Figure 11-20 Different individuals may have different orientations toward the same goal. One person – with a prevention orientation -might pursue a fitness goal primarily to prevent negative health problems, while another person – with a promotion orientation – might pursue the same goal in order to look and feel better.

In addition to two phases in goal pursuit, research also distinguishes between two distinct self-regulatory orientations (or perceptions of effectiveness) in pursuing a goal: **prevention** and **promotion**. A prevention focus emphasizes safety, responsibility, and security needs, and views goals as "oughts." That is, for those who are *prevention*-oriented, a goal is viewed as something they *should* be doing, and they tend to focus on avoiding potential problems (e.g., exercising to avoid health threats). This self-regulatory focus leads to a vigilant strategy aimed at avoiding losses (the presence of negatives) and approaching non-losses (the absence of negatives). On the other hand, a *promotion* focus views goals as "ideals," and emphasizes hopes, accomplishments, and advancement needs. Here, people view their goals as something they *want* to do that will bring them added pleasure (e.g., exercising because being healthy allows them to do more activities). This type of orientation leads to the adoption of an eager strategy concerned with approaching gains (the presence of positives) and avoiding non-gains (the absence of positives).

To compare these two strategies, consider the goal of saving money. Prevention-focused people will save money because they believe it's what they should be doing (an ought), and because they're concerned about not having any money (avoiding a harm). Promotion-focused people, on the other hand, will save money because they want to have extra funds (a desire) so they can do new and fun activities (attaining an advancement). Although these two strategies result in very similar behaviors, emphasizing potential losses will motivate individuals with a prevention focus, whereas emphasizing potential gains will motivate individuals with a promotion focus. And these orientations—responding better to either a prevention or promotion focus— differ across individuals (chronic regulatory focus) and situations (momentary regulatory focus; Higgins, 1997).

A Cybernetic Process of Self-Regulation

Self-regulation depends on feelings that arise from comparing actual **progress** to expected progress. During goal pursuit, individuals calculate the discrepancy between their current state (i.e., all goal-related actions completed so far) and their desired end state (i.e., what they view as "achieving the goal"). After determining this difference, the person then acts to close that gap (Miller, Galanter, & Pribram, 1960; Powers, 1973). In this cybernetic process of self-regulation (or, internal system directing how a person should control behavior), a higher-than-expected rate of closing the discrepancy creates a signal in the form of positive feelings. For example, if you're nearly finished with a class project (i.e., a low discrepancy between your progress and what it will take to completely finish), you feel good about yourself. However, these positive feelings tend to make individuals "coast," or reduce their efforts on the focal goal, and shift their focus to other goals (e.g., you're almost done with your project for one class, so you start working on a paper for another). By contrast, a lower-than-expected rate of closing the gap elicits negative feelings, which leads to greater effort investment on the focal goal (Carver & Scheier, 1998). If it is the day before a project's due and you've hardly started it, you will likely feel anxious and stop all other activities to make progress on your project.

Highlighting One Goal or Balancing Between Goals

When we've completed steps toward achieving our goal, looking back on the behaviors or actions that helped us make such progress can have implications for future behaviors and actions (see The Dynamics of Self-Regulation framework; Fishbach et al., 2009). Remember, **commitment** results from the perceived value and attainability of a goal, whereas *progress* describes the

perception of a reduced discrepancy between the current state and desired end state (i.e., the cybernetic process). After achieving a goal, when people interpret their previous actions as a sign of *commitment* to it, they tend to **highlight** the pursuit of that goal, prioritizing it and putting more effort toward it. However, when people interpret their previous actions as a sign of *progress*, they tend to **balance** between the goal and other goals, putting less effort into the focal goal. For example, if buying a product on sale reinforces your *commitment* to the goal of saving money, you will continue to behave financially responsibly. However, if you perceive the same action (buying the sale item) as evidence of *progress* toward the goal of saving money, you might feel like you can "take a break" from your goal, justifying splurging on a subsequent purchase. Several factors can influence the meanings people assign to previous goal actions. For example, the more confident a person is about a commitment to a goal, the more likely s/he is to infer progress rather than commitment from his/her actions (Koo & Fishbach, 2008).

Conflicting Goals and Self-Control



Figure 11-21 Immediate gratification has a way of interfering with the pursuit of more significant long-term goals. New shoes feel awfully good right now but don't do anything to get us closer to our financial savings target.

In the pursuit of our ordinary and extraordinary goals (e.g., staying physically or financially healthy, landing on Mars), we inevitably come across other goals (e.g., eating delicious food, exploring Earth) that might get in the way of our lofty ambitions. In such situations, we must exercise self-control to stay on course. Self-control is the capacity to control impulses, emotions, desires, and actions in order to resist a temptation (e.g., going on a shopping spree) and protect a valued goal (e.g., stay financially sound). As such, self-control is a process of self-regulation in contexts involving a clear trade-off between long-term interests (e.g., health, financial, or Martian) and some form of immediate gratification (Fishbach & Converse, 2010; Rachlin, 2000; Read, Loewenstein, & Rabin, 1999; Thaler & Shefrin, 1981). For example, whereas reading each page of a textbook requires self-regulation, doing so while resisting the tempting sounds of friends socializing in the next room requires self-control. And although you may tend to believe self-control is just a personal characteristic that varies across individuals, it is like a muscle, in that it becomes drained by being used but is also strengthened in the process.

Self-Control as an Innate Ability

Mischel, Shoda, and Rodriguez (1989) identified enduring individual differences in self-control and found that the persistent capacity to postpone immediate gratification for the sake of future interests leads to greater cognitive and social competence over the course of a lifetime. In a famous series of lab experiments (first conducted by Mischel & Baker, 1975), preschoolers 3–5 years old were asked to choose between getting a smaller treat immediately (e.g., a single marshmallow) or waiting as long as 15 minutes to get a better one (e.g., two marshmallows). Some children were better-able to exercise self-control than others, resisting the temptation to take the available treat and waiting for the better one. Following up with these preschoolers ten years later, the researchers found that the children who were able to wait longer in the experiment for the second marshmallow (vs. those who more quickly ate the single marshmallow) performed better academically and socially, and had better psychological coping skills as adolescents.



Figure 11-22 Willpower is limited. Trying to resist temptation now takes energy and may leave you feeling like it's harder to be disciplined later. You can only eat so many radishes . . .

Beyond personal characteristics, the ability to exercise self-control can fluctuate from one context to the next. In particular, previous exertion of self-control (e.g., choosing not to eat a donut) drains individuals of the limited physiological and psychological resources required to continue the pursuit of a goal (e.g., later in the day, again resisting a sugary treat). **Ego-depletion** refers to this exhaustion of resources from resisting a temptation. That is, just like bicycling for two hours would exhaust someone before a basketball game, exerting self-control reduces individuals' capacity to exert more self-control in a consequent task—whether that task is in the same domain (e.g., resisting a donut and then continuing to eat healthy) or a different one (e.g., resisting a donut and then continuing to be financially responsible; Baumeister, Bratslavsky, Muraven, & Tice, 1998; Vohs & Heatherton, 2000). For example, in a study by Baumeister et al. (1998), research participants who forced themselves to eat radishes instead of tempting chocolates were subsequently less persistent (i.e., gave up sooner) at attempting an unsolvable puzzle task compared to the participants who had not exerted self-control to resist the chocolates.

A Prerequisite to Self-Control: Identification

Although factors such as resources and personal characteristics contribute to the successful exercise of self-control, identifying the self-control conflict inherent to a particular situation is an important—and often overlooked—prerequisite. For example, if you have a long-term goal of getting better sleep but don't perceive that staying up late on a Friday night is inconsistent with this goal, you won't have a self-control conflict. The successful pursuit of a goal in the face of temptation requires that individuals first identify they are having impulses that need to be controlled. However, individuals often fail to identify self-control conflicts because many everyday temptations seem to have very minimal negative consequences: one bowl of ice cream is unlikely to destroy a person's health, but what about 200 bowls of ice cream over the course of a few months?

People are more likely to identify a self-control conflict, and exercise self-control, when they think of a choice as part of a broader pattern of repeated behavior rather than as an isolated choice. For example, rather than seeing one bowl of ice cream as an isolated behavioral decision, the person should try to recognize that this "one bowl of ice cream" is actually part of a nightly routine. Indeed, when considering broader decision patterns, consistent temptations become more problematic for long-term interests (Rachlin, 2000; Read, Loewenstein, & Kalyanaraman, 1999). Moreover, conflict identification is more likely if people see their current choices as similar to their future choices.

Self-Control Processes: Counteracting Temptation

The protection of a valued goal involves several cognitive and behavioral strategies ultimately aimed at "counteracting" the pull of temptations and pushing oneself toward goal-related alternatives (Fishbach & Trope, 2007). One such cognitive process involves decreasing the value of temptations and increasing the value of goal-consistent objects or actions. For example, health-conscious individuals might tell themselves a sugary treat is less appealing than a piece of fruit in order to direct their choice toward the latter. Other behavioral strategies include a precommitment to pursue goals and forgo temptation (e.g., leaving one's credit card at home before going to the mall), establishing rewards for goals and penalties for temptations, or physically approaching goals and distancing oneself from temptations (e.g., pushing away a dessert plate). These self-control processes can benefit individuals' long-term interests, either consciously or without conscious awareness. Thus, at times, individuals automatically activate goal-related

thoughts in response to temptation, and inhibit temptation-related thoughts in the presence of goal cues (Fishbach, Friedman, & Kruglanski, 2003).

Conclusion

People often make New Year's resolutions with the idea that attaining one's goals is simple: "I just have to choose to eat healthier, right?" However, after going through this module and learning a social-cognitive approach to the main theories and findings on goals and motivation, we see that even the most basic decisions take place within a much larger and more complex mental framework. From the principles of goal priming and how goals influence perceptions, feelings, and actions, to the factors of self-regulation and self-control, we have learned the phases, orientations, and fluctuations involved in the course of everyday goal pursuit. Looking back on prior goal failures, it may seem impossible to achieve some of our desires. But, through understanding our own mental representation of our goals (i.e., the values and expectancies behind them), we can help cognitively modify our behavior to achieve our dreams. If *you* do, who knows?—maybe you will be the first person to step on Mars.

Discussion Questions

1. What is the difference between goal and motivation?
2. What is the difference between self-regulation and self-control?
3. How do positive and negative feelings inform goal pursuit in a cybernetic self-regulation process?
4. Describe the characteristics of the deliberative mindset that allows individuals to decide between different goals. How might these characteristics hinder the implemental phase of self-regulation?
5. You just read a module on "Goals and Motivation," and you believe it is a sign of commitment to the goal of learning about social psychology. Define commitment in this context. How would interpreting your efforts as a sign of commitment influence your motivation to read more about social psychology? By contrast, how would interpreting your efforts as a sign of progress influence your motivation to read more?
6. Mel and Alex are friends. Mel has a prevention focus self-regulatory orientation, whereas Alex has a promotion focus. They are both training for a marathon and are looking for motivational posters to hang in their respective apartments. While shopping, they find a poster with the following Confucius quote: "The will to win, the desire to succeed, the urge to reach your full potential … . These are the keys that will unlock the door to personal excellence." Who is this poster more likely to help stay motivated for the marathon (Mel or Alex)? Why? Find or write a quote that might help the other friend.
7. Give an example in which an individual fails to exercise self-control. What are some factors that can cause such a self-control failure?

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11.7: Summary, Key Terms, and Self-Test

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Summary

Affect guides behaviour, helps us make decisions, and has a major impact on our mental and physical health. Affect is guided by arousal — our experiences of the bodily responses created by the sympathetic division of the autonomic nervous system.

Emotions are the mental and physiological feeling states that direct our attention and guide our behaviour. The most fundamental emotions, known as the basic emotions, are those of anger, disgust, fear, happiness, sadness, and surprise. A variety of secondary emotions are determined by the process of cognitive appraisal. The distinction between the primary and the secondary emotions is paralleled by two brain pathways: a fast pathway and a slow pathway.

There are three primary theories of emotion, each supported by research evidence. The Cannon-Bard theory of emotion proposes that the experience of an emotion is accompanied by physiological arousal. The James-Lange theory of emotion proposes that our experience of an emotion is the result of the arousal that we experience. The two-factor theory of emotion asserts that the experience of emotion is determined by the intensity of the arousal we are experiencing, but that the cognitive appraisal of the situation determines what the emotion will be. When people incorrectly label the source of the arousal that they are experiencing, we say that they have misattributed their arousal.

We communicate and perceive emotion in part through nonverbal communication and through facial expressions. The facial feedback hypothesis proposes that we also experience emotion in part through our own facial expressions.

Emotions serve important functions in our life. In this chapter, we divided those functions into three areas: the intrapersonal, interpersonal, and the social/cultural functions of emotions. Intrapersonal are roles within us as individuals, interpersonal functions describe how emotions impact our relationships with others, and social/cultural functions maintain effective functioning of our society at large.

Intrapersonally, emotions help us act quickly and prepare our body for action, influence our thinking, and motivate our behaviours. Interpersonally, emotional expressions facilitate behaviours in perceivers, signal the nature of our interpersonal relationships, and provide incentives for desired social behaviour via social referencing. Cultural display rules tell us how we can express emotions within a culture, which maintains the social order of that culture.

The best antidote for stress is to think positively, have fun, and enjoy the company of others. People who express optimism, self-efficacy, and hardiness cope better with stress and experience better health overall. Happiness is determined in part by genetic factors such that some people are naturally happier than others, but it is also facilitated by social support — our positive social relationships with others.

People often do not know what will make them happy. After a minimum level of wealth is reached, more money does not generally buy more happiness. Although people think that positive and negative events will make a huge difference in their lives, and although these changes do make at least some difference in life satisfaction, they tend to be less influential than we think they are going to be.

Our thoughts and behaviours are strongly influenced by affective experiences known as drive states. Drive states motivate us to fulfill goals that our beneficial to our survival and reproduction, like eat, address thirst, or procreate. Drive states are specific to biological functions. They motivate us to maintain homeostasis, or stability of our physiological systems in our body. Drive states narrow our attention to keep us focused on fulfilling the need we have.

A motivation is a driving force that initiates and directs behaviour. A goal represents our desired state or how we want things to be. We can be intrinsically motivated to pursue a goal (focused on the benefits of the process of pursuing a goal) or extrinsically motivated (focused on the benefits of achieving the goal). When we are activated to pursue a goal, it keeps us moving towards it.

Self-regulation is the process by which we alter our perceptions, feelings, and actions to pursue a goal. It involves a deliberative phase where we decide what goals to pursue and an implemental phase, where we plan specific actions we need to take in order to reach our goal. We inevitably come across goals that compete with each other. Self-control is our capacity to control our impulses, emotions, desires, and actions in order to resist changing goals.

Key Terms

- Affect
- Arousal
- Balance
- Cannon-Bard Theory of Emotion
- Cognitive appraisal
- Commitment
- Conscious
- Cultural Display Rules
- Deliberative Phase
- Direct Effects of Social Support
- Drive State
- Ego-Depletion
- Emotion
- Excitation Transfer
- Extrinsic Motivation
- Facial Feedback Hypothesis
- Goal
- Highlight
- Homeostasis
- Hypothalamus
- Implemental Phase
- Interpersonal Functions of Emotion
- Intrapersonal Functions of Emotion
- Intrinsic Motivation
- James-Lange Theory of Emotion
- Means
- Misattribution of Arousal
- Motivation
- Motivation
- Nonconscious
- Nonverbal Communication
- Optimism
- Perception of Social Support
- Preoptic Area
- Prevention
- Prime
- Progress
- Promotion
- Reward Value
- Satiation
- Self-control
- Self-efficacy
- Self-regulation
- Set Point
- Social and Cultural Functions of Emotion
- Social Referencing
- Two-Factor Theory of Emotion

Self-Test

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CHAPTER OVERVIEW

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12.1: Introduction

Jennifer Walinga and Jorden A. Cummings

Stress has been defined as *the physiological and psychological experience of significant life events, trauma, and chronic strain* (Thoits, 2010). It has long been believed and demonstrated that the level of stress an individual experiences can negatively impact his or her health. Therefore, stress management has become an increasingly important focus from both a personal and organizational perspective.

Canadian mental health services

The Canadian government, for instance, recognizes the personal, economic, and social costs of stress and therefore declares that its role includes helping "Canadians maintain and improve their mental health, including coping with stress" (Health Canada, 2008). In 2007, the federal government provided funding to establish and support the Mental Health Commission of Canada to lead the development of a national mental health strategy. Services developed include:

- Canadian Health Network
- Canadian Mental Health Association https://cmha.ca/
- Canadian Psychiatric Association
- National Network for Mental Health https://nnmh.ca/
- Canadian Psychological Association https://cpa.ca/
- Mood Disorders Society of Canada https://mdsc.ca/
- It's Your Health website https://www.canada.ca/en/health-canada/services/healthy-living/your-health.html

The three constructs of *health*, *stress*, and *coping* are complex, both as separate concepts and as they interact with one another. For instance, stress can be perceived both negatively and positively: it can have both a negative deleterious effect on health, and a positive health-promoting effect depending on the individual's interpretation or appraisal of the stress. The level of stress a person experiences can also determine the degree of impact on health and performance, which invites the question, At what point does the stress become just too much to take? Likewise, health is a multifaceted construct, and an individual's health is relative, perceptual, and contextual. Finally, the concept of coping has spawned many other concepts besides management of stress such as *resiliency, thriving, tolerance for ambiguity*, and *stress-related growth (SRG)*.

Stress, health, and coping is a focus of health psychology, an area of psychology focused on understanding how psychology and health intersect. Health psychologists might examine psychosocial factors related to health and disease, how psychology can promote a healthy life, and how psychology can play a role in medicine.

Positive psychology is another area of psychological research that focuses on the "opposite" of some of the more negatively valanced topics traditionally examined in psychology. For example, instead of examining stress and negative events, positive psychology focuses on wellness, strengths, virtues and resilience. In the last section of this chapter, we will examine major findings within positive psychology with a specific focus on gratitude, forgiveness, and humility.

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12.2: Stress- The Unseen Killer

Charles Stangor and Jennifer Walinga

Learning Objectives

- Define stress and review the body's physiological responses to it.
- Summarize the negative health consequences of prolonged stress.
- Explain the differences in how people respond to stress.
- Review the methods that are successful in coping with stress.

Emotions matter because they influence our behaviour. And there is no emotional experience that has a more powerful influence on us than *stress*. **Stress** refers to the *physiological responses that occur when an organism fails to respond appropriately to emotional or physical threats* (Selye, 1956). Extreme negative events, such as being the victim of a terrorist attack, a natural disaster, or a violent crime, may produce an extreme form of stress known as **post-traumatic stress disorder (PTSD)**, *a medical syndrome that includes symptoms of anxiety, sleeplessness, nightmares, and social withdrawal*. PTSD is frequently experienced by victims or witnesses of violence or abuse, natural disasters, major accidents, or war.

When it is extreme or prolonged, stress can create substantial health problems. A study out of the University of British Columbia found that emergency personnel such as doctors, nurses, paramedics, and firefighters experience post-traumatic stress at twice the rate of the average population. In Canada, it is estimated that up to 10% of war zone veterans — including war service veterans and peacekeeping forces — will experience post-traumatic stress disorder (CMHA, 2014). People in New York City who lived nearer to the site of the 9/11 terrorist attacks reported experiencing more stress in the year following it than those who lived farther away (Pulcino et al., 2003). But stress is not unique to the experience of extremely traumatic events. It can also occur, and have a variety of negative outcomes, in our everyday lives.

The Negative Effects of Stress

The physiologist Hans Selye (1907-1982) studied stress by examining how rats responded to being exposed to stressors such as extreme cold, infection, shock, or excessive exercise (Selye, 1936, 1974, 1982). Selye found that regardless of the source of the stress, the rats experienced the same series of physiological changes as they suffered the prolonged stress. Selye created the term **general adaptation syndrome** to refer to *the three distinct phases of physiological change that occur in response to long-term stress: alarm, resistance, and exhaustion* (Figure 12.1, "General Adaptation Syndrome").

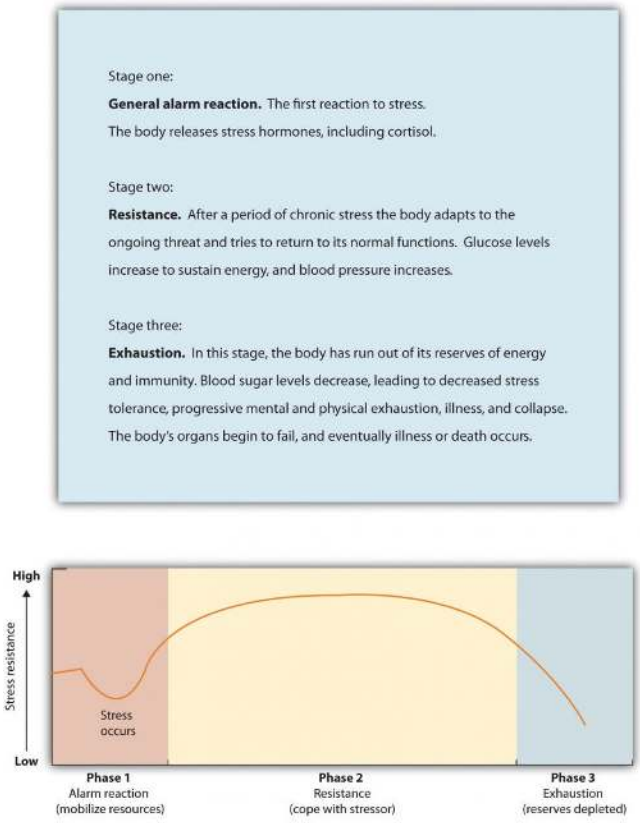


Figure 12.1 General Adaptation Syndrome. Hans Selye's research on the general adaptation syndrome documented the stages of prolonged exposure to stress. [Long Description]

The experience of stress creates both an increase in general arousal in the sympathetic division of the autonomic nervous system (ANS), as well as another, even more complex, system of physiological changes through the *HPA axis*. The **HPA axis** is *a physiological response to stress involving interactions among the (H) hypothalamus, the (P) pituitary, and the (A) adrenal glands* (Figure 12.2, "HPA Axis"). The HPA response begins when the hypothalamus secretes releasing hormones that direct the pituitary gland to release the hormone ACTH. ACTH then directs the adrenal glands to secrete more hormones, including epinephrine, norepinephrine, and *cortisol, a stress hormone that releases sugars into the blood, helping preparing the body to respond to threat* (Rodrigues, LeDoux, & Sapolsky, 2009).

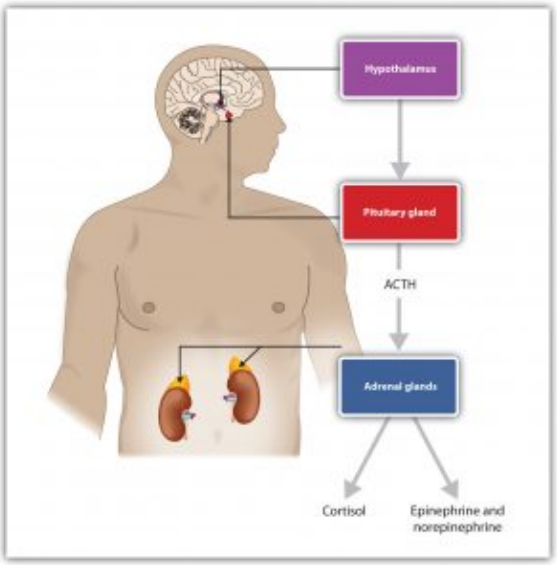


Figure 12.2 HPA Axis. Stress activates the HPA axis. The result is the secretion of epinephrine, norepinephrine, and cortisol.

The initial arousal that accompanies stress is normally quite adaptive because it helps us respond to potentially dangerous events. The experience of prolonged stress, however, has a direct negative influence on our physical health, because at the same time that stress increases activity in the sympathetic division of the ANS, it also suppresses activity in the parasympathetic division of the ANS. When stress is long term, the HPA axis remains active and the adrenals continue to produce cortisol. This increased cortisol production exhausts the stress mechanism, leading to fatigue and depression.

The HPA reactions to persistent stress lead to a weakening of the immune system, making us more susceptible to a variety of health problems including colds and other diseases (Cohen & Herbert, 1996; Faulkner & Smith, 2009; Miller, Chen, & Cole, 2009; Uchino, Smith, Holt-Lunstad, Campo, & Reblin, 2007). Stress also damages our DNA, making us less likely to be able to repair wounds and respond to the genetic mutations that cause disease (Epel et al., 2006). As a result, wounds heal more slowly when we are under stress, and we are more likely to get cancer (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Wells, 2006).

Chronic stress is also a major contributor to heart disease. Although heart disease is caused in part by genetic factors, as well as high blood pressure, high cholesterol, and cigarette smoking, it is also caused by stress (Krantz & McCeney, 2002). Long-term stress creates two opposite effects on the coronary system. Stress increases cardiac output (i.e., the heart pumps more blood) at the same time that it reduces the ability of the blood vessels to conduct blood through the arteries, as the increase in levels of cortisol leads to a buildup of plaque on artery walls (Dekker et al., 2008). The combination of increased blood flow and arterial constriction leads to increased blood pressure (hypertension), which can damage the heart muscle, leading to heart attack and death.

Stressors in Our Everyday Lives

The stressors for Selye's rats included electric shock and exposure to cold. Although these are probably not on your top-10 list of most common stressors, the stress that you experience in your everyday life can also be taxing. Thomas Holmes and Richard Rahe (1967) developed a measure of some everyday life events that might lead to stress, and you can assess your own likely stress level by completing the measure in Table 12.1, "The Holmes and Rahe Stress Scale." You might want to pay particular attention to this score, because it can predict the likelihood that you will get sick. Rahe and colleagues examined the medical records of over 5,000 patients to determine whether stressful events might cause illnesses. Patients were asked to tally a list of 43 life events based on a relative score. A positive correlation of 0.118 was found between their life events and their illnesses resulting in the Social Readjustment Rating Scale (SRRS) (Rahe, Mahan, Arthur, & Gunderson, 1970). Rahe and colleagues (2000) went on to update and revalidate the scale. Reliability testing, using Cronbach alpha correlations, was performed utilizing a sample of 1,772 individuals. The SRRS is commonly used today.

Table 12.1 The Holmes and Rahe Stress Scale.

Life event	Score
Death of spouse	100
Divorce	73
Marital separation from mate	65
Detention in jail, other institution	63
Death of a close family member	63
Major personal injury or illness	53
Marriage	50
Fired from work	47
Marital reconciliation	45
Retirement	45
Major change in the health or behaviour of a family member	44
Pregnancy	40
Sexual difficulties	39
Gaining a new family member (e.g., through birth, adoption, oldster moving)	39
Major business readjustment (e.g., merger, reorganization, bankruptcy)	39
Major change in financial status	38
Death of close friend	37
Change to different line of work	36
Major change in the number of arguments with spouse	35
Taking out a mortgage or loan for a major purchase	31
Foreclosure on a mortgage or loan	30
Major change in responsibilities at work	29
Son or daughter leaving home (e.g., marriage, attending university)	29
Trouble with in-laws	29
Outstanding personal achievement	28
Spouse beginning or ceasing to work outside the home	26
Beginning or ceasing formal schooling	26
Major change in living conditions	25
Revision of personal habits (dress, manners, associations, etc.)	24
Trouble with boss	23
Major change in working hours or conditions	20

Life event	Score
Change in residence	20
Change to a new school	20
Major change in usual type and/or amount of recreation	19
Major change in church activities (a lot more or less than usual)	19
Major change in social activities (clubs, dancing, movies, visiting)	18
Taking out a mortgage or loan for a lesser purchase (e.g., for a car, television, freezer)	17
Major change in sleeping habits	16
Major change in the number of family get-togethers	15
Major change in eating habits	15
Vacation	13
Christmas season	12
Minor violations of the law (e.g., traffic tickets)	11
Total	_____

You can calculate your score on this scale by adding the total points across each of the events that you have experienced over the past year. Then use Table 12.2, “Interpretation of Holmes and Rahe Stress Scale” to determine your likelihood of getting ill.

Table 12.2 Interpretation of Holmes and Rahe Stress Scale.

Number of life-change units	Chance of developing a stress-related illness (%)
Less than 150	30
150–299	50
More than 300	80

Although some of the items on the Holmes and Rahe scale are more major, you can see that even minor stressors add to the total score. *Our everyday interactions with the environment that are essentially negative*, known as **daily hassles**, can also create stress as well as poorer health outcomes (Hutchinson & Williams, 2007). Events that may seem rather trivial altogether, such as misplacing our keys, having to reboot our computer because it has frozen, being late for an assignment, or getting cut off by another car in rush-hour traffic, can produce stress (Fiksenbaum, Greenglass, & Eaton, 2006). Glaser (1985) found that medical students who were tested during, rather than several weeks before, their school examination periods showed lower immune system functioning. Other research has found that even more minor stressors, such as having to do math problems during an experimental session, can compromise the immune system (Cacioppo et al., 1998).

Responses to Stress

Not all people experience and respond to stress in the same way, and these differences can be important. The cardiologists Meyer Friedman and R. H. Rosenman (1974) were among the first to study the link between stress and heart disease. In their research they noticed that even though the partners in married couples often had similar lifestyles, diet, and exercise patterns, the husbands nevertheless generally had more heart disease than the wives did. As they tried to explain the difference, they focused on the personality characteristics of the partners, finding that the husbands were more likely than the wives to respond to stressors with negative emotions and hostility.

Recent research has shown that the strongest predictor of a physiological stress response from daily hassles is the amount of negative emotion that they evoke. People who experience strong negative emotions as a result of everyday hassles, and who respond to stress with hostility, experience more negative health outcomes than do those who react in a less negative way (McIntyre, Korn, & Matsuo, 2008; Suls & Bunde, 2005). Williams and his colleagues (2001) found that people who scored high on measures of anger were three times more likely to suffer from heart attacks in comparison to those who scored lower on anger.

On average, men are more likely than women are to respond to stress by activating the **fight-or-flight response**, which is *an emotional and behavioural reaction to stress that increases the readiness for action*. The arousal that men experience when they are stressed leads them to either go on the attack, in an aggressive or revenging way, or else retreat as quickly as they can to safety from the stressor. The fight-or-flight response allows men to control the source of the stress if they think they can do so, or if that is not possible, it allows them to save face by leaving the situation. The fight-or-flight response is triggered in men by the activation of the HPA axis.

Women, on the other hand, are less likely to take a fight-or-flight response to stress. Rather, they are more likely to take a *tend-and-befriend response* (Taylor et al., 2000). The **tend-and-befriend response** is *a behavioural reaction to stress that involves activities designed to create social networks that provide protection from threats*. This approach is also self-protective because it allows the individual to talk to others about her concerns, as well as to exchange resources, such as child care. The tend-and-befriend response is triggered in women by the release of the hormone *oxytocin*, which promotes affiliation. Overall, the tend-and-befriend response is healthier than the flight-or-flight response because it does not produce the elevated levels of arousal related to the HPA, including the negative results that accompany increased levels of cortisol. This may help explain why women, on average, have less heart disease and live longer than men.

Managing Stress

No matter how healthy and happy we are in our everyday lives, there are going to be times when we experience stress. But we do not need to throw up our hands in despair when things go wrong; rather, we can use our personal and social resources to help us.

Perhaps the most common approach to dealing with negative affect is to attempt to suppress, avoid, or deny it. You probably know people who seem to be stressed, depressed, or anxious, but they cannot or will not see it in themselves. Perhaps you tried to talk to them about it, to get them to open up to you, but were rebuffed. They seem to act as if there is no problem at all, simply moving on with life without admitting or even trying to deal with the negative feelings. Or perhaps you have even taken a similar approach yourself. Have you ever had an important test to study for or an important job interview coming up, and rather than planning and preparing for it, you simply tried to put it out of your mind entirely?

Research has found that ignoring stress is not a good approach for coping with it. For one, ignoring our problems does not make them go away. If we experience so much stress that we get sick, these events will be detrimental to our life even if we do not or cannot admit that they are occurring. Suppressing our negative emotions is also not a very good option, at least in the long run, because it tends to fail (Gross & Levenson, 1997). For one, if we know that we have that big exam coming up, we have to focus on the exam itself to suppress it. We can't really suppress or deny our thoughts, because we actually have to recall and face the event to make the attempt to not think about it. Doing so takes effort, and we get tired when we try to do it. Furthermore, we may continually worry that our attempts to suppress will fail. Suppressing our emotions might work out for a short while, but when we run out of energy the negative emotions may shoot back up into consciousness, causing us to reexperience the negative feelings that we had been trying to avoid.

Daniel Wegner and his colleagues (Wegner, Schneider, Carter, & White, 1987) directly tested whether people would be able to effectively suppress a simple thought. He asked them to *not* think about a white bear for five minutes but to ring a bell in case they did. (Try it yourself; can you do it?) However, participants were unable to suppress the thought as instructed. The white bear kept popping into mind, even when the participants were instructed to avoid thinking about it. You might have had this experience when you were dieting or trying to study rather than party; the chocolate bar in the kitchen cabinet and the fun time you were missing at the party kept popping into mind, disrupting you.

Suppressing our negative thoughts does not work, and there is evidence that the opposite is true: when we are faced with troubles, it is healthy to let out the negative thoughts and feelings by expressing them, either to ourselves or to others. James Pennebaker and his colleagues (Pennebaker, Colder, & Sharp, 1990; Watson & Pennebaker, 1989) have conducted many correlational and

experimental studies that demonstrate the advantages to our mental and physical health of opening up versus suppressing our feelings. This research team has found that simply talking about or writing about our emotions or our reactions to negative events provides substantial health benefits. For instance, Pennebaker and Beall (1986) randomly assigned students to write about either the most traumatic and stressful event of their lives or trivial topics. Although the students who wrote about the traumas had higher blood pressure and more negative moods immediately after they wrote their essays, they were also less likely to visit the student health centre for illnesses during the following six months. Other research studied individuals whose spouses had died in the previous year, finding that the more they talked about the death with others, the less likely they were to become ill during the subsequent year. Daily writing about one's emotional states has also been found to increase immune system functioning (Petrie, Fontanilla, Thomas, Booth, & Pennebaker, 2004).

Opening up probably helps in various ways. For one, expressing our problems to others allows us to gain information, and possibly support, from them (remember the *tend-and-befriend response* that is so effectively used to reduce stress by women). Writing or thinking about one's experiences also seems to help people make sense of these events and may give them a feeling of control over their lives (Pennebaker & Stone, 2004).

It is easier to respond to stress if we can interpret it in more positive ways. Kelsey et al. (1999) found that some people interpret stress as a challenge (something that they feel that they can, with effort, deal with), whereas others see the same stress as a threat (something that is negative and to be feared). People who viewed stress as a challenge had fewer physiological stress responses than those who viewed it as a threat — they were able to frame and react to stress in more positive ways.

Emotion Regulation

Emotional responses such as the stress reaction are useful in warning us about potential danger and in mobilizing our response to it, so it is a good thing that we have them. However, we also need to learn how to control our emotions, to prevent them from letting our behaviour get out of control. *The ability to successfully control our emotions* is known as **emotion regulation**.

Emotion regulation has some important positive outcomes. Consider, for instance, research by Walter Mischel and his colleagues. In their studies, they had four- and five-year-old children sit at a table in front of a yummy snack, such as a chocolate chip cookie or a marshmallow. The children were told that they could eat the snack right away if they wanted. However, they were also told that if they could wait for just a couple of minutes, they'd be able to have two snacks — both the one in front of them and another just like it. However, if they ate the one that was in front of them before the time was up, they would not get a second.

Mischel found that some children were able to override the impulse to seek immediate gratification to obtain a greater reward at a later time. Other children, of course, were not; they just ate the first snack right away. Furthermore, the inability to delay gratification seemed to occur in a spontaneous and emotional manner, without much thought. The children who could not resist simply grabbed the cookie because it looked so yummy, without being able to stop themselves (Metcalfe & Mischel, 1999; Strack & Deutsch, 2007).

The ability to regulate our emotions has important consequences later in life. When Mischel followed up on the children in his original study, he found that those who had been able to self-regulate grew up to have some highly positive characteristics: They got better university admission test scores, were rated by their friends as more socially adept, and were found to cope with frustration and stress better than those children who could not resist the tempting cookie at a young age. Thus effective self-regulation can be recognized as an important key to success in life (Ayduk et al., 2000; Eigsti et al., 2006; Mischel & Ayduk, 2004).

Emotion regulation is influenced by body chemicals, particularly the neurotransmitter *serotonin*. Preferences for small, immediate rewards over large but later rewards have been linked to low levels of serotonin in animals (Bizot, Le Bihan, Peuch, Hamon, & Thiebot, 1999; Liu, Wilkinson, & Robbins, 2004), and low levels of serotonin are tied to violence and impulsiveness in human suicides (Asberg, Traskman, & Thoren, 1976).

Research Focus: Emotion Regulation Takes Effort

Emotion regulation is particularly difficult when we are tired, depressed, or anxious, and it is under these conditions that we more easily let our emotions get the best of us (Muraven & Baumeister, 2000). If you are tired and worried about an upcoming exam, you may find yourself getting angry and taking it out on your roommate, even though she really hasn't done anything to

deserve it and you don't really want to be angry at her. It is no secret that we are more likely fail at our diets when we are under a lot of stress, or at night when we are tired.

Muraven, Tice, and Baumeister (1998) conducted a study to demonstrate that emotion regulation — that is, either increasing or decreasing our emotional responses — takes work. They speculated that self-control was like a muscle; it just gets tired when it is used too much. In their experiment they asked participants to watch a short movie about environmental disasters involving radioactive waste and their negative effects on wildlife. The scenes included sick and dying animals and were very upsetting. According to random assignment to condition, one group (the *increase emotional response* condition) was told to really get into the movie and to express their emotions, one group was to hold back and decrease their emotional responses (the *decrease emotional response* condition), and the third (*control*) group received no emotional regulation instructions.

Both before and after the movie, the experimenter asked the participants to engage in a measure of physical strength by squeezing as hard as they could on a handgrip exerciser, a device used for strengthening hand muscles. The experimenter put a piece of paper in the grip and timed how long the participants could hold the grip together before the paper fell out. Figure 12.3, "Research Results," shows the results of this study. It seems that emotion regulation does indeed take effort, because the participants who had been asked to control their emotions showed significantly less ability to squeeze the handgrip after the movie than they had showed before it, whereas the control group showed virtually no decrease. The emotion regulation during the movie seems to have consumed resources, leaving the participants with less capacity to perform the handgrip task.

Figure 12.3 Research Results. Participants who were instructed to regulate their emotions, either by increasing or decreasing their emotional responses to a move, had less energy left over to squeeze a handgrip in comparison to those who did not regulate their emotions. Adapted from Muraven, Tice, & Baumeister, 1998.

In other studies, people who had to resist the temptation to eat chocolates and cookies, who made important decisions, or who were forced to conform to others all performed more poorly on subsequent tasks that took energy, including giving up on tasks earlier and failing to resist temptation (Vohs & Heatherton, 2000).

Can we improve our emotion regulation? It turns out that training in self-regulation — just like physical training — can help. Students who practised doing difficult tasks, such as exercising, avoiding swearing, or maintaining good posture, were later found to perform better in laboratory tests of emotion regulation such as maintaining a diet or completing a puzzle (Baumeister, Gailliot, DeWall, & Oaten, 2006; Baumeister, Schmeichel, & Vohs, 2007; Oaten & Cheng, 2006).

Key Takeaways

- Stress refers to the physiological responses that occur when an organism fails to respond appropriately to emotional or physical threats.
- The general adaptation syndrome refers to the three distinct phases of physiological change that occur in response to long-term stress: alarm, resistance, and exhaustion.
- Stress is normally adaptive because it helps us respond to potentially dangerous events by activating the sympathetic division of the autonomic nervous system. But the experience of prolonged stress has a direct negative influence on our physical health.
- Chronic stress is a major contributor to heart disease. It also decreases our ability to fight off colds and infections.
- Stressors can occur as a result of both major and minor everyday events.

- Men tend to respond to stress with the fight-or-flight response, whereas women are more likely to take a tend-and-befriend response.

Exercises and Critical Thinking

1. Consider a time when you experienced stress and how you responded to it. Do you now have a better understanding of the dangers of stress? How will you change your coping mechanisms based on what you have learned?
2. Are you good at emotion regulation? Can you think of a time when your emotions got the better of you? How might you make better use of your emotions?

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Long Description

Figure 12.1 long description: Stages of Stress as identified by Hans Selye. Stage 1: General alarm reaction. The first reaction to stress. The body releases stress hormones, including cortisol. Stage 2: Resistance. After a period of chronic stress the body adapts to the ongoing threat and tries to return to normal functions. Glucose levels increase to sustain energy, and blood pressure increases. Stage 3: Exhaustion. In this stage, the body has run out of its reserves of energy and immunity. Blood sugar levels decrease, leading to decreased stress tolerance, progressive mental and physical exhaustion, illness, and collapse. The body's organs begin to fail, and eventually illness or death occurs.

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12.3: Health and Stress

Jennifer Walinga

Learning Objectives

- Understand the nature of stress and its impact on personal, social, economic, and political health.
- Describe the psychological and physiological interactions initiated by stress.
- Identify health symptoms resulting from stress.

Stress can pose a deleterious effect on health outcomes (Thoits, 2010). In 50 years of research concerning the links between stress and health, several major findings emerge (see Figure 12.4, "The Sociopolitical-Economic Factors of Stress").

1. **Personal.** When stressors are measured comprehensively, their damaging impacts on physical and mental health are substantial.
2. **Socioeconomic.** Differential exposure to stressful experiences can produce gender, racial-ethnic, marital status, and social class inequalities in physical and mental health.
3. **Sociopolitical.** Stressors proliferate over the life course and across generations, widening health gaps between advantaged and disadvantaged group members.

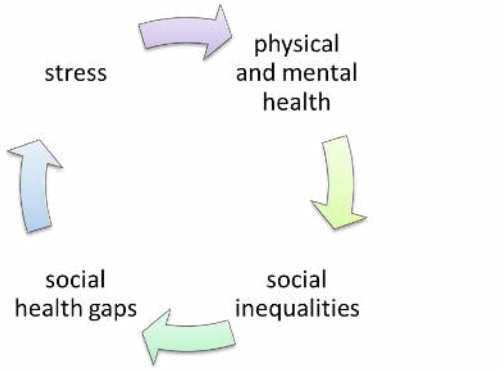


Figure 12.4 The Sociopolitical-Economic Factors of Stress. [Long Description]

Coping with stress depends on high levels of mastery, self-esteem, and/or social support that can reduce the impacts of stressors on health and well-being. Therefore, policy recommendations inspired by the snowballing impacts of stress focus on:

1. The need for more widely disseminated and employed coping and support interventions and education.
2. An increased focus of programs and policies at macro and meso levels of intervention on the structural conditions that put people at risk of stressors.
3. The development of programs and policies that target children who are at lifetime risk of ill health and distress due to exposure to poverty and stressful family circumstances.

Negative Impacts of Stress on Health

The human body is designed to react to stress in ways meant to protect against threats from predators and other aggressors. In today's society, stressors take on a more subtle but equally threatening form such as shouldering a heavy workload, providing for a family, and taking care of children or elderly relatives. The human body treats any perceived stressor as a threat.

When the body encounters a perceived threat (e.g., a near-miss accident, shocking news, a demanding assignment), the hypothalamus, a tiny region at the base of the brain, instigates the "fight-or-flight response" — a combination of nerve and hormonal signals. This system prompts the adrenal glands, located at the top of the kidneys, to release a surge of hormones, including adrenaline and cortisol.

Adrenaline *is a hormone that increases heart rate, elevates blood pressure, and boosts energy supplies.* **Cortisol,** *the primary stress hormone, increases sugars (glucose) in the bloodstream, enhances the brain's use of glucose, and increases the availability of substances that repair tissues.* Cortisol also curbs functions that would be nonessential or detrimental in a fight-or-flight

situation. It alters immune system responses and suppresses the digestive system, the reproductive system, and growth processes. This complex natural alarm system also communicates with regions of the brain that control mood, motivation, and fear.

The body's stress-response system is usually temporary. Once a perceived threat has passed, hormone levels return to normal. As adrenaline and cortisol levels drop, heart rate and blood pressure return to baseline levels, and other systems resume their regular activities. But when stressors are always present, such as those we experience in a modern, fast-paced society, the body can constantly feel under attack, and the fight-or-flight reaction remains activated.

The long-term activation of the stress-response system — and the subsequent overexposure to cortisol and other stress hormones — can disrupt almost all of the body's processes and increase the risk of numerous mental and physical health problems, including:

- Anxiety
- Depression
- Digestive problems
- Heart disease
- Sleep problems
- Weight gain
- Memory and concentration impairment
- Post-traumatic stress disorder

Statistics from the Canadian Mental Health Association are alarming in describing the negative health impacts of stress (Higgins, Duxbury, & Lyons, 2008):

- Stress, depression, and burnout are linked to increased absenteeism, and greater use of prescription medications and employee assistance programs.
- Work-related stress costs Canadian taxpayers an estimated $2.8 billion annually in physician visits, hospital stays, and emergency room visits.
- Additionally, 11% of those surveyed say they use drugs as a coping mechanism, with anti-depressant and tranquilizer use on the rise.
- Over half of the respondents reported high levels of perceived stress; one in three reported high levels of burnout and depressed mood.
- Only 41% were satisfied with their lives and one in five was dissatisfied. Almost one in five perceived that their physical health was fair to poor.
- The physical and mental health of Canadian employees has deteriorated over time: 1.5 times more employees reported high depressed mood in 2001 than in 1991. Similarly, 1.4 times more employees reported high levels of perceived stress in 2001 than in 1991.

Positive Impacts of Stress on Health

While research has shown that stress can be extremely deleterious in terms of health outcomes, it can also have positive impacts on health. Because stress is subjective and hinges on perception, the degree to which a person perceives an event as threatening or non-threatening determines the level of stress that person experiences. An individual's perception or appraisal of an event or instance depends on many factors, such as gender, personality, character, context, memories, upbringing, age, size, relationships, and status – all of which are relative and arbitrary. One individual may perceive a broken-down car on the highway as an extremely stressful event, whereas another individual may perceive such an incident as invigorating, exciting, or a relief.

Eustress

Hans Selye, the prominent stress psychologist, proposed the concept of **eustress** to capture *stress that is not necessarily debilitative and could be potentially facilitative to a person's sense of well-being, capacity, or performance*. Selye explained that every experience or change represents a challenge or stressor to the human system, and thus every experience is met with some degree of "alarm" or arousal (1956). It is individual difference, or "how we take it," that determines whether a stressor is interpreted as eustress (positive or challenging) or dystress (negative or threatening). Likewise, the multidimensional theory of performance anxiety (Jones & Swain, 1992, 1995; Jones & Hardy, 1993; Martens, Burton, Vealey, Bump, & Smith, 1990) includes a directional component for measuring individuals' anxiety interpretation along with the traditional intensity component.

Research Focus: Anxiety Direction

In 2007, Hanton and associates studied six high-performance athletes to better understand the role and nature of anxiety and stress as it relates to athletic performance. Specifically, the researchers were interested in understanding athletes' interpretations of competitive stress and the role that experience plays in that interpretation. Athletes were asked to reflect on the influence of positive and negative critical incidents on the interpretation and appraisal of cognitive and somatic experiences of stress and anxiety symptoms.

Six elite athletes were interviewed prior to critical athletic incidents such as an important race or game, a final game or match, or a particularly challenging event. Some athletes reported negative interpretations of their anxious or nervous feelings:

"I felt anxious thoughts like I had never experienced before. It was the new environment. The fact that we were playing at Wembley with a big crowd. That was unfamiliar and started to overwhelm me. I started to doubt myself and wonder whether I belonged there, whether I had the skills or ability to compete."

Comparatively, one participant described similar anxious thoughts and feelings but interpreted them positively:

"When I'm nervous and feeling sick inside, that means that the race is important to me and I'm there to achieve something. This time it was almost as though I could be sick, they [symptoms] were that intense. But that was positive because it showed just how important that race was to me and that I was ready to compete."

The researchers have found a number of reasons for the variation in interpretation of emotional and somatic experiences of anxiety; the factor impacting performance is not the cognitive, emotional, or somatic anxiety itself, but rather the direction or individual's interpretation of that anxiety that can influence, either facilitatively or debilitatively, performance.

Stress-Related Growth

Stress has also been associated with personal growth and development. Stress can enhance an individual's resilience or *hardiness*. The **hardiness theoretical model** was first presented by Kobasa (1979) and illustrates *resilient stress response patterns in individuals and groups*. Often regarded as a personality trait or set of traits, psychological hardiness has been described by Bartone (1999) as a style of functioning that includes cognitive, emotional, and behavioural qualities. The hardy style of functioning distinguishes people who stay healthy under stress from those who develop stress-related problems.

Hardiness includes the elements of commitment, control, and challenge. **Commitment** is the *tendency to see the world as interesting and meaningful*. **Control** is the *belief in one's own ability to control or influence events*. **Challenge** involves *seeing change and new experiences as exciting opportunities to learn and develop*. The hardy person is considered courageous in dealing with new experiences and disappointments, and highly competent. The hardy person is not immune to stress, but is resilient in responding to a variety of stressful conditions. Individuals high in hardiness not only remain healthy, but they also perform better under stress. In this way, hardiness is a chicken-and-egg concept in that hardy people seem to be able to better tolerate and grow from stressful events or become more hardy. It is unclear whether stress fosters hardiness or hardiness is something a person is born with.

The **inverted U hypothesis** asserts that, up to a point, *stress can be growth inducing but that there is a turning or tipping point when stress just becomes too much* and begins to become debilitative (see Figure 12.5, "The Stress Curve"). Feelings of stress (cognitive or physical) can be interpreted negatively to mean that a person is not ready, or positively to mean that a person is ready. It is the person's interpretation, not the stress itself, that influences the outcome.

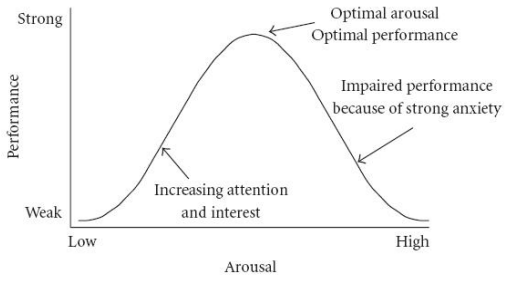


Figure 12.5 The Stress Curve.

Key Takeaways

- When stress is measured comprehensively, it can have debilitating effects on physical and mental health.
- Stress has been shown to create inequalities socioeconomically.
- Over time, stress can lead to health divisions and sociopolitical disparities.
- Policies and programming that enhance education, address structural conditions, and target children are most effective at addressing the negative impacts of stress in society.
- Long-term activation of the physiological stress-response system can disrupt almost all of the body's processes increasing the risk of numerous mental and physical health problems.
- Stress can also have a positive impact on health.
- Anxiety direction is an individual's interpretation of the stress experience (thoughts and emotions) that determine the impact of a stressor on a person's health state or performance.
- The inverted U hypothesis asserts that the degree or intensity of stress can act as a tipping point for an individual's performance or health. There is a subjective point where the stress shifts from invigorating to overwhelming and debilitating.
- Hardiness represents a trait that enables individuals to tolerate and even grow from stressful experiences due to increased commitment, control, and challenge interpretations.

Exercises and Critical Thinking

1. Reflect on a time in your life when stress seemed to increase your negative health outcomes. Based on what you know about the stress response, what physiological factors may have been at play?
2. In a group, share a critical incident you perceived to be stressful but from which you believed you grew as a person. What factors may have helped you to tolerate the stress more effectively?
3. In what ways could we better educate people to navigate an increasingly stressful environment?
4. In a group, discuss the kinds of social and workplace policies that need to be in place to break the cycle of stress-related health problems.

Image Attributions

Figure 12.4: By J. Walinga.

Figure 12.5: (http://en.wikipedia.org/wiki/File:He...rkesDodson.JPG) is in the public domain.

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Long Descriptions

Figure 12.4 long description: Stress can hurt physical and mental health which can increase social inequalities and social health gaps which can cause more stress.

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12.4: Stress and Coping

Jennifer Walinga

Learning Objectives

- Define coping and adaptation.
- Understand the various conceptualizations of stress as stimulus, response, and transactional process.
- Understand the role of cognition and physiology in coping with stress.
- Recognize emotion-focused and problem-focused coping strategies.
- Understand the relationships and interactions between health, stress, and coping.

In order to understand how people learn to cope with stress, it is important to first reflect on the different conceptualizations of stress and how the coping research has emerged alongside distinct approaches to stress. **Stress** has been viewed as a *response*, a *stimulus*, and a *transaction*. How an individual conceptualizes stress determines his or her response, adaptation, or coping strategies.

Stress As a Response

Stress as a **response** model, initially introduced by Hans Selye (1956), describes stress as a *physiological response pattern* and was captured within his **general adaptation syndrome (GAS)** model (Figure 12.6). This *model describes stress as a dependent variable and includes three concepts*:

1. Stress is a defensive mechanism.
2. Stress follows the three stages of *alarm*, *resistance*, and *exhaustion.*
3. If the stress is prolonged or severe, it could result in diseases of adaptation or even death.

Later, in *The Stress Concept: Past, Present and Future* (1983), Selye introduced the idea that the stress response could result in positive or negative outcomes based on cognitive interpretations of the physical symptoms or physiological experience (Figure 12.6, "The General Adaptation to Stress Model"). In this way, stress could be experienced as *eustress* (positive) or *dystress* (negative). However, Selye always considered stress to be a physiologically based construct or response. Gradually, other researchers expanded the thinking on stress to include and involve psychological concepts earlier in the stress model.

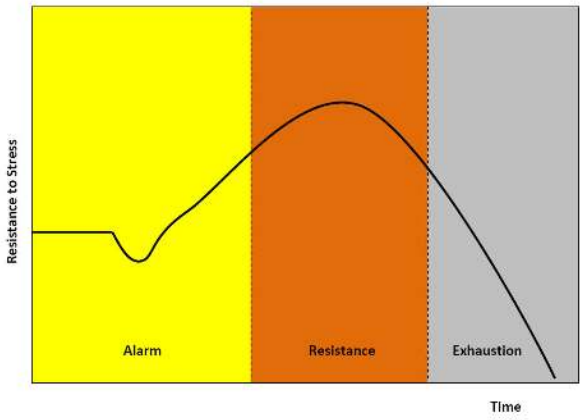


Figure 12.6 General Adaptation to Stress (GAS) Model.

The response model of stress incorporates coping within the model itself. The idea of adaptation or coping is inherent to the GAS model at both the alarm and resistance stages. When confronted with a negative stimulus, the alarm response initiates the sympathetic nervous system to combat or avoid the stressor (i.e., increased heart rate, temperature, adrenaline, and glucose levels). The resistance response then initiates physiological systems with a *fight or flight* reaction to the stressor, returning the system to homeostasis, reducing harm, or more generally accommodating the stressor, which can lead to adaptive diseases such as sleep deprivation, mental illness, hypertension, or heart disease. Thus, along with the early conceptualization of stress as a physiological

response, early research on coping was also born. As early as 1932, Walter Cannon described the notion of self-regulation in his work *The Wisdom of the Body.*

Stress As a Stimulus

The theory of stress as a **stimulus** was introduced in the 1960s, and viewed stress as *a significant life event or change that demands response, adjustment, or adaptation.* Holmes and Rahe (1967) created the Social Readjustment Rating Scale (SRRS) consisting of 42 life events scored according to the estimated degree of adjustment they would each demand of the person experiencing them (e.g., marriage, divorce, relocation, change or loss of job, loss of loved one). Holmes and Rahe theorized that stress was an independent variable in the health-stress-coping equation — the cause of an experience rather than the experience itself. While some correlations emerged between SRRS scores and illness (Rahe, Mahan, & Arthur, 1970; Johnson & Sarason, 1979), there were problems with the stress as stimulus theory. The stress as stimulus theory assumes:

1. Change is inherently stressful.
2. Life events demand the same levels of adjustment across the population.
3. There is a common threshold of adjustment beyond which illness will result.

Rahe and Holmes initially viewed the human subject as a passive recipient of stress, one who played no role in determining the degree, intensity, or valence of the stressor. Later, Rahe introduced the concept of interpretation into his research (Rahe & Arthur, 1978), suggesting that a change or life event could be interpreted as a positive or negative experience based on cognitive and emotional factors. However, the stress as stimulus model still ignored important variables such as prior learning, environment, support networks, personality, and life experience.

Stress As a Transaction

In attempting to explain stress as more of a dynamic process, Richard Lazarus developed the **transactional theory of stress and coping** (TTSC) (Lazarus, 1966; Lazarus & Folkman, 1984), which presents *stress as a product of a transaction between a person (including multiple systems: cognitive, physiological, affective, psychological, neurological) and his or her complex environment*. Stress as a transaction was introduced with the most impact when Dr. Susan Kobasa first used the concept of hardiness (Kobasa, 1979). Hardiness refers to a pattern of personality characteristics that distinguishes people who remain healthy under life stress compared with those who develop health problems. In the late 1970s, the concept of hardiness was further developed by Salvatore Maddi, Kobasa, and their graduate students at the University of Chicago (Kobasa, 1982; Kobasa & Maddi, 1981; Kobasa, Maddi, & Kahn, 1982; Kobasa, Maddi, Puccetti, & Zola, 1985; Maddi & Kobasa, 1984). Hardiness has some notable similarities with other personality constructs in psychology, including locus of control (Rotter, 1966), sense of coherence (Antonovsky, 1987), self-efficacy (Bandura, 1997), and dispositional optimism (Scheier & Carver, 1985), all of which will be discussed in the next section. Researchers introduced multiple variables to the stress-as-transaction model, expanding and categorizing various factors to account for the complex systems involved in experiencing a stressor (Werner, 1993). The nature of stress was described in multiple ways: acute, episodic or intermittent, and chronic. Different types of stressors emerged, such as event, situation, cue, and condition, which then fell into categories based on locus of control, predictability, tone, impact, and duration. Figure 12.7 illustrates theories of stress as a response, stimulus, and transaction.

Figure 12.7 Theories of stress as response, stimulus, and transaction.

In his book *Psychological Stress and the Coping Process* (1966), Lazarus presented an elegant integration of previous research on stress, health, and coping that placed a person's appraisal of a stressor at the centre of the stress experience. How an individual appraises a stressor determines how he or she copes with or responds to the stressor. Whether or not a stressor is experienced as discomforting is influenced by a variety of personal and contextual factors including capacities, skills and abilities, constraints, resources, and norms (Mechanic, 1978). Lazarus and Folkman (1984) unpacked the concept of interpretation further in their model of stress appraisal, which includes primary, secondary, and reappraisal components (see Figure 12.8, "The Transactional Theory of Stress and Coping"). **Primary appraisal** involves *determining whether the stressor poses a threat*. **Secondary appraisal** involves *the individual's evaluation of the resources or coping strategies at his or her disposal for addressing any perceived threats*. The process of **reappraisal** is *ongoing and involves continually reappraising both the nature of the stressor and the resources available for responding to the stressor*.

Figure 12.8 The Transactional Theory of Stress and Coping, by J. Walinga.

Coping with Stress

There are many ways that people strive to cope with stressors and feelings of stress in their lives. A host of literature, both popular and academic, extols the practice of stress management and whole industries are devoted to it. Many techniques are available to help individuals cope with the stresses that life brings. Some of the techniques listed in Figure 12.9, "Stress Management Techniques," induce a lower than usual stress level temporarily to compensate the biological tissues involved; others face the stressor at a higher level of abstraction. Stress management techniques are more general and range from cognitive (mindfulness, cognitive therapy, meditation) to physical (yoga, art, natural medicine, deep breathing) to environmental (spa visits, music, pets, nature).

Figure 12.9 Stress Management Techniques [Long Description]

Stress coping, as described by researchers such as Lazarus and Folkman, implies a more specific process of cognitive appraisal to determine whether *an individual believes he or she has the resources to respond effectively to the challenges of a stressor* or change (Folkman & Lazarus, 1988; Lazarus & Folkman, 1987). The appraisal literature explains the response or coping process in terms of problem-focused coping or emotion-focused coping (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984), also referred to as *active* and *passive* coping styles (Jex, Bliese, Buzzell, & Primeau, 2001). As well, *approach* and *avoidance-style* measures of coping exist involving assertiveness or withdrawal (Anshel, 1996; Anshel & Weinberg, 1999; Roth & Cohen, 1986). When faced with a challenge, an individual primarily appraises the challenge as either threatening or non-threatening, and secondarily in terms of whether he or she has the resources to respond to or cope with the challenge effectively. If the individual does not believe he or she has the capacity to respond to the challenge or feels a lack of control, he or she is most likely to turn to an emotion-focused coping response such as wishful thinking (e.g., I wish that I could change what is happening or how I feel), distancing (e.g., I'll try to forget the whole thing), or emphasizing the positive (e.g., I'll just look for the silver lining) (Lazarus & Folkman, 1987). If the person has the resources to manage the challenge, he or she will usually develop a problem-focused coping response such as analysis (e.g., I try to analyze the problem in order to understand it better; I'm making a plan of action and following it). It is

theorized and empirically demonstrated that a person's secondary appraisal then determines coping strategies (Lazarus & Folkman, 1987). Coping strategies vary from positive thinking to denial (see Figure 12.10, "COPE Inventory") and are measured and tested using a variety of instruments and scales such as the COPE inventory (Carver, Scheier, & Weintraub, 1989).

Figure 12.10 COPE Inventory. The COPE inventory scale of coping techniques. [Long Description]

Research Focus: Stress and Playing Soccer

Walinga (2008), in her work with a university soccer team that was undergoing several stressful changes in addition to the usual performance stressors, recently elaborated upon the appraisal model by suggesting that reappraisal more specifically involves a reiteration of the primary-secondary appraisal process. Once a person determines that a stressor is indeed a threat, and secondarily appraises resources as lacking, he or she then primarily appraises the secondary appraisal. In other words, the person determines whether having a lack of resources indeed poses some sort of threat. If lack of resources is deemed not to be a threat, the person is much more likely to generate creative solutions to the initial stressor and therefore cope effectively. But if a lack of resources is deemed to be a threat, then the person tends to focus on finding resources rather than addressing the initial stressor, and arrives at ineffective control-focused coping strategies.

In the case of the university soccer players, some initial stressors were identified as "a particularly challenging or sizable opponent," "rainy conditions," "the cold," "not connecting with the coach," or "negative attitudes on the field." Typical emotion- or control-focused coping strategies included "working harder" and "sucking it up," as well as avoidance or passivity. One player who struggled with her opponent's size felt that she had little control over the fact that her opponent was taller and thus "beat her to the header balls." She explained how she would "just kinda fade away when we play that team…get passive and just fade into the background." Her coping response signified a withdrawal subscale on the emotion-focused coping scale, and when asked about her degree of satisfaction with her chosen path of response, she replied that she was "unhappy but could see no other alternative." However, generally the team and several of the key leaders expressed alternative coping strategies not accounted for in the transactional theory of stress and coping. While several members of the team had a negative secondary appraisal, believing themselves to be lacking in the resources required to deal with the changes that occurred to the team, during the interviews it became apparent that such powerlessness did not, as was expected, lead only to emotion-focused coping, such as defensiveness, blame, or withdrawal; an acknowledged lack of control often resulted in an ability to move on and solve the challenges of change effectively.

Many of the team members believed "hitting rock bottom" accounted for their successful transformation, acting as a sort of "trigger" or "restart" and enabling them to gain greater clarity about their goals, as well as strategies for achieving these goals. Rather than focusing on increasing control or controlling the barrier or threat itself, the tolerant individual accepts the barrier as reality and accepts the lack of control as a reality. This person can now attend to and identify the challenges that the barrier poses to attaining her goals. For instance, the goalkeeper focused not on regretting or blaming herself for a missed save, or even trying harder next time, but instead focused on the challenges that a difficult shot posed for her and how she might resolve an unexpected spin on the ball. When faced with rainy conditions, the tolerant player focused not on denying or pushing through the rain, but on the problems the rain creates for her and how to resolve the resulting lack of ball control or slippery field conditions:

- "I guess the spin on the ball was out of my control, but I had total control in terms of adjusting to it."

- "I was not in control of what my opponent did with the ball or could have done to ensure that I did not win the ball, but I was in control of making sure I did not dive into the tackle, I held my check up so we could get numbers back and avoid a counterattack."
- "I went forward when I probably shouldn't have and I left our defenders outnumbered in the back, so I made sure I won the ball so that we would not be faced with a 3-on-2."
- "Despite my fatigue, I decided to make better decisions on when to commit myself and made sure I communicated when I needed help so that my opponent wouldn't get a breakaway."
- "The lights in my eyes were beyond my control, but I could control my focus on the ball and my positioning."
- "I was not in control of the fact that they were fast; I was in control of my positioning and my decision making."

By extending the theory of stress and coping, it is hypothesized here that when an individual perceives that he or she is lacking in resources to manage a threat, the perceived lack of control, and not necessarily anxiety, becomes the new challenge and focal point. If the person deems the perceived lack of control to be threatening or problematic for any reason, this would hypothetically cause him or her to fixate on increasing resources for managing the threat (control-focused coping), and impede any kind of response to the particular threats the challenge itself generates. If, on the other hand, the person accepts the lack of control, deeming the lack of resources to be a benign reality, he or she would be able to move the focus to the problems this threat creates and consider options for resolution and goal achievement (problem-focused coping). Control-focused coping seems to be a more generalizable construct for explaining an individual's inability to focus on the problem at hand. The readiness model proposes that the appraisal process continues to cycle through the primary and secondary phases to determine an individual's coping response (i.e., primary appraisal = Is it a threat?; secondary appraisal = Do I have the resources to change or control the threat?; if not, we find ourselves back at primary appraisal = Is my lack of control a threat?), and it is this cyclical process of appraisal that offers leverage for facilitating effective coping.

Related concepts to stress coping include locus of control (Rotter, 1966), sense of coherence (Antonovsky, 1987), self-efficacy (Bandura, 1997), and stress-related growth (Scheier & Carver, 1985). Rotter posited that a person with an **internal locus of control** *believes that their achievements and outcomes are determined by their own decisions and efforts.* If they do not succeed, they believe it is due to their own lack of effort. Whereas, a person with an **external locus of control** *believes that achievements and outcomes are determined by fate, luck, or other*. If the person does not succeed, he or she believes it is due to external forces outside of the person's control. Aaron Antonovsky (1987) defined **sense of coherence** as:

> *a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable and explicable; (2) the resources are available to one to meet the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement (pg. 19).*

Self-efficacy is often confused with self-confidence, but in fact confidence is merely one of the many factors that make up a strong sense of self-efficacy. Albert Bandura (1997) defined **self-efficacy** as *the extent or strength of one's belief in one's own ability to complete tasks and reach goals.* Self-confidence is a trait measure (a quality that is built over time) whereas self-efficacy is a state measure (a capacity experienced at a specific point in time and concerning a specific task). **Stress-related growth** or thriving is *a dispositional response to stress that enables the individual to see opportunities for growth as opposed to threat or debilitation.* Spreitzer and colleagues (2005) offered a preliminary definition of **thriving** as a "psychological state in which individuals experience both a sense of vitality and a sense of learning at work" (p. 538). Carver (1998) described thriving as being "better off after adversity" (p. 247). There are many examples of individuals surpassing previous performances when faced with particularly stressful scenarios, showing increased growth and strength in the face of adversity.

Coping and Health

The capacity for thriving, resilience, or stress-related growth has been associated with improved health outcomes. For example, building on Carver's work on dispositional optimism and thriving, Shepperd, Maroto, and Pbert (1996) found, in their longitudinal study of cardiac patients, that optimism predicts success in making health changes associated with lower risk of cardiac disease. Optimism was significantly and directly correlated with improved health outcomes, including lower levels of saturated fat, body

fat, and global coronary risk, and positively associated with success in increasing aerobic capacity. Billings and colleagues (2000) showed that coping affected positive and negative affect among men who were caregiving for AIDS patients. Social support coping predicted increases in positive affect, which in turn were related to fewer physical symptoms. Avoidant coping, however, was related to increases in negative affect, which were related to more physical symptoms.

Research Focus: Coping with Melanoma

Perhaps the most dramatic of stress coping interventions studies was conducted by Fawzy and his colleagues (Fawzy, Cousins, Fawzy, Kemeny, & Morton, 1990; Fawzy, Kemeny, et al., 1990; Fawzy, et al., 1993; Fawzy & Fawzy, 1994), who did specific coping skills interventions with melanoma patients. During a six-week structured program, participants experienced multiple program components including health education, psychological support, problem-solving, and stress management training. In the short term, the experimental subjects were more likely to use active behaviour coping than the controls, and also had more positive affect. Differences in immune functioning were evident between the two groups at the six-month assessment. Specifically, experimental subjects had a greater percentage of large granular lymphocytes, more NK cells, and better NK cytotoxicity. While coping strategies were not directly associated with immune cell changes, they were correlated with affect, which in turn was associated with immune functioning. The studies supported the hypothesis that effects of coping on biomedical outcomes may be mediated through affect. At a five-year follow-up, a third of the control group had died, compared with less than 10% of the experimental group. Longer survival was associated with more active coping at baseline.

Key Takeaways

- Stress has been conceived of in different ways: as a response, as a stimulus, and as a transaction.
- Stress as response treats stress as the physiological dependent variable.
- Stress as stimulus treats stress as a life event or change that acts as an independent variable.
- Stress as transaction considers the myriad personal, social, and environmental factors that come into play in determining the nature, degree, and impact of the stress experience.
- There are a variety of stress management techniques deriving from a multitude of theoretical derivations and philosophies.
- Coping with stress can be a trait or state-based process — an inherent quality or ability or a learned skill or capacity.
- How people appraise a stressor determines how they will attempt to cope with the stressor.
- Appraisal hinges on multiple human, social, and environmental factors.
- Concepts related to coping include optimism, thriving, hardiness, locus of control, and self-efficacy, all qualities and capacities that can influence the coping strategies an individual chooses to apply to a stressor.

Exercises and Critical Thinking

1. Reflect on a recent emotionally or physiologically impactful stressor that you perceived to be threatening or negative. What social, environmental, and personal factors contributed to your appraisal of the stressor? Referencing the list of coping items on the COPE inventory, what types of coping strategies did you apply?
2. Imagine a stressful situation that you believe you coped with positively. Can you identify some coping strategies you used? Can you determine whether you were able to grow through the experience? What factors facilitated a positive outcome for you?
3. What are some major life events you have experienced? Can you identify differences in how you appraised these events? How you coped with these events?

Image Attributions

Figure 12.6: A diagram of the General Adaptation syndrome model by David G. Myers (http://commons.wikimedia.org/wiki/Fi...n_Syndrome.jpg) used under the CC-BY 3.0 (http://creativecommons.org/licenses/by/3.0/deed.en).

Figure 12.7: by J. Walinga.

Figure 12.8: by J. Walinga.

Figure 12.9: by J. Walinga.

Figure 12.10: Adapted by J. Walinga from Carver, Scheier, & Weintraub, 1989.

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Long Descriptions

Figure 12.9 long description: Stress Management Techniques.

Cognitive	Physical	Environmental	Other
• Therapy • Hobbies • Meditation • Mindfulness • Planning • Reading • Time management	• Artistic expression • Deep breating • Natural medicine • Physical excersize • Relaxation • Yoga	• Music • Nature • Pets • Spa visits	• Conflict resolution • Prayer

Figure 12.10 long description: COPE Inventory scale of coping techniques

- positive reinterpretation and growth
- mental disengagement
- focus on and venting of emotions
- use of instrumental social support

- active coping
- denial
- religious coping
- humour
- behavioural disengagement
- restraint
- use of emotional social support
- substance use
- acceptance
- suppression of competing activities
- planning

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12.5: The Healthy Life

Emily Hooker and Sarah Pressman

Our emotions, thoughts, and behaviors play an important role in our health. Not only do they influence our day-to-day health practices, but they can also influence how our body functions. This module provides an overview of health psychology, which is a field devoted to understanding the connections between psychology and health. Discussed here are examples of topics a health psychologist might study, including stress, psychosocial factors related to health and disease, how to use psychology to improve health, and the role of psychology in medicine.

Learning Objectives

- Describe basic terminology used in the field of health psychology.
- Explain theoretical models of health, as well as the role of psychological stress in the development of disease.
- Describe psychological factors that contribute to resilience and improved health.
- Defend the relevance and importance of psychology to the field of medicine.

What Is Health Psychology?

Today, we face more **chronic disease** than ever before because we are living longer lives while also frequently behaving in unhealthy ways. One example of a chronic disease is coronary heart disease (CHD): It is the number one cause of death worldwide (World Health Organization, 2013). CHD develops slowly over time and typically appears midlife, but related heart problems can persist for years after the original diagnosis or cardiovascular event. In managing illnesses that persist over time (other examples might include cancer, diabetes, and long-term disability) many psychological factors will determine the progression of the ailment. For example, do patients seek help when appropriate? Do they follow doctor recommendations? Do they develop negative psychological symptoms due to lasting illness (e.g., depression)? Also important is that psychological factors can play a significant role in *who* develops these diseases, the prognosis, and the nature of the symptoms related to the illness. Health psychology is a relatively new, interdisciplinary field of study that focuses on these very issues, or more specifically, the role of psychology in maintaining health, as well as preventing and treating illness.



Figure 12.11 Health psychologists are helping people to adapt behaviors to avoid disease, reduce stress, and improve overall health.

Consideration of how psychological and social factors influence health is especially important today because many of the leading causes of illness in developed countries are often attributed to psychological and behavioral factors. In the case of CHD, discussed above, psychosocial factors, such as excessive stress, smoking, unhealthy eating habits, and some personality traits can also lead to increased risk of disease and worse health outcomes. That being said, many of these factors can be adjusted using psychological techniques. For example, clinical health psychologists can improve health practices like poor dietary choices and smoking, they can teach important stress reduction techniques, and they can help treat psychological disorders tied to poor health. Health psychology considers how the choices we make, the behaviors we engage in, and even the emotions that we feel, can play an important role in our overall health (Cohen & Herbert, 1996; Taylor, 2012).

Health psychology relies on the **Biopsychosocial Model of Health**. This model posits that biology, psychology, and social factors are just as important in the development of disease as biological causes (e.g., germs, viruses), which is consistent with the World Health Organization (1946) definition of **health**. This model replaces the older **Biomedical Model of Health**, which primarily considers the physical, or pathogenic, factors contributing to illness. Thanks to advances in medical technology, there is a growing understanding of the physiology underlying the **mind–body connection**, and in particular, the role that different feelings can have on our body's function. Health psychology researchers working in the fields of **psychosomatic medicine** and **psychoneuroimmunology**, for example, are interested in understanding how psychological factors can "get under the skin" and influence our physiology in order to better understand how factors like stress can make us sick.

Stress And Health

You probably know exactly what it's like to feel stress, but what you may not know is that it can objectively influence your health. Answers to questions like, "How stressed do you feel?" or "How overwhelmed do you feel?" can predict your likelihood of developing both minor illnesses as well as serious problems like future heart attack (Cohen, Janicki-Deverts, & Miller, 2007). (Want to measure your own stress level? Check out the links at the end of the module.) To understand how health psychologists study these types of associations, we will describe one famous example of a stress and health study. Imagine that you are a research subject for a moment. After you check into a hotel room as part of the study, the researchers ask you to report your general levels of stress. Not too surprising; however, what happens next is that you receive droplets of *cold virus* into your nose! The researchers intentionally try to make you sick by exposing you to an infectious illness. After they expose you to the virus, the researchers will then evaluate you for several days by asking you questions about your symptoms, monitoring how much mucus you are producing by weighing your used tissues, and taking body fluid samples—all to see if you are objectively ill with a cold. Now, the interesting thing is that not everyone who has drops of cold virus put in their nose develops the illness. Studies like this one find that people who are less stressed and those who are more positive at the beginning of the study are at a decreased risk of developing a cold (Cohen, Tyrrell, & Smith, 1991; Cohen, Alper, Doyle, Treanor, & Turner, 2006) (see Figure 12.12 for an example).

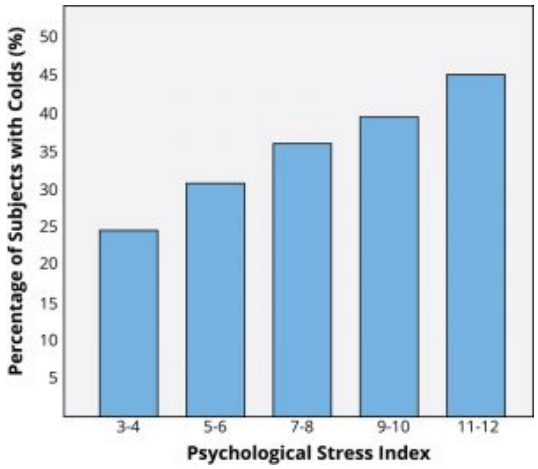


Figure 12.12 Adapted from Cohen et al. 1991

Importantly, it is not just major life **stressors** (e.g., a family death, a natural disaster) that increase the likelihood of getting sick. Even small **daily hassles** like getting stuck in traffic or fighting with your girlfriend can raise your blood pressure, alter your stress hormones, and even suppress your immune system function (DeLongis, Folkman, & Lazarus, 1988; Twisk, Snel, Kemper, & van Machelen, 1999).

It is clear that stress plays a major role in our mental and physical health, but what exactly is it? The term **stress** was originally derived from the field of mechanics where it is used to describe materials under pressure. The word was first used in a *psychological* manner by researcher Hans Selye. He was examining the effect of an ovarian hormone that he thought caused sickness in a sample of rats. Surprisingly, he noticed that almost any injected hormone produced this same sickness. He smartly realized that it was not the hormone under investigation that was causing these problems, but instead, the aversive experience of being handled and injected by researchers that led to high physiological arousal and, eventually, to health problems like ulcers. Selye (1946) coined the term stressor to label a stimulus that had this effect on the body and developed a model of the stress

response called the **General Adaptation Syndrome**. Since then, psychologists have studied stress in a myriad of ways, including stress as negative events (e.g., natural disasters or major life changes like dropping out of school), as chronically difficult situations (e.g., taking care of a loved one with Alzheimer's), as short-term hassles, as a biological fight-or-flight response, and even as clinical illness like post-traumatic stress disorder (PTSD). It continues to be one of the most important and well-studied psychological correlates of illness, because excessive stress causes potentially damaging wear and tear on the body and can influence almost any imaginable disease process.

Protecting Our Health

An important question that health psychologists ask is: What keeps us protected from disease and alive longer? When considering this issue of **resilience** (Rutter, 1985), five factors are often studied in terms of their ability to protect (or sometimes harm) health. They are:

1. Coping
2. Control and Self-Efficacy
3. Social Relationships
4. Dispositions and Emotions
5. Stress Management

Coping Strategies

How individuals cope with the stressors they face can have a significant impact on health. Coping is often classified into two categories: problem-focused coping or emotion-focused coping (Carver, Scheier, & Weintraub, 1989). **Problem-focused coping** is thought of as actively addressing the event that is causing stress in an effort to solve the issue at hand. For example, say you have an important exam coming up next week. A problem-focused strategy might be to spend additional time over the weekend studying to make sure you understand all of the material. **Emotion-focused coping**, on the other hand, regulates the emotions that come with stress. In the above examination example, this might mean watching a funny movie to take your mind off the anxiety you are feeling. In the short term, emotion-focused coping might reduce feelings of stress, but problem-focused coping seems to have the greatest impact on mental wellness (Billings & Moos, 1981; Herman-Stabl, Stemmler, & Petersen, 1995). That being said, when events are uncontrollable (e.g., the death of a loved one), emotion-focused coping directed at managing your feelings, at first, might be the better strategy. Therefore, it is always important to consider the match of the stressor to the coping strategy when evaluating its plausible benefits.

Control and Self-Efficacy



Figure 12.13 Feeling a sense of control in one's life is important. Something as simple as having control over the care of a houseplant has been shown to improve health and longevity.

Another factor tied to better health outcomes and an improved ability to cope with stress is having the belief that you have **control** over a situation. For example, in one study where participants were forced to listen to unpleasant (stressful) noise, those who were led to believe that they had control over the noise performed much better on proofreading tasks afterwards (Glass & Singer, 1972). In other words, even though participants *did not* have actual control over the noise, the control *belief* aided them in completing the task. In similar studies, perceived control benefited immune system functioning (Sieber et al., 1992). Outside of the laboratory, studies have shown that older residents in assisted living facilities, which are notorious for low control, lived *longer* and showed *better* health outcomes when given control over something as simple as watering a plant or choosing

when student volunteers came to visit (Rodin & Langer, 1977; Schulz & Hanusa, 1978). In addition, feeling in control of a threatening situation can actually change stress hormone levels (Dickerson & Kemeny, 2004). Believing that you have control over your own behaviors can also have a positive influence on important outcomes like smoking cessation, contraception use, and weight management (Wallston & Wallston, 1978). When individuals do not believe they have control, they do not try to change. **Self-efficacy** is closely related to control, in that people with high levels of this trait believe they can complete tasks and reach their goals. Just as feeling in control can reduce stress and improve health, higher self-efficacy can reduce stress and negative **health behaviors**, and is associated with better health (O'Leary, 1985).

Social Relationships

Research has shown that the impact of social isolation on our risk for disease and death is similar in magnitude to the risk associated with smoking regularly (Holt-Lunstad, Smith, & Layton, 2010; House, Landis, & Umberson, 1988). In fact, the importance of social relationships for our health is so significant that some scientists believe our body has developed a physiological system that encourages us to seek out our relationships, especially in times of stress (Taylor et al., 2000). **Social integration** is the concept used to describe the number of social roles that you have (Cohen & Wills, 1985), as well as the lack of isolation. For example, you might be a daughter, a basketball team member, a Humane Society volunteer, a coworker, and a student. Maintaining these different roles can improve your health via encouragement from those around you to maintain a healthy lifestyle. Those in your social network might also provide you with **social support** (e.g., when you are under stress). This support might include emotional help (e.g., a hug when you need it), tangible help (e.g., lending you money), or advice. By helping to improve health behaviors and reduce stress, social relationships can have a powerful, protective impact on health, and in some cases, might even help people with serious illnesses stay alive longer (Spiegel, Kraemer, Bloom, & Gottheil, 1989).

Dispositions and Emotions: What's Risky and What's Protective?

Negative dispositions and personality traits have been strongly tied to an array of health risks. One of the earliest negative trait-to-health connections was discovered in the 1950s by two cardiologists. They made the interesting discovery that there were common behavioral and psychological patterns among their heart patients that were not present in other patient samples. This pattern included being competitive, impatient, hostile, and time urgent. They labeled it **Type A Behavior**. Importantly, it was found to be associated with *double* the risk of heart disease as compared with **Type B Behavior** (Friedman & Rosenman, 1959). Since the 1950s, researchers have discovered that it is the **hostility** and competitiveness components of Type A that are especially harmful to heart health (Iribarren et al., 2000; Matthews, Glass, Rosenman, & Bortner, 1977; Miller, Smith, Turner, Guijarro, & Hallet, 1996). Hostile individuals are quick to get upset, and this angry arousal can damage the arteries of the heart. In addition, given their negative personality style, hostile people often lack a heath-protective supportive social network.

Positive traits and states, on the other hand, are often health protective. For example, characteristics like positive emotions (e.g., feeling happy or excited) have been tied to a wide range of benefits such as increased longevity, a reduced likelihood of developing some illnesses, and better outcomes once you are diagnosed with certain diseases (e.g., heart disease, HIV) (Pressman & Cohen, 2005). Across the world, even in the most poor and underdeveloped nations, positive emotions are consistently tied to better health (Pressman, Gallagher, & Lopez, 2013). Positive emotions can also serve as the "antidote" to stress, protecting us against some of its damaging effects (Fredrickson, 2001; Pressman & Cohen, 2005; see Figure 12.14). Similarly, looking on the bright side can also improve health. Optimism has been shown to improve coping, reduce stress, and predict better disease outcomes like recovering from a heart attack more rapidly (Kubzansky, Sparrow, Vokonas, & Kawachi, 2001; Nes & Segerstrom, 2006; Scheier & Carver, 1985; Segerstrom, Taylor, Kemeny, & Fahey, 1998).

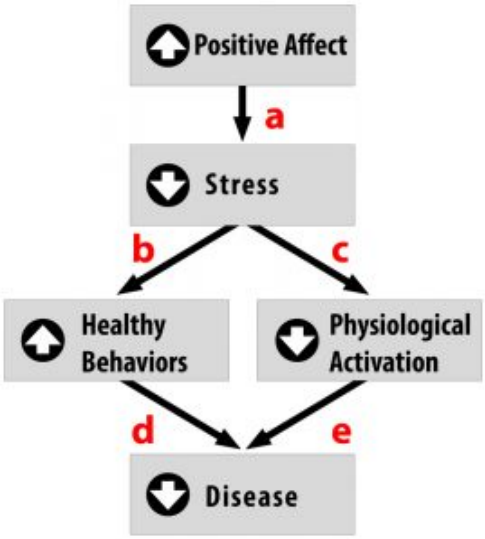


Figure 12.14 This figure illustrates one possible way that positive affect protects individuals against disease. Positive affect can reduce stress perceptions (a), thereby improving health behaviors (b) and lowering physiological stress responses (c) (e.g., decreased cardiovascular reactivity, lower stress hormones, non-suppressed immune activity). As a result, there is likely to be less incidence of disease (d, e).

Stress Management

About 20 percent of Americans report having stress, with 18–33 year-olds reporting the highest levels (American Psychological Association, 2012). Given that the sources of our stress are often difficult to change (e.g., personal finances, current job), a number of interventions have been designed to help reduce the aversive responses to duress. For example, relaxation activities and forms of meditation are techniques that allow individuals to reduce their stress via breathing exercises, muscle relaxation, and mental imagery. Physiological arousal from stress can also be reduced via **biofeedback**, a technique where the individual is shown bodily information that is not normally available to them (e.g., heart rate), and then taught strategies to alter this signal. This type of intervention has even shown promise in reducing heart and hypertension risk, as well as other serious conditions (e.g., Moravec, 2008; Patel, Marmot, & Terry, 1981). But reducing stress does not have to be complicated! For example, exercise is a great stress reduction activity (Salmon, 2001) that has a myriad of health benefits.

The Importance Of Good Health Practices

As a student, you probably strive to maintain good grades, to have an active social life, and to stay healthy (e.g., by getting enough sleep), but there is a popular joke about what it's like to be in college: you can only pick two of these things (see Figure 12.15 for an example). The busy life of a college student doesn't always allow you to maintain all three areas of your life, especially during test-taking periods. In one study, researchers found that students taking exams were more stressed and, thus, smoked more, drank more caffeine, had less physical activity, and had worse sleep habits (Oaten & Chang, 2005), all of which could have detrimental effects on their health. Positive health practices are *especially* important in times of stress when your immune system is compromised due to high stress and the elevated frequency of exposure to the illnesses of your fellow students in lecture halls, cafeterias, and dorms.



Figure 12.15 A popular joke about how difficult it is to stay balanced and healthy during college.

Psychologists study both **health behaviors** and health habits. The former are behaviors that can improve or harm your health. Some examples include regular exercise, flossing, and wearing sunscreen, versus negative behaviors like drunk driving, pulling all-nighters, or smoking. These behaviors become *habits* when they are firmly established and performed automatically. For example, do you have to think about putting your seatbelt on or do you do it automatically? Habits are often developed early in life thanks to parental encouragement or the influence of our peer group.

While these behaviors sound minor, studies have shown that those who engaged in more of these protective habits (e.g., getting 7–8 hours of sleep regularly, not smoking or drinking excessively, exercising) had fewer illnesses, felt better, and were less likely to die over a 9–12-year follow-up period (Belloc & Breslow 1972; Breslow & Enstrom 1980). For college students, health behaviors can even influence academic performance. For example, poor sleep quality and quantity are related to weaker learning capacity and academic performance (Curcio, Ferrara, & De Gennaro, 2006). Due to the effects that health behaviors can have, much effort is put forward by psychologists to understand *how* to change unhealthy behaviors, and to understand *why* individuals fail to act in healthy ways. Health promotion involves enabling individuals to improve health by focusing on behaviors that pose a risk for future illness, as well as spreading knowledge on existing risk factors. These might be genetic risks you are born with, or something you developed over time like obesity, which puts you at risk for Type 2 diabetes and heart disease, among other illnesses.

Psychology And Medicine

There are many psychological factors that influence medical treatment outcomes. For example, older individuals, (Meara, White, & Cutler, 2004), women (Briscoe, 1987), and those from higher socioeconomic backgrounds (Adamson, Ben-Shlomo, Chaturvedi, & Donovan, 2008) are all *more* likely to seek medical care. On the other hand, some individuals who need care might avoid it due to financial obstacles or preconceived notions about medical practitioners or the illness. Thanks to the growing amount of medical information online, many people now use the Internet for health information and 38% percent report that this influences their decision to see a doctor (Fox & Jones, 2009). Unfortunately, this is not always a good thing because individuals tend to do a poor job assessing the credibility of health information. For example, college-student participants reading online articles about HIV and syphilis rated a physician's article and a college student's article as *equally* credible if the participants said they were familiar with the health topic (Eastin, 2001). Credibility of health information often means how accurate or trustworthy the information is, and it can be influenced by irrelevant factors, such as the website's design, logos, or the organization's contact information (Freeman & Spyridakis, 2004). Similarly, many people post health questions on online, unmoderated forums where *anyone* can respond, which allows for the possibility of inaccurate information being provided for serious medical conditions by unqualified individuals.

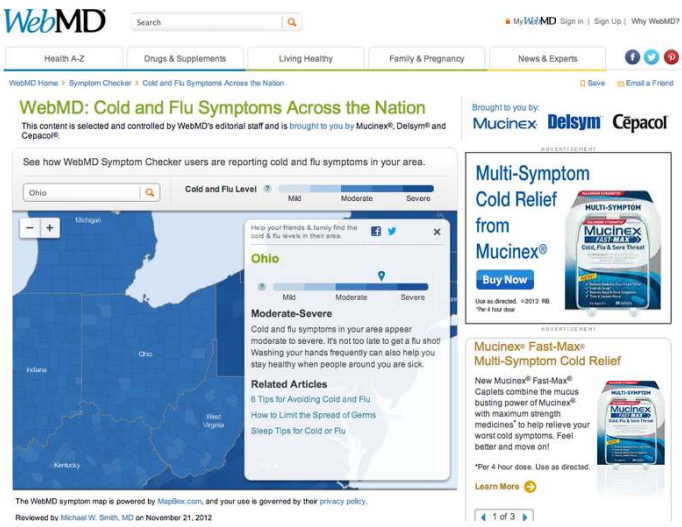


Figure 12.16 While the Internet has increased the amount of medical information available to the public and created greater access, there are real concerns about how people are making decisions about their health based on that information.

After individuals decide to seek care, there is also variability in the information they give their medical provider. Poor communication (e.g., due to embarrassment or feeling rushed) can influence the accuracy of the diagnosis and the effectiveness of the prescribed treatment. Similarly, there is variation following a visit to the doctor. While most individuals are tasked with a health recommendation (e.g., buying and using a medication appropriately, losing weight, going to another expert), not everyone *adheres* to medical recommendations (Dunbar-Jacob & Mortimer-Stephens, 2010). For example, many individuals take medications inappropriately (e.g., stopping early, not filling prescriptions) or fail to change their behaviors (e.g., quitting smoking). Unfortunately, getting patients to follow medical orders is not as easy as one would think. For example, in one study, over one third of diabetic patients failed to get proper medical care that would prevent or slow down diabetes-related blindness (Schoenfeld, Greene, Wu, & Leske, 2001)! Fortunately, as mobile technology improves, physicians now have the ability to monitor **adherence** and work to improve it (e.g., with pill bottles that monitor if they are opened at the right time). Even text messages are useful for improving treatment adherence and outcomes in depression, smoking cessation, and weight loss (Cole-Lewis, & Kershaw, 2010).

Being A Health Psychologist

Training as a clinical health psychologist provides a variety of possible career options. Clinical health psychologists often work on teams of physicians, social workers, allied health professionals, and religious leaders. These teams may be formed in locations like rehabilitation centers, hospitals, primary care offices, emergency care centers, or in chronic illness clinics. Work in each of these settings will pose unique challenges in patient care, but the primary responsibility will be the same. Clinical health psychologists will evaluate physical, personal, and environmental factors contributing to illness and preventing improved health. In doing so, they will then help create a treatment strategy that takes into account all dimensions of a person's life and health, which maximizes its potential for success. Those who specialize in health psychology can also conduct research to discover new health predictors and risk factors, or develop interventions to prevent and treat illness. Researchers studying health psychology work in numerous locations, such as universities, public health departments, hospitals, and private organizations. In the related field of **behavioral medicine**, careers focus on the application of this type of research. Occupations in this area might include jobs in occupational therapy, rehabilitation, or preventative medicine. Training as a health psychologist provides a wide skill set applicable in a number of different professional settings and career paths.

The Future Of Health Psychology

Much of the past medical research literature provides an incomplete picture of human health. "Health care" is often "illness care." That is, it focuses on the management of symptoms and illnesses as they arise. As a result, in many developed countries, we are faced with several health epidemics that are difficult and costly to treat. These include obesity, diabetes, and cardiovascular disease, to name a few. The National Institutes of Health have called for researchers to use the knowledge we have about risk factors to

design effective interventions to reduce the prevalence of *preventable* illness. Additionally, there are a growing number of individuals across developed countries with *multiple* chronic illnesses and/or lasting disabilities, especially with older age. Addressing their needs and maintaining their quality of life will require skilled individuals who understand how to properly treat these populations. Health psychologists will be on the forefront of work in these areas.

With this focus on prevention, it is important that health psychologists move beyond studying risk (e.g., depression, stress, hostility, low socioeconomic status) in isolation, and move toward studying factors that confer resilience and protection from disease. There is, fortunately, a growing interest in studying the positive factors that protect our health (e.g., Diener & Chan, 2011; Pressman & Cohen, 2005; Richman, Kubzansky, Maselko, Kawachi, Choo, & Bauer, 2005) with evidence strongly indicating that people with higher positivity live longer, suffer fewer illnesses, and generally feel better. Seligman (2008) has even proposed a field of "Positive Health" to specifically study those who exhibit "above average" health—something we do not think about enough. By shifting some of the research focus to identifying and understanding these health-promoting factors, we may capitalize on this information to improve public health.

Innovative interventions to improve health are already in use and continue to be studied. With recent advances in technology, we are starting to see great strides made to improve health with the aid of computational tools. For example, there are hundreds of simple applications (apps) that use email and text messages to send reminders to take medication, as well as mobile apps that allow us to monitor our exercise levels and food intake (in the growing mobile-health, or m-health, field). These m-health applications can be used to raise health awareness, support treatment and compliance, and remotely collect data on a variety of outcomes. Also exciting are devices that allow us to monitor physiology in real time; for example, to better understand the stressful situations that raise blood pressure or heart rate. With advances like these, health psychologists will be able to serve the population better, learn more about health and health behavior, and develop excellent health-improving strategies that could be specifically targeted to certain populations or individuals. These leaps in equipment development, partnered with growing health psychology knowledge and exciting advances in neuroscience and genetic research, will lead health researchers and practitioners into an exciting new time where, hopefully, we will understand more and more about how to keep people healthy.

Outside Resources

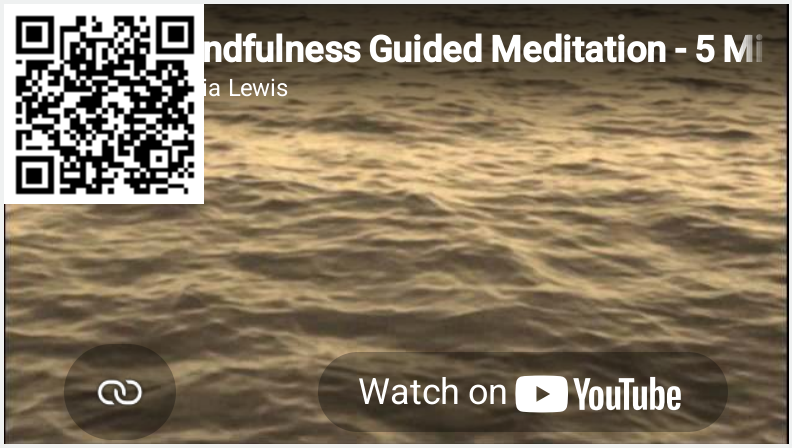
App: 30 iPhone apps to monitor your health http://www.hongkiat.com/blog/iphone-health-app/

Quiz: Hostility http://www.mhhe.com/socscience/hhp/fahey7e/wellness_worksheets/wellness_worksheet_090.html

Self-assessment: Perceived Stress Scale http://www.ncsu.edu/assessment/resources/perceived_stress_scale.pdf

Self-assessment: What's your real age (based on your health practices and risk factors)? http://www.realage.com

Video: Try out a guided meditation exercise to reduce your stress



Web: American Psychosomatic Society http://www.psychosomatic.org/home/index.cfm

Web: APA Division 38, Health Psychology http://www.health-psych.org

Web: Society of Behavioral Medicine http://www.sbm.org

Discussion Questions

1. What psychological factors contribute to health?
2. Which psychosocial constructs and behaviors might help protect us from the damaging effects of stress?
3. What kinds of interventions might help to improve resilience? Who will these interventions help the most?
4. How should doctors use research in health psychology when meeting with patients?
5. Why do clinical health psychologists play a critical role in improving public health?

Image Attributions

Figure 12.11: Adelphi Lab Center, https://goo.gl/N9wXon, CC BY 2.0, https://goo.gl/BRvSA7

Figure 12.13: JJ Harrison, https://goo.gl/82FsdV, CC BY-SA 2.5, https://goo.gl/SRAIwa

Figure 12.14: Adapted from Pressman & Cohen, 2005.

Figure 12.16: Mapbox, https://goo.gl/UNhmx5, CC BY 2.0, https://goo.gl/BRvSA7

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12.6: Positive Psychology

Robert A. Emmons

A brief history of the positive psychology movement is presented, and key themes within positive psychology are identified. Three important positive psychology topics are gratitude, forgiveness, and humility. Ten key findings within the field of positive psychology are put forth, and the most important empirical findings regarding gratitude, forgiveness, and humility are discussed. Assessment techniques for these three strengths are described, and interventions for increasing gratitude, developing forgiveness, and becoming more humble are briefly considered.

Learning Objectives

- Describe what positive psychology is, who started it, and why it came into existence.
- Identify some of the most important findings from the science of positive psychology with respect to forgiveness, gratitude, and humility.
- Explore how positive psychology might make a difference in how you think about your own life, the nature of human nature, and what is really important to you.

Introduction

Positive psychology is a popular movement that began in the late 1990's. It is the branch of psychology that has as its primary focus the on the strengths, virtues, and talents that contribute to successful functioning and enable individuals and communities to **flourish**. Core topics include happiness, resiliency, well-being, and states of flow and engagement. It was spearheaded by a former president of the American Psychological Association, Martin Seligman.



Figure 12.17 Martin Seligman, who is credited with starting the positive psychology movement, attributes the inspiration to his prior work on learned helplessness. New research prompted him to instead focus on the good in people's lives.

Throughout most of its history, psychology was concerned with identifying and remedying human ills. It has largely focused on decreasing maladaptive emotions and behaviors, while generally ignoring positive and optimal functioning. In contrast, the goal of positive psychology is to identify and enhance the human strengths and virtues that make life worth living. Unlike the positive thinking or new thought movements that are associated with people like Norman Vincent Peale or Rhonda Byrne (*The Secret*), positive psychology pursues scientifically informed perspectives on what makes life worth living. It is empirically based. It focuses on measuring aspects of the human condition that lead to happiness, fulfillment, and flourishing. The science of happiness is covered in other modules within this section of this book. Therefore, aside from key findings summarized in Table 12.3, the emphasis in this module will be on other topics within positive psychology.

Moving from an exclusive focus on distress, disorder, and dysfunction, positive psychology shifts the scientific lens to a concentration on well-being, health, and optimal functioning. Positive psychology provides a different vantage point through which to understand human experience. Recent developments have produced a common framework and that locates the study of positive states, strengths and virtues in relation to each other and links them to important life outcomes. Recent developments suggest that problems in psychological functioning may be more profitably dealt with as the absence, excess, or opposite of these strengths rather than traditional diagnostic categories of mental illness. The principal claim of positive psychology is that the study of health,

fulfillment and well-being is as deserving of study as illness, dysfunction, and distress, has resonated well with both the academic community and the general public.

As a relatively new field of research, positive psychology lacked a common vocabulary for discussing measurable positive traits before 2004. Traditional psychology benefited from the creation of Diagnostic and Statistical Manual of Mental Disorders (DSM), which provided researchers and clinicians with the same set of language from which they could talk about the negative. As a first step in remedying this disparity between traditional and positive psychology, Chris Peterson and Martin Seligman set out to identify, organize and measure character. The Values in Action (VIA) classification of strengths was an important initial step toward specifying important positive traits (Peterson & Seligman, 2004). Peterson and Seligman examined ancient cultures (including their religions, politics, education and philosophies) for information about how people in the past construed human virtue. The researchers looked for virtues that were present across cultures and time. Six core virtues emerged from their analysis: courage, justice, humanity, temperance, transcendence and wisdom. The VIA is the positive psychology counterpart to the DSM used in traditional psychology and psychiatry. Unlike the DSM, which scientifically categorizes human deficits and disorders, the VIA classifies positive human strengths. This approach vastly departs from the medical model of traditional psychology, which focuses on fixing deficits. In contrast, positive psychologists emphasize that people should focus and build upon on what they are doing well.

The VIA is a tool by which people can identify their own **character strengths** and learn how to capitalize on them. It consists of 240 questions that ask respondents to report the degree to which statements reflecting each of the strengths apply to themselves. For example, the character strength of hope is measured with items that include ‘‘I know that I will succeed with the goals I set for myself.’’ The strength of **gratitude** is measured with such items as ‘‘At least once a day, I stop and count my blessings.’’

Within the United States, the most commonly endorsed strengths are kindness, fairness, honesty, gratitude and judgment (Park, Peterson & Seligman, 2006). Worldwide, the following strengths were most associated with positive life satisfaction: hope, zest, gratitude and love. The researchers called these strengths of the heart. Moreover, strengths associated with knowledge, such as love of learning and curiosity, were least correlated with life satisfaction (Park, Peterson & Seligman, 2005).

Table 12.3 Ten Key Findings from the Science of Positive Psychology

Three Key Strengths

Forgiveness, gratitude, and humility are three key strengths that have been the focus of sustained research programs within positive psychology. What have we learned about each of these and why do these matter for human flourishing?

Forgiveness

Figure 12.18 There is a famous quotation that does a good job of illustrating the importance of forgiveness: “Holding onto anger is like drinking poison and expecting the other person to die.”

Forgiveness is essential to harmonious long-term relationships between individuals, whether between spouses or nations, dyads or collectives. At the level of the individual, forgiveness of self can help one achieve an inner peace as well as peace with others and with God. Wrongdoing against others can result in guilt, and self-loathing. Resentment can give away to hate and intolerance. Both perpetrator and victim suffer. Conversely, forgiveness can be an avenue to healing. It is the basic building block of loving

relationships with others. When one person or nation does something to hurt another, the relationship between the two can be irrevocably damaged. Because the potential for conflict is seemingly built into human nature, the prospects for long-term peace may seem faint. Forgiveness offers another way. If the victim can forgive the perpetrator, the relationship may be restored and possibly even saved from termination. The essence of forgiveness is that it creates a possibility for a relationship to recover from the damage caused by the offending party's offense. Forgiveness is thus a powerful **pro-social** process. It can benefit human social life by helping relationships to heal. , on the social level, forgiveness may be the critical element needed for world peace. Culligan (2002) wrote "Forgiveness may ultimately be the most powerful weapon for breaking the dreadful cycle of violence."

Research is answering fundamental questions about what forgiveness is and isn't, how it develops, what are its physiological correlates and physical effects, whether it is always beneficial, and how people—if they are so motivated—might be helped to forgive. Forgiveness is not excusing, condoning, tolerating, or forgetting that one has been hurt because of the actions of another. Forgiveness is letting go of negative thoughts (e.g. wishing the offender harm), negative behaviors (e.g. a desire to retaliate, and negative feelings (e.g. resentment) toward the offender (McCullough, Root, & Cohen, 2006).

There have been numerous studies looking at forgiveness interventions. The interventions involved counseling and exercises which were used to help people move from anger and resentment towards forgiveness. In one study, incest survivors who experienced the forgiveness intervention had at the end of the intervention increased abilities to forgive others, increased hopefulness and decreased levels of anxiety and depression. In another study, college students were randomized to a group that received a forgiveness education program and another group who studied human relations. The group that received the forgiveness education program showed higher levels of hope and an increased willingness to forgive others. This greater self-forgiveness was associated with increased self-esteem, lower levels of anxiety, lower levels of depression and a more positive view of their patient. In many of these studies, it was shown that people who are able to forgive are more likely to have better interpersonal functioning and therefore social support. The act of forgiveness can result in less anxiety and depression, better health outcomes, increased coping with stress, and increased closeness to God and others (Enright, 2001).

Gratitude

Figure 12.19 It is hard to feel sad when you're feeling grateful. Try to practice giving thanks, even for something small, every day.

Gratitude is a feeling of appreciation or thankfulness in response to receiving a benefit. The emerging science of gratitude has produced some important findings. From childhood to old age, accumulating evidence documents the wide array of psychological, physical, and relational benefits associated with gratitude (Wood, Froh, & Geraghty, 2010). Gratitude is important not only because it helps us feel good, but also because it inspires us to do good. Gratitude heals, energizes, and transforms lives in a myriad of ways consistent with the notion that virtue is both its own reward and produces other rewards (Emmons, 2007).

To give a flavor of these research findings, dispositional gratitude has been found to be positively associated qualities such as empathy, forgiveness, and the willingness to help others. For example, people who rated themselves as having a grateful disposition perceived themselves as having more socially helpful characteristics, expressed by their empathetic behavior, and emotional support for friends within the last month (McCullough, Emmons, & Tsang, 2002). In our research, when people report feeling grateful, thankful, and appreciative in their daily lives, they also feel more loving, forgiving, joyful, and enthusiastic. Notably, the family, friends, partners and others who surround them consistently report that people who practice gratitude are viewed as more helpful, more outgoing, more optimistic, and more trustworthy (Emmons & McCullough, 2003).

Expressing gratitude for life's blessings – that is, a sense of wonder, thankfulness and appreciation– is likely to elevate happiness for a number of reasons. Grateful thinking fosters the savoring of positive life experiences and situations, so that people can extract the maximum possible satisfaction and enjoyment from their circumstances. Counting one's blessings may directly counteract the effects of hedonic adaptation, the process by which our happiness level returns, again and again, to its set range, by preventing people from taking the good things in their lives for granted. If we consciously remind ourselves of our blessings, it should become harder to take them for granted and adapt to them. And the very act of viewing good things as gifts itself is likely to be beneficial for mood. How much does it matter? Consider these eye-popping statistics. People are 25% happier if they keep gratitude journals, sleep 1/2 hour more per evening, and exercise 33% more each week compared to persons who are not keeping journals. They achieve up to a 10% reduction in systolic blood pressure, and decrease their dietary fat intake by up to 20%. Lives marked by frequent positive emotions of joy, love and gratitude are up to 7 years longer than lives bereft of these pleasant feelings.

The science of gratitude has also revealed some surprising findings. For example, students who practice gratitude increase their grade point average. Occasional gratitude journaling boosts well-being more than the regular practice of counting blessings. Remembering one's sorrows, failures, and other painful experiences is more beneficial to happiness than recalling only successes. Becoming aware that a very pleasant experience is about to end enhances feelings of gratitude for it. Thinking about the absence of something positive in your life produces more gratitude and happiness than imagining its presence.

To assess your own level of gratefulness, take the test in Table 12.4.

Table 12.4 Your Gratitude Quotient

Figure 12.20 One aspect of humility is an awareness of the relatively little that one can really know about the world.

What is humility and why does it matter? Although the etymological roots of **humility** are in lowliness and self-abasement (from the Latin term humilis meaning “lowly, humble,” or literally “on the ground” and from the Latin term humus meaning “earth”), the emerging consensus among scholars is that humility is a psychological and intellectual virtue, or a character strength. There is no simple definition but it seems to involve the following elements: A clear and accurate (not underestimated) sense of one’s abilities and achievements; the ability to acknowledge one’s mistakes, imperfections, gaps in knowledge, and limitations (often with reference to a “higher power”); an openness to new ideas, contradictory information, and advice keeping one’s abilities and accomplishments in perspective; relatively low self-focus or an ability to “forget the self”; appreciation of the value of all things, as well as the many different ways that people and things can contribute to our world. In contemporary society, it is easy to overlook the merits of humility. In politics, business and sports, the egoists command our attention. “Show me someone without an ego,” said real estate mogul Donald Trump, “and I’ll show you a loser.” In contrast, the primary message of this book is that the unassuming virtue of humility, rather than representing weakness or inferiority, as is commonly assumed, is a strength of character that produces positive, beneficial results for self and society. Successful people are humble people. They are more likely to flourish in life, in more domains, than are people who are less humble (Exline & Hill, 2012).

Do you think you are you a humble person? For obvious reasons, you cannot rate your own level of humility. It’s an elusive concept to get at scientifically. “I am very humble” is self-contradictory. This has not discouraged personality psychologists from developing questionnaires to get at it, albeit indirectly. For example, to what extent do you identify with each of the following statements:

1. I generally have a good idea about the things I do well or do poorly.
2. I have difficulty accepting advice from other people.
3. I try my best in things, but I realize that I have a lot of work to do in many areas.
4. I am keenly aware of what little I know about the world.

Questions such as these tap various facets of the humble personality, including an appreciation and recognition of one’s limitations, and an accurate assessment of oneself.

Humble people are more likely to flourish in life, in more domains, than are people who are less humble. Consider a handful of findings from recent research studies and surveys:

- People who say they feel humble when they are praised report that the experience made them want to be nice to people, increase their efforts, and challenge themselves
- Humble people are more admired and the trait of humility is viewed positively by most
- Humble teachers are rated as more effective and humble lawyers as more likeable by jurors
- CEO’s who possessed a rare combination of extreme humility and strong professional will were catalysts for transforming a good company into a great one
- Over 80% of adults surveyed indicated that it is important that professionals demonstrate modesty/humility in their work

- Humility is positively associated with academic success in the form of higher grades (Exline & Hill, 2012).

The science of positive psychology has grown remarkably quickly since it first appeared on the scene in the late 1990's. Already, considerable progress has been made in understanding empirically the foundations of a good life. Knowledge from basic research in positive psychology is being applied in a number of settings, from psychotherapy to workplace settings to schools and even to the military (Biswas-Diener, 2011); A proper blend of science and practice will be required in order for positive psychology to fully realize its potential in dealing with the future challenges that we face as humans.

Outside Resources

Web: Authentic Happiness. http://www.authentichappiness.sas.upenn.edu

Web: The International Positive Psychology Association (IPPA). http://www.ippanetwork.org/

Discussion Questions

1. Can you think of people in your life who are very humble? What do they do or say that expresses their humility? To what extent do you think it would be good if you were more humble? To what extent do you think it would be good if you were less humble?
2. How can thinking gratefully about an unpleasant event from your past help you to deal positively with it? As the result of this event, what kinds of things do you now feel thankful or grateful for? How has this event benefited you as a person? How have you grown? Were there personal strengths that grew out of your experience?
3. Mahatma Gandhi once said, "The weak can never forgive. Forgiveness is the attribute of the strong." What do you think he meant by this? Do you agree or disagree? What are some of the obstacles you have faced in your own life when trying to forgive others?

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12.7: Summary, Key Terms, and Self-Test

Jennifer Walinga and Jorden A. Cummings

Summary

Early research on stress was conducted by Canadian physiologist Hans Selye, who studied how rats responded to stressful situations. He described the general adaptation syndrome, referring to the three distinct phases of physiological change occurring in response to long-term stress: alarm, resistance, and exhaustion. Stress creates an increase in general arousal in the sympathetic division of the autonomic nervous system and the HPA axis.

Stressful events can be divided into major and daily negative life events. Major events, such as a major illness or the death of a loved one, that occur relatively infrequently and have large disruptive effects on our lives. Daily events, such as losing one's key or having an argument with someone, occur more frequently but have an additive detrimental effect on our mental health. We tend to respond to stress with a fight or flight or tend and befriend response.



Figure 12.21 The Interaction of Health, Stress, and Coping, by J. Walinga

Whether stress is considered a response, a stimulus, or a transaction, how a person experiences stress is a complex interweaving of individual health, the capacity to cope, and the stress itself. Heavy or chronic stress is associated with negative physiological or health outcomes.

Stress level and experience are mediated by an individual's perception based on the cognitive appraisal of the stressor. If a stressor is perceived to be threatening and an individual believes he or she does not have the resources to cope with that stressor, then the stress experienced will be debilitative. But if a person is able to interpret the stressor positively, or believes he or she has the resources to cope, then the outcome can be neutral or even facilitative, as in the case of *stress-related growth*.

Not only the stressor, but the physiological stress response itself (e.g., increased heart rate, sweating, and trembling), can produce anxiety based on interpretation. If a person interprets the physiological response to a stressor negatively, as worrisome, the impact on health or performance will be debilitative. But if the person interprets the physiological response positively, as a sign of readiness or preparation, the impact can be neutral, positive, or even facilitative.

Mental and physical health appear to be the greatest leverage points for helping individuals cope with or perceive stress positively. If a person is healthy, he or she is more likely to perceive a stressor positively and/or cope well with negative stressors. If a person is able to cope productively (i.e., problem-focused coping) with negative stress, his or her health is more likely to remain strong. If a person is able to perceive stress facilitatively, he or she is more likely to retain health and cope productively.

Health psychology is an area of psychology that examines the intersection of psychology and health. Health psychologists might examine topics like how our behaviour influences our likelihood and experience of disease, how psychology can influence medicine, and how to promote physical health. Health psychology and its related discipline of behavioural medicine is an interesting career option that many psychologists choose.

Positive psychology focuses on the strengths, virtues, and talents that contribute to successful functioning and enable flourishing. It covers topics like happiness and well-being. Overall, research in positive psychology has found that most people are happy and that happiness causes good things in life. In terms of satisfaction, having meaning in life seems to trump pleasure. Moreover, most people are resilient and bounce back from adversity. In this chapter we examined three key strengths in particular: Forgiveness, gratitude, and humility. Forgiveness is essential for harmony in our relationships and benefits the self as well. Gratitude is an

important protective factor against stress and deepens life. It is correlated with empathy, forgiveness, and the willingness to help others. Humility includes both a clear sense of one's abilities and achievements as well as the ability to acknowledge one's imperfections.

Key Terms

- Adherence
- Adrenaline
- Behavioral Medicine
- Biofeedback
- Biomedical Model of Health
- Biopsychosocial Model of Health
- Challenge
- Character Strengths
- Chronic Disease
- Commitment
- Control
- Cortisol
- Daily Hassles
- Emotion Regulation
- Emotion-Focused Coping
- Eustress
- External Locus of Control
- Fight-or-Flight Response
- Flourish
- Forgiveness
- General Adaptation Syndrome (GAS) Model
- Gratitude
- Hardiness Theoretical Model
- Health Behaviors
- Hostility
- HPA Axis
- Humility
- Internal Locus of Control
- Inverted U Hypothesis
- Major Life Stressors
- Mind–Body Connection
- Personal
- Positive Psychology
- Post-Traumatic Stress Disorder (PTSD)
- Primary Appraisal
- Pro-Social
- Problem-Focused Coping
- Psychoneuroimmunology
- Psychosomatic Medicine
- Reappraisal
- Resilience
- Response
- Secondary Appraisal
- Self-efficacy
- Sense of Coherence
- Social Integration
- Social Support
- Socioeconomic
- Sociopolitical
- Stimulus
- Stress
- Stress Coping
- Stress-Related Growth
- Tend-and-Befriend Response
- Thriving
- Transactional Theory of Stress and Coping (TTSC)
- Type A Behavior
- Type B Behavior

Self-Test

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CHAPTER OVERVIEW

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13.1: Introduction

Jorden A. Cummings

One of the largest areas of psychology is **social psychology**, which aims to understand how other people influence our lives – from the way we see the world, what we think and feel, to how we love and break up, how we make peace, and how other people can influence our behaviour. In this chapter, you'll learn about some of the major areas of social psychology.

First, we'll discuss social psychology as a science and how social psychologists conduct their research and an overview of some of the major topics that fall under social psychology's study of group processes like **attraction**, **attitudes**, peace and conflict, **social influence**, and social cognition. **Social cognition** is a topic we're going to cover in more detail. It examines how people influence our thinking and how we think about our social environment. One way that we simplify this thinking is by various **heuristics**, or thinking shortcuts. In this section we'll discuss lots of various heuristics and how they influence our social thinking.

Conformity and **obedience** are two of the oldest areas of research in social psychology and have some of the most famous research studies. We'll discuss why and how we conform to others' behaviours – even when we know they are wrong! We'll also discuss under what conditions we are more and less likely to obey others and some of the research controversy in this area. We'll then turn to review another major area of study in social psychology: **Prejudice**, **discrimination**, and **stereotyping**. Last, we will discuss the ways in which humans help one another and how **altruism** influences us.

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13.2: An Introduction to the Science of Social Psychology

Robert Biswas-Diener

The science of social psychology investigates the ways other people affect our thoughts, feelings, and behaviors. It is an exciting field of study because it is so familiar and relevant to our day-to-day lives. Social psychologists study a wide range of topics that can roughly be grouped into 5 categories: attraction, attitudes, peace & conflict, social influence, and social cognition.

Learning Objectives

- Define social psychology and understand how it is different from other areas of psychology.
- Understand "levels of analysis" and why this concept is important to science.
- List at least three major areas of study in social psychology.
- Define the "need to belong".

Introduction

We live in a world where, increasingly, people of all backgrounds have smart phones. In economically developing societies, cellular towers are often less expensive to install than traditional landlines. In many households in industrialized societies, each person has his or her own mobile phone instead of using a shared home phone. As this technology becomes increasingly common, curious researchers have wondered what effect phones might have on relationships. Do you believe that smart phones help foster closer relationships? Or do you believe that smart phones can hinder connections? In a series of studies, researchers have discovered that the mere presence of a mobile phone lying on a table can interfere with relationships. In studies of conversations between both strangers and close friends—conversations occurring in research laboratories and in coffee shops—mobile phones appeared to distract people from connecting with one another. The participants in these studies reported lower conversation quality, lower trust, and lower levels of empathy for the other person (Przybylski & Weinstein, 2013). This is not to discount the usefulness of mobile phones, of course. It is merely a reminder that they are better used in some situations than they are in others. It is also a real-world example of how social psychology can help produce insights about the ways we understand and interact with one another.



13.1 Social psychology is interested in how other people affect our thoughts, feelings, and behaviors. Researchers study group interactions, the way culture shapes our thinking, and even how technology impacts human relationships.

Social psychology is the branch of psychological science mainly concerned with understanding how the presence of others affects our thoughts, feelings, and behaviors. Just as clinical psychology focuses on mental disorders and their treatment, and developmental psychology investigates the way people change across their lifespan, social psychology has its own focus. As the name suggests, this science is all about investigating the ways groups function, the costs and benefits of social status, the influences of culture, and all the other psychological processes involving two or more people.

Social psychology is such an exciting science precisely because it tackles issues that are so familiar and so relevant to our everyday life. Humans are "social animals." Like bees and deer, we live together in groups. Unlike those animals, however, people are

unique, in that we care a great deal about our relationships. In fact, a classic study of life stress found that the most stressful events in a person's life—the death of a spouse, divorce, and going to jail—are so painful because they entail the loss of relationships (Holmes & Rahe, 1967). We spend a huge amount of time thinking about and interacting with other people, and researchers are interested in understanding these thoughts and actions. Giving up a seat on the bus for another person is an example of social psychology. So is disliking a person because he is wearing a shirt with the logo of a rival sports team. Flirting, conforming, arguing, trusting, competing—these are all examples of topics that interest social psychology researchers.

At times, science can seem abstract and far removed from the concerns of daily life. When neuroscientists discuss the workings of the anterior cingulate cortex, for example, it might sound important. But the specific parts of the brain and their functions do not always seem directly connected to the stuff you care about: parking tickets, holding hands, or getting a job. Social psychology feels so close to home because it often deals with universal psychological processes to which people can easily relate. For example, people have a powerful **need to belong** (Baumeister & Leary, 1995). It doesn't matter if a person is from Israel, Mexico, or the Philippines; we all have a strong need to make friends, start families, and spend time together. We fulfill this need by doing things such as joining teams and clubs, wearing clothing that represents "our group," and identifying ourselves based on national or religious affiliation. It feels good to belong to a group. Research supports this idea. In a study of the most and least happy people, the differentiating factor was not gender, income, or religion; it was having high-quality relationships (Diener & Seligman, 2002). Even introverts report being happier when they are in social situations (Pavot, Diener & Fujita, 1990). Further evidence can be found by looking at the negative psychological experiences of people who do not feel they belong. People who feel lonely or isolated are more vulnerable to depression and problems with physical health (Cacioppo, & Patrick, 2008).



Figure 13.2 The feelings we experience as members of groups – as teammates, fellow citizens, followers of a particular faith – play a huge role in our identities and in our happiness.

Social Psychology is a Science

The need to belong is also a useful example of the ways the various aspects of psychology fit together. Psychology is a science that can be sub-divided into specialties such as "abnormal psychology" (the study of mental illness) or "developmental psychology" (the study of how people develop across the life span). In daily life, however, we don't stop and examine our thoughts or behaviors as being distinctly social versus developmental versus personality-based versus clinical. In daily life, these all blend together. For example, the need to belong is rooted in developmental psychology. Developmental psychologists have long paid attention to the importance of attaching to a caregiver, feeling safe and supported during childhood, and the tendency to conform to peer pressure during adolescence. Similarly, clinical psychologists—those who research mental disorders– have pointed to people feeling a lack of belonging to help explain loneliness, depression, and other psychological pains. In practice, psychologists separate concepts into categories such as "clinical," "developmental," and "social" only out of scientific necessity. It is easier to simplify thoughts, feelings, and behaviors in order to study them. Each psychological sub-discipline has its own unique approaches to research. You may have noticed that this is almost always how psychology is taught, as well. You take a course in personality, another in human sexuality, and a third in gender studies, as if these topics are unrelated. In day-to-day life, however, these distinctions do not actually exist, and there is heavy overlap between the various areas of psychology.

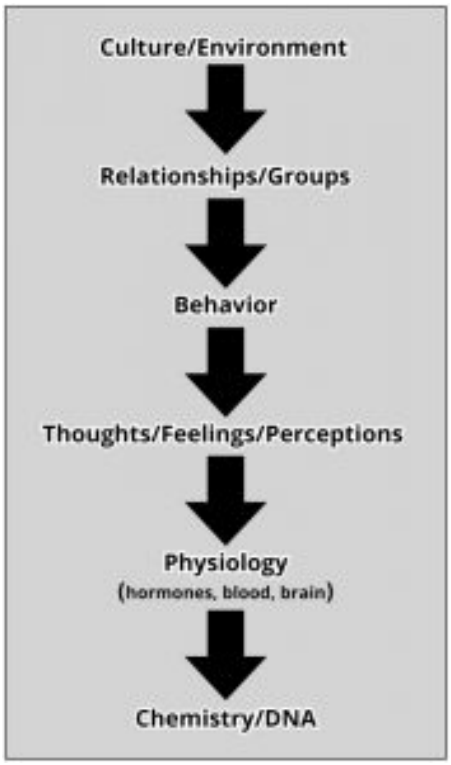


Figure 13.3 The levels of analysis in psychology.

In psychology, there are varying **levels of analysis**. Figure 13.3 summarizes the different levels at which scientists might understand a single event. Take the example of a toddler watching her mother make a phone call: the toddler is curious, and is using **observational learning** to teach herself about this machine called a telephone. At the most specific levels of analysis, we might understand that various neurochemical processes are occurring in the toddler's brain. We might be able to use imaging techniques to see that the cerebellum, among other parts of the brain, is activated with electrical energy. If we could "pull back" our scientific lens, we might also be able to gain insight into the toddler's own experience of the phone call. She might be confused, interested, or jealous. Moving up to the next level of analysis, we might notice a change in the toddler's behavior: during the call she furrows her brow, squints her eyes, and stares at her mother and the phone. She might even reach out and grab at the phone. At still another level of analysis, we could see the ways that her relationships enter into the equation. We might observe, for instance, that the toddler frowns and grabs at the phone when her mother uses it, but plays happily and ignores it when her stepbrother makes a call. All of these chemical, emotional, behavioral, and social processes occur simultaneously. None of them is the objective truth. Instead, each offers clues into better understanding what, psychologically speaking, is happening.

Social psychologists attend to all levels of analysis but—historically—this branch of psychology has emphasized the higher levels of analysis. Researchers in this field are drawn to questions related to relationships, groups, and culture. This means that they frame their research hypotheses in these terms. Imagine for a moment that you are a social researcher. In your daily life, you notice that older men on average seem to talk about their feelings less than do younger men. You might want to explore your **hypothesis** by recording natural conversations between males of different ages. This would allow you to see if there was evidence supporting your original observation. It would also allow you to begin to sift through all the factors that might influence this phenomenon: What happens when an older man talks to a younger man? What happens when an older man talks to a stranger versus his best friend? What happens when two highly educated men interact versus two working class men? Exploring each of these questions focuses on interactions, behavior, and culture rather than on perceptions, hormones, or DNA.



Figure 13.4 Social psychologists have developed unique methods for studying attitudes and behaviors that help answer questions that may not be possible to answer in a laboratory. Naturalistic observation of real world interactions, for example, would be a method well suited for understanding more about men and how they share their feelings.

In part, this focus on complex relationships and interactions is one of the things that makes research in social psychology so difficult. High quality research often involves the ability to control the environment, as in the case of laboratory experiments. The research laboratory, however, is artificial, and what happens there may not translate to the more natural circumstances of life. This is why social psychologists have developed their own set of unique methods for studying attitudes and social behavior. For example, they use naturalistic observation to see how people behave when they don't know they are being watched. Whereas people in the laboratory might report that they personally hold no racist views or opinions (biases most people wouldn't readily admit to), if you were to observe how close they sat next to people of other ethnicities while riding the bus, you might discover a behavioral clue to their actual attitudes and preferences.

What is Included in Social Psychology?

Social psychology is the study of group processes: how we behave in groups, and how we feel and think about one another. While it is difficult to summarize the many areas of social psychology research, it can be helpful to lump them into major categories as a starting point to wrap our minds around. There is, in reality, no specific number of definitive categories, but for the purpose of illustration, let's use five. Most social psychology research topics fall into one (but sometimes more) of each of these areas:

Attraction

A large amount of study in social psychology has focused on the process of **attraction**. Think about a young adult going off to college for the first time. He takes an art history course and sits next to a young woman he finds attractive. This feeling raises several interesting questions: Where does the attraction come from? Is it biological or learned? Why do his standards for beauty differ somewhat from those of his best friend? The study of attraction covers a huge range of topics. It can begin with first impressions, then extend to courtship and commitment. It involves the concepts of beauty, sex, and evolution. Attraction researchers might study stalking behavior. They might research divorce or remarriage. They might study changing standards of beauty across decades.

Figure 13.5 When a study of attractiveness was conducted with Maasai tribal people the researchers found that when participants rated the attractiveness of their friends they used different criteria than when they rated the attractiveness of strangers – a pattern that was also discovered in a sample of people from the United States.

In a series of studies focusing on the topic of attraction, researchers were curious how people make judgments of the extent to which the faces of their friends and of strangers are good looking (Wirtz, Biswas-Diener, Diener & Drogos, 2011). To do this, the researchers showed a set of photographs of faces of young men and women to several assistants who were **blind to the research hypothesis**. Some of the people in the photos were Caucasian, some were African-American, and some were Maasai, a tribe of traditional people from Kenya. The assistants were asked to rate the various facial features in the photos, including skin smoothness, eye size, prominence of cheekbones, symmetry (how similar the left and the right halves of the face are), and other characteristics. The photos were then shown to the research participants—of the same three ethnicities as the people in the photos—who were asked to rate the faces for overall attractiveness. Interestingly, when rating the faces of strangers, white people, Maasai, and African-Americans were in general agreement about which faces were better looking. Not only that, but there was high consistency in which *specific* facial features were associated with being good looking. For instance, across ethnicities and cultures, everyone seemed to find smooth skin more attractive than blemished skin. Everyone seemed to also agree that larger chins made men more attractive, but not women.

Then came an interesting discovery. The researchers found that Maasai tribal people agreed about the faces of strangers—but *not* about the faces of people they knew! Two people might look at the same photo of someone they knew; one would give a thumbs up for attractiveness, the other one, not so much. It appeared that friends were using some other standard of beauty than simply nose, eyes, skin, and other facial features. To explore this further, the researchers conducted a second study in the United States. They brought university students into their laboratory in pairs. Each pair were friends; some were same-sex friends and some were opposite-sex friends. They had their photographs taken and were then asked to privately rate each other's attractiveness, along with photos of other participants whom they did not know (strangers). Friends were also asked to rate each other on personality traits, including "admirable," "generous," "likable," "outgoing," "sensitive," and "warm."

In doing this, the researchers discovered two things. First, they found the exact same pattern as in the earlier study: when the university students rated strangers, they focused on actual facial features, such as skin smoothness and large eyes, to make their judgments (whether or not they realized it). But when it came to the hotness-factor of their friends, these features appeared not to be very important. Suddenly, likable personality characteristics were a better predictor of who was considered good looking. This makes sense. Attractiveness is, in part, an evolutionary and biological process. Certain features such as smooth skin are signals of health and reproductive fitness—something especially important when scoping out strangers. Once we know a person, however, it is possible to swap those biological criteria for psychological ones. People tend to be attracted not just to muscles and symmetrical faces but also to kindness and generosity. As more information about a person's personality becomes available, it becomes the most important aspect of a person's attractiveness.

Understanding how attraction works is more than an intellectual exercise; it can also lead to better interventions. Insights from studies on attraction can find their way into public policy conversations, couples therapy, and sex education programs.

Attitudes

Figure 13.6 Social psychologists are interested in finding ways to apply their research to improve the lives of individuals and benefit communities and society as a whole. For example researchers are looking at ways to change the general public's attitudes about stigmatized groups such as the homeless.

Social psychology shares with its intellectual cousins sociology and political science an interest in **attitudes**. Attitudes are opinions, feelings, and beliefs about a person, concept, or group. People hold attitudes about all types of things: the films they see, political issues, and what constitutes a good date. Social psychology researchers are interested in what attitudes people hold, where these attitudes come from, and how they change over time. Researchers are especially interested in social attitudes people hold about categories of people, such as the elderly, military veterans, or people with mental disabilities.

Among the most studied topics in attitude research are stereotyping and prejudice. Although people often use these words interchangeably, they are actually different concepts. **Stereotyping** is a way of using information shortcuts about a group to effectively navigate social situations or make decisions. For instance, you might hold a stereotype that elderly people are physically slower and frailer than twenty-year-olds. If so, you are more likely to treat interactions with the elderly in a different manner than interactions with younger people. Although you might delight in jumping on your friend's back, punching a buddy in the arm, or jumping out and scaring a friend you probably do not engage in these behaviors with the elderly. Stereotypical information may or may not be correct. Also, stereotypical information may be positive or negative. Regardless of accuracy, all people use stereotypes, because they are efficient and inescapable ways to deal with huge amounts of social information. It is important to keep in mind, however, that stereotypes, even if they are correct in general, likely do not apply to every member of the group. As a result, it can seem unfair to judge an individual based on perceived group norms.

Prejudice, on the other hand, refers to how a person feels about an individual based on their group membership. For example, someone with a prejudice against tattoos may feel uncomfortable sitting on the metro next to a young man with multiple, visible tattoos. In this case, the person is pre-judging the man with tattoos based on group members (people with tattoos) rather than getting to know the man as an individual. Like stereotypes, prejudice can be positive or negative.

Discrimination occurs when a person is biased against an individual, simply because of the individual's membership in a social category. For instance, if you were to learn that a person has gone to rehabilitation for alcohol treatment, it might be unfair to treat him or her as untrustworthy. You might hold a stereotype that people who have been involved with drugs are untrustworthy or that they have an arrest record. Discrimination would come when you *act* on that stereotype by, for example, refusing to hire the person for a job for which they are otherwise qualified. Understanding the psychological mechanisms of problems like prejudice can be the first step in solving them.

Social psychology focuses on basic processes, but also on applications. That is, researchers are interested in ways to make the world a better place, so they look for ways to put their discoveries into constructive practice. This can be clearly seen in studies on attitude change. In such experiments, researchers are interested in how people can overcome negative attitudes and feel more empathy towards members of other groups. Take, for example, a study by Daniel Batson and his colleagues (1997) on attitudes about people from **stigmatized groups**. In particular, the researchers were curious how college students in their study felt about homeless people. They had students listen to a recording of a fictitious homeless man—Harold Mitchell—describing his life. Half of the participants were told to be objective and fair in their consideration of his story. The other half were instructed to try to see life through Harold's eyes and imagine how he felt. After the recording finished, the participants rated their attitudes toward homeless people in general. They addressed attitudes such as "Most homeless people could get a job if they wanted to," or "Most homeless people choose to live that way." It turns out that when people are instructed to have empathy—to try to see the world through another person's eyes—it gives them not only more empathy for that individual, but also for the group as a whole. In the Batson et al. experiment (1997), the high empathy participants reported a favorable rating of homeless people than did those participants in the low empathy condition.

Studies like these are important because they reveal practical possibilities for creating a more positive society. In this case, the results tell us that it is possible for people to change their attitudes and look more favorably on people they might otherwise avoid or be prejudiced against. In fact, it appears that it takes relatively little—simply the effort to see another's point of view—to nudge people toward being a bit kinder and more generous toward one another. In a world where religious and political divisions are highly publicized, this type of research might be an important step toward working together.

Figure 13.7 Why do we fight? How do we fight? What factors contribute to successful reconciliation? Social psychologists study conflict, aggression, and violence and their research leads to many real-world applications in areas such as international relations and clinical therapy.

Social psychologists are also interested in peace and conflict. They research conflicts ranging from the small—such as a spat between lovers—to the large—such as wars between nations. Researchers are interested in why people fight, how they fight, and what the possible costs and benefits of fighting are. In particular, social psychologists are interested in the mental processes associated with conflict and reconciliation. They want to understand how emotions, thoughts, and sense of identity play into conflicts, as well as making up afterward.

Take, for instance, a 1996 study by Dov Cohen and his colleagues. They were interested in people who come from a "**culture of honor**"—that is, a cultural background that emphasizes personal or family reputation and social status. Cohen and his colleagues realized that cultural forces influence why people take offense and how they behave when others offend them. To investigate how people from a culture of honor react to aggression, the Cohen research team invited dozens of university students into the laboratory, half of whom were from a culture of honor. In their experiment, they had a **research confederate** "accidentally" bump the **research participant** as they passed one another in the hallway, then say "asshole" quietly. They discovered that people from the Northern United States were likely to laugh off the incident with amusement (only 35% became angry), while 85% of folks from the Southern United States—a culture of honor region—became angry.

In a follow-up study, the researchers were curious as to whether this anger would boil over and lead people from cultures of honor to react more violently than others (Cohen, Nisbett, Bowdle, & Schwarz, 1996). In a cafeteria setting, the researchers "accidentally" knocked over drinks of people from cultures of honor as well as drinks of people not from honor cultures. As expected, the people from honor cultures became angrier; however, they did not act out more aggressively. Interestingly, in follow-up interviews, the people from cultures of honor said they would expect their peers—other people from their culture of honor—to act violently even though they, themselves, had not. This follow-up study provides insights into the links between emotions and social behavior. It also sheds light on the ways that people perceive certain groups.

This line of research is just a single example of how social psychologists study the forces that give rise to aggression and violence. Just as in the case of attitudes, a better understanding of these forces might help researchers, therapists, and policy makers intervene more effectively in conflicts.

Social Influence

Take a moment and think about television commercials. How influenced do you think you are by the ads you see? A very common perception voiced among psychology students is "Other people are influenced by ads, but not me!" To some degree, it is an unsettling thought that outside influences might sway us to spend money on, make decisions about, or even *feel* what they want us to. Nevertheless, none of us can escape **social influence**. Perhaps, more than any other topic, social influence is the heart and soul of social psychology. Our most famous studies deal with the ways that other people affect our behavior; they are studies on **conformity**—being persuaded to give up our own opinions and go along with the group—and **obedience**—following orders or requests from people in authority.

Figure 13.8 Many of our most common everyday-activities – eating in a restaurant for example – involve instances of social influence. We may not even be aware that our behaviors are being guided by outside forces of persuasion, but none of us is immune to social influence.

Among the most researched topics is persuasion. Persuasion is the act of delivering a particular message so that it influences a person's behavior in a desired way. Your friends try to persuade you to join their group for lunch. Your parents try to persuade you to go to college and to take your studies seriously. Doctors try to persuade you to eat a healthy diet or exercise more often. And, yes, advertisers try to persuade you also. They showcase their products in a way that makes them seem useful, affordable, reliable, or cool.

One example of persuasion can be seen in a very common situation: tipping the serving staff at a restaurant. In some societies, especially in the United States, tipping is an important part of dining. As you probably know, servers hope to get a large tip in exchange for good service. One group of researchers was curious what servers do to coax diners into giving bigger tips. Occasionally, for instance, servers write a personal message of thanks on the bill. In a series of studies, the researchers were interested in how gift-giving would affect tipping. First, they had two male waiters in New York deliver a piece of foil-wrapped chocolate along with the bill at the end of the meal. Half of 66 diners received the chocolate and the other half did not. When patrons were given the unexpected sweet, they tipped, on average, 2% more (Strohmetz, Rind, Fisher & Lynn 2002).

In a follow-up study, the researchers changed the conditions. In this case, two female servers brought a small basket of assorted chocolates to the table (Strohmetz et al., 2002). In one research condition, they told diners they could pick two sweets; in a separate research condition, however, they told diners they could pick one sweet, but then—as the diners were getting ready to leave—the waiters returned and offered them a second sweet. In both situations, the diners received the same number of sweets, but in the second condition the waiters appeared to be more generous, as if they were making a personal decision to give an additional little gift. In both of these conditions the average amount of tips went up, but tips increased a whopping 21% in the "very generous" condition. The researchers concluded that giving a small gift puts people in the frame of mind to give a little something back, a principle called **reciprocity**.

Research on persuasion is very useful. Although it is tempting to dismiss it as a mere attempt by advertisers to get you to purchase goods and services, persuasion is used for many purposes. For example, medical professionals often hope people will donate their organs after they die. Donated organs can be used to train medical students, advance scientific discovery, or save other people's lives through transplantation. For years, doctors and researchers tried to persuade people to donate, but relatively few people did. Then, policy makers offered an organ donation option for people getting their driver's license, and donations rose. When people received their license, they could tick a box that signed them up for the organ donation program. By coupling the decision to donate organs with a more common event—getting a license—policy makers were able to increase the number of donors. Then, they had the further idea of "nudging" people to donate—by making them "opt out" rather than "opt in." Now, people are automatically signed up to donate organs *unless* they make the effort to check a box indicating they don't want to. By making organ donation the default, more people have donated and more lives have been saved. This is a small but powerful example of how we can be persuaded to behave certain ways, often without even realizing what is influencing us.

Social Cognition

You, me, all of us—we spend much of our time thinking about other people. We make guesses as to their honesty, their motives, and their opinions. **Social cognition** is the term for the way we think about the social world and how we perceive others. In some sense, we are continually telling a story in our own minds about the people around us. We struggle to understand why a date failed to show up, whether we can trust the notes of a fellow student, or if our friends are laughing at our jokes because we are funny or if they are just being nice. When we make educated guesses about the efforts or motives of others, this is called **social attribution**. We are "attributing" their behavior to a particular cause. For example, we might attribute the failure of a date to arrive on time to car trouble, forgetfulness, or the wrong-headed possibility that we are not worthy of being loved.

Figure 13.9 "Am I the only one who knows how to drive? The roads are full of maniacs and idiots today!" If you've ever had these feelings while behind the wheel you likely have experienced what psychologists call the fundamental attribution error.

Because the information we have regarding other people's motives and behavior is not as complete as our insights into our own, we are likely to make unreliable judgments of them. Imagine, for example, that a person on the freeway speeds up behind you, follows dangerously close, then swerves around and passes you illegally. As the driver speeds off into the distance you might think to yourself, "What a jerk!" You are beginning to tell yourself a story about why that person behaved that way. Because you don't have any information about his or her situation—rushing to the hospital, or escaping a bank robbery?—you default to judgments of character: clearly, that driver is impatient, aggressive, and downright rude. If you were to do the exact same thing, however—cut someone off on the freeway—you would be less likely to attribute the same behavior to poor character, and more likely to chalk it up to the situation. (Perhaps you were momentarily distracted by the radio.) The consistent way we attribute people's actions to personality traits while overlooking situational influences is called the **fundamental attribution error**.

The fundamental attribution error can also emerge in other ways. It can include groups we belong to versus opposing groups. Imagine, for example, that you are a fan of rugby. Your favorite team is the All Blacks, from New Zealand. In one particular match, you notice how unsporting the opposing team is. They appear to pout and seem to commit an unusually high number of fouls. Their fouling behavior is clearly linked to their character; they are mean people! Yet, when a player from the All Blacks is called for a foul, you may be inclined to see that as a bad call by the referee or a product of the fact that your team is pressured from a tough schedule and a number of injuries to their star players. This mental process allows a person to maintain his or her own high self-esteem while dismissing the bad behavior of others.

Conclusion

People are more connected to one another today than at any time in history. For the first time, it is easy to have thousands of acquaintances on social media. It is easier than ever before to travel and meet people from different cultures. Businesses, schools, religious groups, political parties, and governments interact more than they ever have. For the first time, people in greater numbers live clustered in cities than live spread out across rural settings. These changes have psychological consequences. Over the last hundred years, we have seen dramatic shifts in political engagement, ethnic relations, and even the very definition of family itself.

Social psychologists are scientists who are interested in understanding the ways we relate to one another, and the impact these relationships have on us, individually and collectively. Not only can social psychology research lead to a better understanding of

personal relationships, but it can lead to practical solutions for many social ills. Lawmakers, teachers and parents, therapists, and policy makers can all use this science to help develop societies with less conflict and more social support.

Outside Resources

Web: A collection of links on the topic of peace psychology https://www.socialpsychology.org/peace.htm

Web: A great resource for all things social psychology, all in one place – Social Psychology Network http://www.socialpsychology.org/

Web: A list of profiles of major historical figures in social psychology https://www.socialpsychology.org/social-figures.htm

Web: A review of the history of social psychology as well as the topics of interest in the field https://en.wikipedia.org/wiki/Social_psychology

Web: A succinct review of major historical figures in social psychology http://www.simplypsychology.org/social-psychology.html

Web: An article on the definition and areas of influence of peace psychology https://en.wikipedia.org/wiki/Peace_psychology

Web: Article describing another way of conceptualizing levels of analysis in social psychology http://psych.colorado.edu/~oreilly/cecn/node11.html

Web: Extended list of major historical figures in social psychology http://www.sparknotes.com/psychology/psych101/majorfigures/characters.html

Web: History and principles of social psychology https://opentextbc.ca/socialpsychology/chapter/defining-social-psychology-history-and-principles/

Web: Links to sources on history of social psychology as well as major historical figures https://www.socialpsychology.org/history.htm

Web: The Society for the Study of Peace, Conflict and Violence http://www.peacepsych.org/

Discussion Questions

1. List the types of relationships you have. How do these people affect your behavior? Are there actions you perform or things you do that you might not otherwise if it weren't for them?
2. When you think about where each person in your psychology class sits, what influences the seat he or she chooses to use? Is it just a matter of personal preference or are there other influences at work?
3. Do you ever try to persuade friends or family members to do something? How do you try to persuade them? How do they try to persuade you? Give specific examples.
4. If you were a social psychologist, what would you want to research? Why? How would you go about it?

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13.3: Social Cognition and Attitudes

Yanine D. Hess and Cynthia L. Pickett

Social cognition is the area of social psychology that examines how people perceive and think about their social world. This module provides an overview of key topics within social cognition and attitudes, including judgmental heuristics, social prediction, affective and motivational influences on judgment, and explicit and implicit attitudes.

Learning Objectives

- Learn how we simplify the vast array of information in the world in a way that allows us to make decisions and navigate our environments efficiently.
- Understand some of the social factors that influence how we reason.
- Determine if our reasoning processes are always conscious, and if not, what some of the effects of automatic/nonconscious cognition are.
- Understand the difference between explicit and implicit attitudes, and the implications they have for behavior.

Introduction

Imagine you are walking toward your classroom and you see your teacher and a fellow student you know to be disruptive in class whispering together in the hallway. As you approach, both of them quit talking, nod to you, and then resume their urgent whispers after you pass by. What would you make of this scene? What story might you tell yourself to help explain this interesting and unusual behavior?

People know intuitively that we can better understand others' behavior if we know the thoughts contributing to the behavior. In this example, you might guess that your teacher harbors several concerns about the disruptive student, and therefore you believe their whispering is related to this. The area of social psychology that focuses on how people think about others and about the social world is called **social cognition**.

Researchers of social cognition study how people make sense of themselves and others to make judgments, form attitudes, and make predictions about the future. Much of the research in social cognition has demonstrated that humans are adept at distilling large amounts of information into smaller, more usable chunks, and that we possess many cognitive tools that allow us to efficiently navigate our environments. This research has also illuminated many social factors that can influence these judgments and predictions. Not only can our past experiences, expectations, motivations, and moods impact our reasoning, but many of our decisions and behaviors are driven by unconscious processes and implicit attitudes we are unaware of having. The goal of this module is to highlight the mental tools we use to navigate and make sense of our complex social world, and describe some of the emotional, motivational, and cognitive factors that affect our reasoning.

Simplifying Our Social World

Consider how much information you come across on any given day; just looking around your bedroom, there are hundreds of objects, smells, and sounds. How do we simplify all this information to attend to what is important and make decisions quickly and efficiently? In part, we do it by forming schemas of the various people, objects, situations, and events we encounter. A **schema** is a mental model, or representation, of any of the various things we come across in our daily lives. A schema (related to the word schematic) is kind of like a mental blueprint for how we expect something to be or behave. It is an organized body of general information or beliefs we develop from direct encounters, as well as from secondhand sources. Rather than spending copious amounts of time learning about each new individual object (e.g., each new dog we see), we rely on our schemas to tell us that a newly encountered dog probably barks, likes to fetch, and enjoys treats. In this way, our schemas greatly reduce the amount of cognitive work we need to do and allow us to "go beyond the information given" (Bruner, 1957).

We can hold schemas about almost anything—individual people (*person schemas*), ourselves (*self-schemas*), and recurring events (*event schemas*, or *scripts*). Each of these types of schemas is useful in its own way. For example, event schemas allow us to navigate new situations efficiently and seamlessly. A script for dining at a restaurant would indicate that one should wait to be seated by the host or hostess, that food should be ordered from a menu, and that one is expected to pay the check at the end of the

meal. Because the majority of dining situations conform to this general format, most diners just need to follow their mental scripts to know what to expect and how they should behave, greatly reducing their cognitive workload.



Figure 13.10 Does the person in this image fit reasonably into your heuristic of a librarian? How representative is he of that category?

Another important way we simplify our social world is by employing **heuristics**, which are mental shortcuts that reduce complex problem-solving to more simple, rule-based decisions. For example, have you ever had a hard time trying to decide on a book to buy, then you see one ranked highly on a book review website? Although selecting a book to purchase can be a complicated decision, you might rely on the "rule of thumb" that a recommendation from a credible source is likely a safe bet—so you buy it. A common instance of using heuristics is when people are faced with judging whether an object belongs to a particular category. For example, you would easily classify a pit bull into the category of "dog." But what about a coyote? Or a fox? A plastic toy dog? In order to make this classification (and many others), people may rely on the **representativeness heuristic** to arrive at a quick decision (Kahneman & Tversky, 1972, 1973). Rather than engaging in an in-depth consideration of the object's attributes, one can simply judge the likelihood of the object belonging to a category, based on how similar it is to one's mental representation of that category. For example, a perceiver may quickly judge a female to be an athlete based on the fact that the female is tall, muscular, and wearing sports apparel—which fits the perceiver's representation of an athlete's characteristics.

In many situations, an object's similarity to a category is a good indicator of its membership in that category, and an individual using the representativeness heuristic will arrive at a correct judgment. However, when base-rate information (e.g., the actual percentage of athletes in the area and therefore the probability that this person actually *is* an athlete) conflicts with representativeness information, use of this heuristic is less appropriate. For example, if asked to judge whether a quiet, thin man who likes to read poetry is a classics professor at a prestigious university or a truck driver, the representativeness heuristic might lead one to guess he's a professor. However, considering the base-rates, we know there are far fewer university classics professors than truck drivers. Therefore, although the man fits the mental image of a professor, the actual probability of him being one (considering the number of professors out there) is lower than that of being a truck driver.

In addition to judging whether things belong to particular categories, we also attempt to judge the likelihood that things will happen. A commonly employed heuristic for making this type of judgment is called the **availability heuristic**. People use the availability heuristic to evaluate the frequency or likelihood of an event based on how easily instances of it come to mind (Tversky & Kahneman, 1973). Because more commonly occurring events are more likely to be cognitively accessible (or, they come to mind more easily), use of the availability heuristic can lead to relatively good approximations of frequency. However, the heuristic can be less reliable when judging the frequency of relatively infrequent *but highly accessible* events. For example, do you think there are more words that begin with "k," or more that have "k" as the third letter? To figure this out, you would probably make a list of words that start with "k" and compare it to a list of words with "k" as the third letter. Though such a quick test may lead you to believe there are more words that begin with "k," the truth is that there are 3 times as many words that have "k" as the third letter (Schwarz et al., 1991). In this case, words beginning with "k" are more readily available to memory (i.e., more accessible), so they

seem to be more numerous. Another example is the very common fear of flying: dying in a plane crash is extremely rare, but people often overestimate the probability of it occurring because plane crashes tend to be highly memorable and publicized.

In summary, despite the vast amount of information we are bombarded with on a daily basis, the mind has an entire kit of "tools" that allows us to navigate that information efficiently. In addition to category and frequency judgments, another common mental calculation we perform is predicting the future. We rely on our predictions about the future to guide our actions. When deciding what entrée to select for dinner, we may ask ourselves, "How happy will I be if I choose this over that?" The answer we arrive at is an example of a future prediction. In the next section, we examine individuals' ability to accurately predict others' behaviors, as well as their own future thoughts, feelings, and behaviors, and how these predictions can impact their decisions.

Making Predictions About the Social World

Whenever we face a decision, we predict our future behaviors or feelings in order to choose the best course of action. If you have a paper due in a week and have the option of going out to a party or working on the paper, the decision of what to do rests on a few things: the amount of time you predict you will need to write the paper, your prediction of how you will feel if you do poorly on the paper, and your prediction of how harshly the professor will grade it.

In general, we make predictions about others quickly, based on relatively little information. Research on "thin-slice judgments" has shown that perceivers are able to make surprisingly accurate inferences about another person's emotional state, personality traits, and even sexual orientation based on just snippets of information—for example, a 10-second video clip (Ambady, Bernieri, & Richeson, 2000; Ambady, Hallahan, & Conner, 1999; Ambady & Rosenthal, 1993). Furthermore, these judgments are predictive of the target's future behaviors. For example, one study found that students' ratings of a teacher's warmth, enthusiasm, and attentiveness from a 30-second video clip strongly predicted that teacher's final student evaluations after an entire semester (Ambady & Rosenthal, 1993). As might be expected, the more information there is available, the more accurate many of these judgments become (Carney, Colvin, & Hall, 2007).



Figure 13.11 Although we can be reasonably certain that a winning lottery ticket will make us feel good, we tend to overestimate both how good we'll feel and for how long.

Because we seem to be fairly adept at making predictions about others, one might expect predictions about the self to be foolproof, given the considerable amount of information one has about the self compared to others. To an extent, research has supported this conclusion. For example, our own predictions of our future academic performance are more accurate than peers' predictions of our performance, and self-expressed interests better predict occupational choice than career inventories (Shrauger & Osberg, 1981). Yet, it is not always the case that we hold greater insight into ourselves. While our own assessment of our personality traits does predict certain behavioral tendencies better than peer assessment of our personality, for certain behaviors, peer reports are more accurate than self-reports (Kolar, Funder, & Colvin, 1996; Vazire, 2010). Similarly, although we are generally aware of our knowledge, abilities, and future prospects, our perceptions are often overly positive, and we display overconfidence in their accuracy and potential (Metcalfe, 1998). For example, we tend to underestimate how much time it will take us to complete a task, whether it is writing a paper, finishing a project at work, or building a bridge—a phenomenon known as the **planning**

fallacy (Buehler, Griffin, & Ross, 1994). The planning fallacy helps explain why so many college students end up pulling all-nighters to finish writing assignments or study for exams. The tasks simply end up taking longer than expected. On the positive side, the planning fallacy can also lead individuals to pursue ambitious projects that may turn out to be worthwhile. That is, if they had accurately predicted how much time and work it would have taken them, they may have never started it in the first place.

The other important factor that affects decision-making is our ability to predict how we will *feel* about certain outcomes. Not only do we predict whether we will feel positively or negatively, we also make predictions about how strongly and for how long we will feel that way. Research demonstrates that these predictions of one's future feelings—known as **affective forecasting**—are accurate in some ways but limited in others (Gilbert & Wilson, 2007). We are adept at predicting whether a future event or situation will make us feel positively or negatively (Wilson & Gilbert, 2003), but we often incorrectly predict the strength or duration of those emotions. For example, you may predict that if your favorite sports team loses an important match, you will be devastated. Although you're probably right that you will feel negative (and not positive) emotions, will you be able to accurately estimate how negative you'll feel? What about how long those negative feelings will last?

Predictions about future feelings are influenced by the **impact bias**: the tendency for a person to overestimate the *intensity* of their future feelings. For example, by comparing people's estimates of how they expected to feel after a specific event to their actual feelings after the event, research has shown that people generally overestimate how badly they will feel after a negative event—such as losing a job—and they also overestimate how happy they will feel after a positive event—such as winning the lottery (Brickman, Coates, & Janoff-Bullman, 1978). Another factor in these estimations is the **durability bias**. The durability bias refers to the tendency for people to overestimate *how long* (or, the *duration*) positive and negative events will affect them. This bias is much greater for predictions regarding negative events than positive events, and occurs because people are generally unaware of the many psychological mechanisms that help us adapt to and cope with negative events (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998;Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000).

In summary, individuals form impressions of themselves and others, make predictions about the future, and use these judgments to inform their decisions. However, these judgments are shaped by our tendency to view ourselves in an overly positive light and our inability to appreciate our habituation to both positive and negative events. In the next section, we will discuss how motivations, moods, and desires also shape social judgment.

Hot Cognition: The Influence of Motivations, Mood, and Desires on Social Judgment

Although we may believe we are always capable of rational and objective thinking (for example, when we methodically weigh the pros and cons of two laundry detergents in an unemotional—i.e., "cold"—manner), our reasoning is often influenced by our motivations and mood. **Hot cognition** refers to the mental processes that are influenced by desires and feelings. For example, imagine you receive a poor grade on a class assignment. In this situation, your ability to reason objectively about the quality of your assignment may be limited by your anger toward the teacher, upset feelings over the bad grade, and your motivation to maintain your belief that you are a good student. In this sort of scenario, we may want the situation to turn out a particular way or our belief to be the truth. When we have these **directional goals**, we are motivated to reach a particular outcome or judgment and do not process information in a cold, objective manner.

Figure 13.12 Motivated skepticism is a bias that can easily impact our views of political candidates or issues. It may be more difficult to objectively evaluate the merits of a political argument if it comes from someone we don't expect to vote for.

Directional goals can bias our thinking in many ways, such as leading to **motivated skepticism**, whereby we are skeptical of evidence that goes against what we want to believe despite the strength of the evidence (Ditto & Lopez, 1992). For example, individuals trust medical tests less if the results suggest they have a deficiency compared to when the results suggest they are healthy. Through this motivated skepticism, people often continue to believe what they want to believe, even in the face of nearly incontrovertible evidence to the contrary.

There are also situations in which we do not have wishes for a particular outcome but our goals bias our reasoning, anyway. For example, being motivated to reach an accurate conclusion can influence our reasoning processes by making us more cautious—leading to indecision. In contrast, sometimes individuals are motivated to make a quick decision, without being particularly concerned about the quality of it. Imagine trying to choose a restaurant with a group of friends when you're really hungry. You may choose whatever's nearby without caring if the restaurant is the best or not. This **need for closure** (the desire to come to a firm conclusion) is often induced by time constraints (when a decision needs to be made quickly) as well as by individual differences in the need for closure (Webster & Kruglanski, 1997). Some individuals are simply more uncomfortable with ambiguity than others, and are thus more motivated to reach clear, decisive conclusions.

Just as our goals and motivations influence our reasoning, our moods and feelings also shape our thinking process and ultimate decisions. Many of our decisions are based in part on our memories of past events, and our retrieval of memories is affected by our current mood. For example, when you are sad, it is easier to recall the sad memory of your dog's death than the happy moment you received the dog. This tendency to recall memories similar in valence to our current mood is known as **mood-congruent memory** (Blaney, 1986; Bower 1981, 1991; DeSteno, Petty, Wegener, & Rucker, 2000; Forgas, Bower, & Krantz, 1984; Schwarz, Strack, Kommer, & Wagner, 1987). The mood we were in when the memory was recorded becomes a retrieval cue; our present mood primes these congruent memories, making them come to mind more easily (Fiedler, 2001). Furthermore, because the availability of events in our memory can affect their perceived frequency (the availability heuristic), the biased retrieval of congruent memories can then impact the subsequent judgments we make (Tversky & Kahneman, 1973). For example, if you are retrieving many sad memories, you might conclude that you have had a tough, depressing life.

In addition to our moods influencing the specific memories we retrieve, our moods can also influence the broader judgments we make. This sometimes leads to inaccuracies when our current mood is irrelevant to the judgment at hand. In a classic study demonstrating this effect, researchers found that study participants rated themselves as less-satisfied with their lives in general if they were asked on a day when it happened to be raining vs. sunny (Schwarz & Clore, 1983). However, this occurred only if the participants were not aware that the weather might be influencing their mood. In essence, participants were in worse moods on rainy days than sunny days, and, if unaware of the weather's effect on their mood, they incorrectly used their mood as evidence of their overall life satisfaction.

In summary, our mood and motivations can influence both the way we think and the decisions we ultimately make. Mood can shape our thinking even when the mood is irrelevant to the judgment, and our motivations can influence our thinking even if we have no particular preference about the outcome. Just as we might be unaware of how our reasoning is influenced by our motives and moods, research has found that our behaviors can be determined by unconscious processes rather than intentional decisions, an idea we will explore in the next section.

Automaticity

Do we actively choose and control all our behaviors or do some of these behaviors occur automatically? A large body of evidence now suggests that many of our behaviors are, in fact, **automatic**. A behavior or process is considered automatic if it is unintentional, uncontrollable, occurs outside of conscious awareness, or is cognitively efficient (Bargh & Chartrand, 1999). A process may be considered automatic even if it does not have all these features; for example, driving is a fairly automatic process, but is clearly intentional. Processes can become automatic through repetition, practice, or repeated associations. Staying with the driving example: although it can be very difficult and cognitively effortful at the start, over time it becomes a relatively automatic process, and aspects of it can occur outside conscious awareness.

Figure 13.13 Our tendency to subtly mimic the people we interact with is largely an unconscious behavior.

In addition to practice leading to the learning of automatic behaviors, some automatic processes, such as fear responses, appear to be innate. For example, people quickly detect negative stimuli, such as negative words, even when those stimuli are presented subliminally (Dijksterhuis & Aarts, 2003; Pratto & John, 1991). This may represent an evolutionarily adaptive response that makes individuals more likely to detect danger in their environment. Other innate automatic processes may have evolved due to their pro-social outcomes. The **chameleon effect**—where individuals nonconsciously mimic the postures, mannerisms, facial expressions, and other behaviors of their interaction partners—is an example of how people may engage in certain behaviors without conscious intention or awareness (Chartrand & Bargh, 1999). For example, have you ever noticed that you've picked up some of the habits of your friends? Over time, but also in brief encounters, we will nonconsciously mimic those around us because of the positive social effects of doing so. That is, automatic mimicry has been shown to lead to more positive social interactions and to increase liking between the mimicked person and the mimicking person.

When concepts and behaviors have been repeatedly associated with each other, one of them can be **primed**—i.e., made more cognitively accessible—by exposing participants to the (strongly associated) other one. For example, by presenting participants with the concept of a doctor, associated concepts such as "nurse" or "stethoscope" are primed. As a result, participants recognize a word like "nurse" more quickly (Meyer, & Schvaneveldt, 1971). Similarly, stereotypes can automatically prime associated judgments and behaviors. **Stereotypes** are our general beliefs about a group of people and, once activated, they may guide our judgments outside of conscious awareness. Similar to schemas, stereotypes involve a mental representation of how we expect a person will think and behave. For example, someone's mental schema for women may be that they're caring, compassionate, and maternal; however, a stereotype would be that *all* women are examples of this schema. As you know, assuming all people are a certain way is not only wrong but insulting, especially if negative traits are incorporated into a schema and subsequent stereotype.

In a now classic study, Patricia Devine (1989) primed study participants with words typically associated with Blacks (e.g., "blues," "basketball") in order to activate the stereotype of Blacks. Devine found that study participants who were primed with the Black

stereotype judged a target's ambiguous behaviors as being more hostile (a trait stereotypically associated with Blacks) than nonprimed participants. Research in this area suggests that our social context—which constantly bombards us with concepts—may prime us to form particular judgments and influence our thoughts and behaviors.

In summary, there are many cognitive processes and behaviors that occur outside of our awareness and despite our intentions. Because automatic thoughts and behaviors do not require the same level of cognitive processing as conscious, deliberate thinking and acting, automaticity provides an efficient way for individuals to process and respond to the social world. However, this efficiency comes at a cost, as unconsciously held stereotypes and attitudes can sometimes influence us to behave in unintended ways. We will discuss the consequences of both consciously and unconsciously held attitudes in the next section.

Attitudes and Attitude Measurement

When we encounter a new object or person, we often form an attitude toward it (him/her). An **attitude** is a "psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1993, p. 1). In essence, our attitudes are our general evaluations of things (i.e., do you regard this thing positively or negatively?) that can bias us toward having a particular response to it. For example, a negative attitude toward mushrooms would predispose you to avoid them and think negatively of them in other ways. This bias can be long- or short-term and can be overridden by another experience with the object. Thus, if you encounter a delicious mushroom dish in the future, your negative attitude could change to a positive one.

Traditionally, attitudes have been measured through **explicit attitude** measures, in which participants are directly asked to provide their attitudes toward various objects, people, or issues (e.g., a survey).

Figure 13.14 The explicit attitudes expressed by voters are used to predict the outcomes of elections, however some people who respond to opinion questions that involve controversial issues may hide their true attitudes.

For example, in a semantic-differential scale, respondents are asked to provide evaluations of an attitude object using a series of negative to positive response scales—which have something like "unpleasant" at one end of the scale and "pleasant" at the other (Osgood, Suci, & Tannenbaum, 1957). In a Likert scale, respondents are asked to indicate their agreement level with various evaluative statements, such as, "I believe that psychology is the most interesting major" (Likert, 1932). Here, participants mark their selection between something like "strongly disagree" and "strongly agree." These explicit measures of attitudes can be used to predict people's actual behavior, but there are limitations to them. For one thing, individuals aren't always aware of their true attitudes, because they're either undecided or haven't given a particular issue much thought. Furthermore, even when individuals are aware of their attitudes, they might not want to admit to them, such as when holding a certain attitude is viewed negatively by their culture. For example, sometimes it can be difficult to measure people's true opinions on racial issues, because participants fear that expressing their true attitudes will be viewed as socially unacceptable. Thus, explicit attitude measures may be unreliable when asking about controversial attitudes or attitudes that are not widely accepted by society.

In order to avoid some of these limitations, many researchers use more subtle or covert ways of measuring attitudes that do not suffer from such self-presentation concerns (Fazio & Olson, 2003). An **implicit attitude** is an attitude that a person does not

verbally or overtly express. For example, someone may have a positive, explicit attitude toward his job; however, nonconsciously, he may have a lot of negative associations with it (e.g., having to wake up early, the long commute, the office heating is broken) which results in an implicitly negative attitude. To learn what a person's implicit attitude is, you have to use **implicit measures of attitudes**. These measures infer the participant's attitude rather than having the participant explicitly report it. Many implicit measures accomplish this by recording the time it takes a participant (i.e., the reaction time) to label or categorize an attitude object (i.e., the person, concept, or object of interest) as positive or negative. For example, the faster someone categorizes his or her job (measured in milliseconds) as negative compared to positive, the more negative the implicit attitude is (i.e., because a faster categorization implies that the two concepts—"work" and "negative"—are closely related in one's mind).

One common implicit measure is the **Implicit Association Test** (IAT; Greenwald & Banaji, 1995; Greenwald, McGhee, & Schwartz, 1998), which does just what the name suggests, measuring how quickly the participant pairs a concept (e.g., cats) with an attribute (e.g., good or bad). The participant's response time in pairing the concept with the attribute indicates how strongly the participant associates the two. Another common implicit measure is the **evaluative priming task** (Fazio, Jackson, Dunton, & Williams, 1995), which measures how quickly the participant labels the valence (i.e., positive or negative) of the attitude object when it appears immediately after a positive or negative image. The more quickly a participant labels the attitude object after being primed with a positive versus negative image indicates how positively the participant evaluates the object.

Individuals' implicit attitudes are sometimes inconsistent with their explicitly held attitudes. Hence, implicit measures may reveal biases that participants do not report on explicit measures. As a result, implicit attitude measures are especially useful for examining the pervasiveness and strength of controversial attitudes and stereotypic associations, such as racial biases or associations between race and violence. For example, research using the IAT has shown that about 66% of white respondents have a negative bias toward Blacks (Nosek, Banaji, & Greenwald, 2002), that bias on the IAT against Blacks is associated with more discomfort during interracial interactions (McConnell, & Leibold, 2001), and that implicit associations linking Blacks to violence are associated with a greater tendency to shoot unarmed Black targets in a video game (Payne, 2001). Thus, even though individuals are often unaware of their implicit attitudes, these attitudes can have serious implications for their behavior, especially when these individuals do not have the cognitive resources available to override the attitudes' influence.

Conclusion

Decades of research on social cognition and attitudes have revealed many of the "tricks" and "tools" we use to efficiently process the limitless amounts of social information we encounter. These tools are quite useful for organizing that information to arrive at quick decisions. When you see an individual engage in a behavior, such as seeing a man push an elderly woman to the ground, you form judgments about his personality, predictions about the likelihood of him engaging in similar behaviors in the future, as well as predictions about the elderly woman's feelings and how you would feel if you were in her position. As the research presented in this module demonstrates, we are adept and efficient at making these judgments and predictions, but they are not made in a vacuum. Ultimately, our perception of the social world is a subjective experience, and, consequently, our decisions are influenced by our experiences, expectations, emotions, motivations, and current contexts. Being aware of when our judgments are most accurate, and how our judgments are shaped by social influences, prepares us to be in a much better position to appreciate, and potentially counter, their effects.

Outside Resources

Video: Daniel Gilbert discussing affective forecasting. http://www.dailymotion.com/video/xebnl3_dan-gilbert-on-what-affective-forec_people#.UQlwDx3WLm4

Video: Focus on heuristics. http://study.com/academy/lesson/heuristics.html

Web: Implicit Attitudes Test.https://implicit.harvard.edu/implicit/

Discussion Questions

1. Describe your event-schema, or script, for an event that you encounter regularly (e.g., dining at a restaurant). Now, attempt to articulate a script for an event that you have encountered only once or a few times. How are these scripts different? How confident are you in your ability to navigate these two events?

2. Think of a time when you made a decision that you thought would make you very happy (e.g., purchasing an item). To what extent were you accurate or inaccurate? In what ways were you wrong, and why do you think you were wrong?
3. What is an issue you feel strongly about (e.g., abortion, death penalty)? How would you react if research demonstrated that your opinion was wrong? What would it take before you would believe the evidence?
4. Take an implicit association test at the Project Implicit website (https://implicit.harvard.edu/implicit). How do your results match or mismatch your explicit attitudes.

Image Attributions

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13.4: Conformity and Obedience

Jerry M. Burger

We often change our attitudes and behaviors to match the attitudes and behaviors of the people around us. One reason for this conformity is a concern about what other people think of us. This process was demonstrated in a classic study in which college students deliberately gave wrong answers to a simple visual judgment task rather than go against the group. Another reason we conform to the norm is because other people often have information we do not, and relying on norms can be a reasonable strategy when we are uncertain about how we are supposed to act. Unfortunately, we frequently misperceive how the typical person acts, which can contribute to problems such as the excessive binge drinking often seen in college students. Obeying orders from an authority figure can sometimes lead to disturbing behavior. This danger was illustrated in a famous study in which participants were instructed to administer painful electric shocks to another person in what they believed to be a learning experiment. Despite vehement protests from the person receiving the shocks, most participants continued the procedure when instructed to do so by the experimenter. The findings raise questions about the power of blind obedience in deplorable situations such as atrocities and genocide. They also raise concerns about the ethical treatment of participants in psychology experiments.

Learning Objectives

- Become aware of how widespread conformity is in our lives and some of the ways each of us changes our attitudes and behavior to match the norm.
- Understand the two primary reasons why people often conform to perceived norms.
- Appreciate how obedience to authority has been examined in laboratory studies and some of the implications of the findings from these investigations.
- Consider some of the remaining issues and sources of controversy surrounding Milgram's obedience studies.

Introduction

When he was a teenager, my son often enjoyed looking at photographs of me and my wife taken when we were in high school. He laughed at the hairstyles, the clothing, and the kind of glasses people wore "back then." And when he was through with his ridiculing, we would point out that no one is immune to fashions and fads and that someday his children will probably be equally amused by his high school photographs and the trends he found so normal at the time.

Everyday observation confirms that we often adopt the actions and attitudes of the people around us. Trends in clothing, music, foods, and entertainment are obvious. But our views on political issues, religious questions, and lifestyles also reflect to some degree the attitudes of the people we interact with. Similarly, decisions about behaviors such as smoking and drinking are influenced by whether the people we spend time with engage in these activities. Psychologists refer to this widespread tendency to act and think like the people around us as **conformity**.



Figure 13.15 Fashion trends serve as good, and sometimes embarrassing, examples of our own susceptibility to conformity.

Conformity

What causes all this conformity? To start, humans may possess an inherent tendency to imitate the actions of others. Although we usually are not aware of it, we often mimic the gestures, body posture, language, talking speed, and many other behaviors of the people we interact with. Researchers find that this mimicking increases the connection between people and allows our interactions to flow more smoothly (Chartrand & Bargh, 1999).

Beyond this automatic tendency to imitate others, psychologists have identified two primary reasons for conformity. The first of these is **normative influence**. When normative influence is operating, people go along with the crowd because they are concerned about what others think of them. We don't want to look out of step or become the target of criticism just because we like different kinds of music or dress differently than everyone else. Fitting in also brings rewards such as camaraderie and compliments.

How powerful is normative influence? Consider a classic study conducted many years ago by Solomon Asch (1956). The participants were male college students who were asked to engage in a seemingly simple task. An experimenter standing several feet away held up a card that depicted one line on the left side and three lines on the right side. The participant's job was to say aloud which of the three lines on the right was the same length as the line on the left. Sixteen cards were presented one at a time, and the correct answer on each was so obvious as to make the task a little boring. Except for one thing. The participant was not alone. In fact, there were six other people in the room who also gave their answers to the line-judgment task aloud. Moreover, although they pretended to be fellow participants, these other individuals were, in fact, confederates working with the experimenter. The real participant was seated so that he always gave his answer after hearing what five other "participants" said. Everything went smoothly until the third trial, when inexplicably the first "participant" gave an obviously incorrect answer. The mistake might have been amusing, except the second participant gave the same answer. As did the third, the fourth, and the fifth participant. Suddenly the real participant was in a difficult situation. His eyes told him one thing, but five out of five people apparently saw something else.

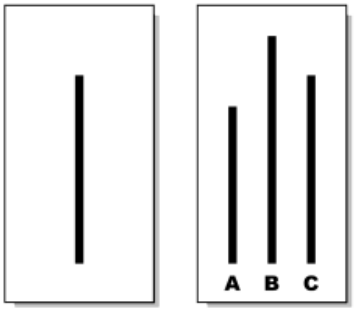


Figure 13.16 Examples of the cards used in the Asch experiment. How powerful is the normative influence? Would you be tempted to give a clearly incorrect answer, like many participants in the Asch experiment did, to better match the thoughts of a group of peers?

It's one thing to wear your hair a certain way or like certain foods because everyone around you does. But, would participants intentionally give a wrong answer just to conform with the other participants? The confederates uniformly gave incorrect answers on 12 of the 16 trials, and 76 percent of the participants went along with the norm at least once and also gave the wrong answer. In total, they conformed with the group on one-third of the 12 test trials. Although we might be impressed that the majority of the time participants answered honestly, most psychologists find it remarkable that so many college students caved in to the pressure of the group rather than do the job they had volunteered to do. In almost all cases, the participants knew they were giving an incorrect answer, but their concern for what these other people might be thinking about them overpowered their desire to do the right thing.

Variations of Asch's procedures have been conducted numerous times (Bond, 2005; Bond & Smith, 1996). We now know that the findings are easily replicated, that there is an increase in conformity with more confederates (up to about five), that teenagers are more prone to conforming than are adults, and that people conform significantly less often when they believe the confederates will not hear their responses (Berndt, 1979; Bond, 2005; Crutchfield, 1955; Deutsch & Gerard, 1955). This last finding is consistent with the notion that participants change their answers because they are concerned about what others think of them. Finally,

although we see the effect in virtually every culture that has been studied, more conformity is found in collectivist countries such as Japan and China than in individualistic countries such as the United States (Bond & Smith, 1996). Compared with individualistic cultures, people who live in collectivist cultures place a higher value on the goals of the group than on individual preferences. They also are more motivated to maintain harmony in their interpersonal relations.

The other reason we sometimes go along with the crowd is that people are often a source of information. Psychologists refer to this process as **informational influence**. Most of us, most of the time, are motivated to do the right thing. If society deems that we put litter in a proper container, speak softly in libraries, and tip our waiter, then that's what most of us will do. But sometimes it's not clear what society expects of us. In these situations, we often rely on **descriptive norms** (Cialdini, Reno, & Kallgren, 1990). That is, we act the way most people—or most people like us—act. This is not an unreasonable strategy. Other people often have information that we do not, especially when we find ourselves in new situations. If you have ever been part of a conversation that went something like this,

> *"Do you think we should?"*
> *"Sure. Everyone else is doing it."*,

you have experienced the power of informational influence.

Figure 13.17 Efforts to influence people to engage in healthier or more sustainable behaviors have benefitted from the informational influence. For example, hotels have been able to significantly increase the numbers of people who re-use bath towels (reducing water and energy use) by informing them on signs in their rooms that re-using towels is a typical behavior of other hotel guests.

However, it's not always easy to obtain good descriptive norm information, which means we sometimes rely on a flawed notion of the norm when deciding how we should behave. A good example of how misperceived norms can lead to problems is found in research on binge drinking among college students. Excessive drinking is a serious problem on many campuses (Mita, 2009). There are many reasons why students binge drink, but one of the most important is their perception of the descriptive norm. How much students drink is highly correlated with how much they believe the average student drinks (Neighbors, Lee, Lewis, Fossos, & Larimer, 2007). Unfortunately, students aren't very good at making this assessment. They notice the boisterous heavy drinker at the party but fail to consider all the students not attending the party. As a result, students typically overestimate the descriptive norm for college student drinking (Borsari & Carey, 2003; Perkins, Haines, & Rice, 2005). Most students believe they consume significantly less alcohol than the norm, a miscalculation that creates a dangerous push toward more and more excessive alcohol consumption. On the positive side, providing students with accurate information about drinking norms has been found to reduce overindulgent drinking (Burger, LaSalvia, Hendricks, Mehdipour, & Neudeck, 2011; Neighbors, Lee, Lewis, Fossos, & Walter, 2009).

Researchers have demonstrated the power of descriptive norms in a number of areas. Homeowners reduced the amount of energy they used when they learned that they were consuming more energy than their neighbors (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). Undergraduates selected the healthy food option when led to believe that other students had made this choice

(Burger et al., 2010). Hotel guests were more likely to reuse their towels when a hanger in the bathroom told them that this is what most guests did (Goldstein, Cialdini, & Griskevicius, 2008). And more people began using the stairs instead of the elevator when informed that the vast majority of people took the stairs to go up one or two floors (Burger & Shelton, 2011).

Obedience

Although we may be influenced by the people around us more than we recognize, whether we conform to the norm is up to us. But sometimes decisions about how to act are not so easy. Sometimes we are directed by a more powerful person to do things we may not want to do. Researchers who study **obedience** are interested in how people react when given an order or command from someone in a position of authority. In many situations, obedience is a good thing. We are taught at an early age to obey parents, teachers, and police officers. It's also important to follow instructions from judges, firefighters, and lifeguards. And a military would fail to function if soldiers stopped obeying orders from superiors. But, there is also a dark side to obedience. In the name of "following orders" or "just doing my job," people can violate ethical principles and break laws. More disturbingly, obedience often is at the heart of some of the worst of human behavior—massacres, atrocities, and even genocide.

Figure 13.18 Photographs of victims of Cambodian dictator Pol Pot. From 1975-79 the Khmer Rouge army obediently carried out orders to execute tens of thousands of civilians.

It was this unsettling side of obedience that led to some of the most famous and most controversial research in the history of psychology. Milgram (1963, 1965, 1974) wanted to know why so many otherwise decent German citizens went along with the brutality of the Nazi leaders during the Holocaust. "These inhumane policies may have originated in the mind of a single person," Milgram (1963, p. 371) wrote, "but they could only be carried out on a massive scale if a very large number of persons obeyed orders."

To understand this obedience, Milgram conducted a series of laboratory investigations. In all but one variation of the basic procedure, participants were men recruited from the community surrounding Yale University, where the research was carried out. These citizens signed up for what they believed to be an experiment on learning and memory. In particular, they were told the research concerned the effects of punishment on learning. Three people were involved in each session. One was the participant. Another was the experimenter. The third was a confederate who pretended to be another participant.

The experimenter explained that the study consisted of a memory test and that one of the men would be the teacher and the other the learner. Through a rigged drawing, the real participant was always assigned the teacher's role and the confederate was always the learner. The teacher watched as the learner was strapped into a chair and had electrodes attached to his wrist. The teacher then moved to the room next door where he was seated in front of a large metal box the experimenter identified as a "shock generator." The front of the box displayed gauges and lights and, most noteworthy, a series of 30 levers across the bottom. Each lever was labeled with a voltage figure, starting with 15 volts and moving up in 15-volt increments to 450 volts. Labels also indicated the strength of the shocks, starting with "Slight Shock" and moving up to "Danger: Severe Shock" toward the end. The last two levers were simply labeled "XXX" in red.

Through a microphone, the teacher administered a memory test to the learner in the next room. The learner responded to the multiple-choice items by pressing one of four buttons that were barely within reach of his strapped-down hand. If the teacher saw

the correct answer light up on his side of the wall, he simply moved on to the next item. But if the learner got the item wrong, the teacher pressed one of the shock levers and, thereby, delivered the learner's punishment. The teacher was instructed to start with the 15-volt lever and move up to the next highest shock for each successive wrong answer.

In reality, the learner received no shocks. But he did make a lot of mistakes on the test, which forced the teacher to administer what he believed to be increasingly strong shocks. The purpose of the study was to see how far the teacher would go before refusing to continue. The teacher's first hint that something was amiss came after pressing the 75-volt lever and hearing through the wall the learner say "Ugh!" The learner's reactions became stronger and louder with each lever press. At 150 volts, the learner yelled out, "Experimenter! That's all. Get me out of here. I told you I had heart trouble. My heart's starting to bother me now. Get me out of here, please. My heart's starting to bother me. I refuse to go on. Let me out."

Figure 13.19 Diagram of the Milgram Experiment in which the "teacher" (T) was asked to deliver a (supposedly) painful electric shock to the "learner"(L). Would this experiment be approved by a review board today?

The experimenter's role was to encourage the participant to continue. If at any time the teacher asked to end the session, the experimenter responded with phrases such as, "The experiment requires that you continue," and "You have no other choice, you must go on." The experimenter ended the session only after the teacher stated four successive times that he did not want to continue. All the while, the learner's protests became more intense with each shock. After 300 volts, the learner refused to answer any more questions, which led the experimenter to say that no answer should be considered a wrong answer. After 330 volts, despite vehement protests from the learner following previous shocks, the teacher heard only silence, suggesting that the learner was now physically unable to respond. If the teacher reached 450 volts—the end of the generator—the experimenter told him to continue pressing the 450 volt lever for each wrong answer. It was only after the teacher pressed the 450-volt lever three times that the experimenter announced that the study was over.

If you had been a participant in this research, what would you have done? Virtually everyone says he or she would have stopped early in the process. And most people predict that very few if any participants would keep pressing all the way to 450 volts. Yet in the basic procedure described here, 65 percent of the participants continued to administer shocks to the very end of the session. These were not brutal, sadistic men. They were ordinary citizens who nonetheless followed the experimenter's instructions to administer what they believed to be excruciating if not dangerous electric shocks to an innocent person. The disturbing implication from the findings is that, under the right circumstances, each of us may be capable of acting in some very uncharacteristic and perhaps some very unsettling ways.

Milgram conducted many variations of this basic procedure to explore some of the factors that affect obedience. He found that obedience rates decreased when the learner was in the same room as the experimenter and declined even further when the teacher

had to physically touch the learner to administer the punishment. Participants also were less willing to continue the procedure after seeing other teachers refuse to press the shock levers, and they were significantly less obedient when the instructions to continue came from a person they believed to be another participant rather than from the experimenter. Finally, Milgram found that women participants followed the experimenter's instructions at exactly the same rate the men had.

Milgram's obedience research has been the subject of much controversy and discussion. Psychologists continue to debate the extent to which Milgram's studies tell us something about atrocities in general and about the behavior of German citizens during the Holocaust in particular (Miller, 2004). Certainly, there are important features of that time and place that cannot be recreated in a laboratory, such as a pervasive climate of prejudice and dehumanization. Another issue concerns the relevance of the findings. Some people have argued that today we are more aware of the dangers of blind obedience than we were when the research was conducted back in the 1960s. However, findings from partial and modified replications of Milgram's procedures conducted in recent years suggest that people respond to the situation today much like they did a half a century ago (Burger, 2009).

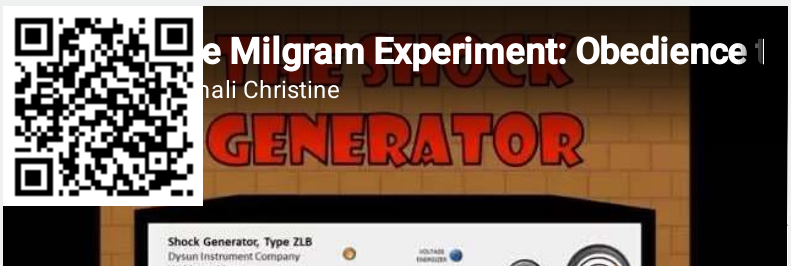
Figure 13.20 If you had been "a teacher" in the Milgram experiment, would you have behaved differently than the majority who delivered what they thought were massive 450-volt shocks?

Another point of controversy concerns the ethical treatment of research participants. Researchers have an obligation to look out for the welfare of their participants. Yet, there is little doubt that many of Milgram's participants experienced intense levels of stress as they went through the procedure. In his defense, Milgram was not unconcerned about the effects of the experience on his participants. And in follow-up questionnaires, the vast majority of his participants said they were pleased they had been part of the research and thought similar experiments should be conducted in the future. Nonetheless, in part because of Milgram's studies, guidelines and procedures were developed to protect research participants from these kinds of experiences. Although Milgram's intriguing findings left us with many unanswered questions, conducting a full replication of his experiment remains out of bounds by today's standards.

Social psychologists are fond of saying that we are all influenced by the people around us more than we recognize. Of course, each person is unique, and ultimately each of us makes choices about how we will and will not act. But decades of research on conformity and obedience make it clear that we live in a social world and that—for better or worse—much of what we do is a reflection of the people we encounter.

Outside Resources

Student Video: Christine N. Winston and Hemali Maher's 'The Milgram Experiment' gives an excellent 3-minute overview of one of the most famous experiments in the history of psychology. It was one of the winning entries in the 2015 Noba Student Video Award.



Video: An example of inf



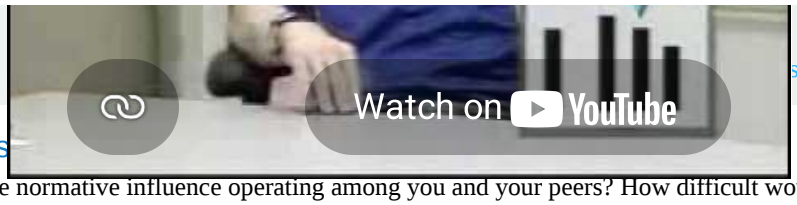
Video: Scenes from a recent partial replication of Milgram's obedience studies



Video: Scenes from a recent replication of Asch's conformity experiment



Web: Website devoted to



stanleymilgram.com

Discussion Questions

1. In what ways do you see normative influence operating among you and your peers? How difficult would it be to go against the norm? What would it take for you to not do something just because all your friends were doing it?
2. What are some examples of how informational influence helps us do the right thing? How can we use descriptive norm information to change problem behaviors?
3. Is conformity more likely or less likely to occur when interacting with other people through social media as compared to face-to-face encounters?
4. When is obedience to authority a good thing and when is it bad? What can be done to prevent people from obeying commands to engage in truly deplorable behavior such as atrocities and massacres?
5. In what ways do Milgram's experimental procedures fall outside the guidelines for research with human participants? Are there ways to conduct relevant research on obedience to authority without violating these guidelines?

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Figure 13.17: Infrogmation of New Orleans, https://goo.gl/5P5F0v, CC BY 2.0, https://goo.gl/BRvSA7

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13.5: Prejudice, Discrimination, and Stereotyping

Susan T. Fiske

People are often biased against others outside of their own social group, showing prejudice (emotional bias), stereotypes (cognitive bias), and discrimination (behavioral bias). In the past, people used to be more explicit with their biases, but during the 20th century, when it became less socially acceptable to exhibit bias, such things like prejudice, stereotypes, and discrimination became more subtle (automatic, ambiguous, and ambivalent). In the 21st century, however, with social group categories even more complex, biases may be transforming once again.

Learning Objectives

- Distinguish prejudice, stereotypes, and discrimination.
- Distinguish old-fashioned, blatant biases from contemporary, subtle biases.
- Understand old-fashioned biases such as social dominance orientation and right-wing. authoritarianism.
- Understand subtle, unexamined biases that are automatic, ambiguous, and ambivalent.
- Understand 21st century biases that may break down as identities get more complicated.

Introduction



Figure 13.21 You are an individual, full of beliefs, identities, and more that help make you unique. You don't want to be labeled just by your gender or race or religion. But as complex as we perceive ourselves to be, we often define others merely by their most distinct social group.

Even in one's own family, everyone wants to be seen for who they are, not as "just another typical X." But still, people put other people into groups, using that label to inform their evaluation of the person as a whole—a process that can result in serious consequences. This module focuses on biases against social groups, which social psychologists sort into emotional **prejudices**, mental **stereotypes**, and behavioral **discrimination**. These three aspects of bias are related, but they each can occur separately from the others (Dovidio & Gaertner, 2010; Fiske, 1998). For example, sometimes people have a negative, emotional reaction to a social group (prejudice) without knowing even the most superficial reasons to dislike them (stereotypes).

This module shows that today's biases are not yesterday's biases in many ways, but at the same time, they are troublingly similar. First, we'll discuss old-fashioned biases that might have belonged to our grandparents and great-grandparents—or even the people nowadays who have yet to leave those wrongful times. Next, we will discuss late 20th century biases that affected our parents and still linger today. Finally, we will talk about today's 21st century biases that challenge fairness and respect for all.

Old-fashioned Biases: Almost Gone

You would be hard pressed to find someone today who openly admits they don't believe in equality. Regardless of one's demographics, most people believe everyone is entitled to the same, natural rights. However, as much as we now collectively

believe this, not too far back in our history, this ideal of equality was an unpracticed sentiment. Of all the countries in the world, only a few have equality in their constitution, and those who do, originally defined it for a select group of people.

At the time, old-fashioned biases were simple: people openly put down those not from their own group. For example, just 80 years ago, American college students unabashedly thought Turkish people were "cruel, very religious, and treacherous" (Katz & Braly, 1933). So where did they get those ideas, assuming that most of them had never met anyone from Turkey? Old-fashioned stereotypes were overt, unapologetic, and expected to be shared by others—what we now call "blatant biases."

Blatant biases are conscious beliefs, feelings, and behavior that people are perfectly willing to admit, which mostly express hostility toward other groups (outgroups) while unduly favoring one's own group (in-group). For example, organizations that preach contempt for other races (and praise for their own) is an example of a blatant bias. And scarily, these blatant biases tend to run in packs: People who openly hate one outgroup also hate many others. To illustrate this pattern, we turn to two personality scales next.

Social Dominance Orientation



Figure 13.22 People with a social dominance orientation are more likely to be attracted to certain types of careers, such as law enforcement, that maintain group hierarchies.

Social dominance orientation (SDO) describes a belief that group hierarchies are inevitable in all societies and are even a good idea to maintain order and stability (Sidanius & Pratto, 1999). Those who score high on SDO believe that some groups are inherently better than others, and because of this, there is no such thing as group "equality." At the same time, though, SDO is not just about being personally dominant and controlling of others; SDO describes a preferred arrangement of groups with some on top (preferably one's own group) and some on the bottom. For example, someone high in SDO would likely be upset if someone from an outgroup moved into his or her neighborhood. It's not that the person high in SDO wants to "control" what this outgroup member does; it's that moving into this "nice neighborhood" disrupts the social hierarchy the person high in SDO believes in (i.e. living in a nice neighborhood denotes one's place in the social hierarchy—a place reserved for one's in-group members).

Although research has shown that people higher in SDO are more likely to be politically conservative, there are other traits that more strongly predict one's SDO. For example, researchers have found that those who score higher on SDO are usually lower than average on tolerance, empathy, altruism, and community orientation. In general, those high in SDO have a strong belief in work ethic—that hard work always pays off and leisure is a waste of time. People higher on SDO tend to choose and thrive in occupations that maintain existing group hierarchies (police, prosecutors, business), compared to those lower in SDO, who tend to pick more equalizing occupations (social work, public defense, psychology).

The point is that SDO—a preference for inequality as normal and natural—also predicts endorsing the superiority of certain groups: men, native-born residents, heterosexuals, and believers in the dominant religion. This means seeing women, minorities, homosexuals, and non-believers as inferior. Understandably, the first list of groups tend to score higher on SDO, while the second group tends to score lower. For example, the SDO gender difference (men higher, women lower) appears all over the world.

At its heart, SDO rests on a fundamental belief that the world is tough and competitive with only a limited number of resources. Thus, those high in SDO see groups as battling each other for these resources, with winners at the top of the social hierarchy and losers at the bottom (see Table 13.1).

	Social Dominance Orientation	Right-Wing Authoritarianism
Core Belief	Groups compete for economic resources	Groups compete over values
Intergroup Belief	Group hierarchies are inevitable, good	Groups must follow authority
Ingroup Belief	Ingroup must be tough, competitive	Ingroup must unite, protect
Outgroup Belief	"They" are trying to beat "us"	"They" have bad values

Table 13.1 Old-Fashioned Biases.

Right-wing Authoritarianism

Right-wing authoritarianism (RWA) focuses on value conflicts, whereas SDO focuses on the economic ones. That is, RWA endorses respect for obedience and authority in the service of group conformity (Altemeyer, 1988). Returning to an example from earlier, the homeowner who's high in SDO may dislike the outgroup member moving into his or her neighborhood because it "threatens" one's economic resources (e.g. lowering the value of one's house; fewer openings in the school; etc.). Those high in RWA may equally dislike the outgroup member moving into the neighborhood but for different reasons. Here, it's because this outgroup member brings in values or beliefs that the person high in RWA disagrees with, thus "threatening" the collective values of his or her group. RWA respects group unity over individual preferences, wanting to maintain group values in the face of differing opinions. Despite its name, though, RWA is not necessarily limited to people on the right (conservatives). Like SDO, there does appear to be an association between this personality scale (i.e. the preference for order, clarity, and conventional values) and conservative beliefs. However, regardless of political ideology, RWA focuses on groups' competing frameworks of values. Extreme scores on RWA predict biases against outgroups while demanding in-group loyalty and conformity Notably, the combination of high RWA and high SDO predicts joining hate groups that openly endorse aggression against minority groups, immigrants, homosexuals, and believers in non-dominant religions (Altemeyer, 2004).

20th Century Biases: Subtle but Significant

Fortunately, old-fashioned biases have diminished over the 20th century and into the 21st century. Openly expressing prejudice is like blowing second-hand cigarette smoke in someone's face: It's just not done any more in most circles, and if it is, people are readily criticized for their behavior. Still, these biases exist in people; they're just less in view than before. These **subtle biases** are unexamined and sometimes unconscious but real in their consequences. They are automatic, ambiguous, and ambivalent, but nonetheless biased, unfair, and disrespectful to the belief in equality.

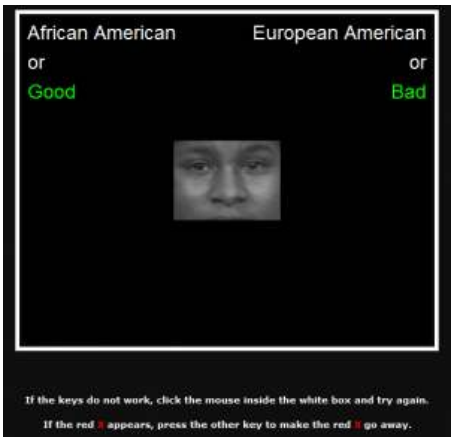


Figure 13.23 An actual screenshot from an IAT (Implicit Association Test) that is designed to test a person's reaction time (measured in milliseconds) to an array of stimuli that are presented on the screen. This particular item is testing an individual's unconscious reaction towards members of various ethnic groups.

Most people like themselves well enough, and most people identify themselves as members of certain groups but not others. Logic suggests, then, that because we like ourselves, we therefore like the groups we associate with more, whether those groups are our hometown, school, religion, gender, or ethnicity. Liking yourself and your groups is human nature. The larger issue, however, is that own-group preference often results in liking other groups less. And whether you recognize this "favoritism" as wrong, this trade-off is relatively **automatic**, that is, unintended, immediate, and irresistible.

Social psychologists have developed several ways to measure this relatively automatic own-group preference, the most famous being the **Implicit Association Test** (IAT; Greenwald, Banaji, Rudman, Farnham, Nosek, & Mellott, 2002; Greenwald, McGhee, & Schwartz, 1998). The test itself is rather simple and you can experience it yourself if you Google "implicit" or go to *understandingprejudice.org*. Essentially, the IAT is done on the computer and measures how quickly you can sort words or pictures into different categories. For example, if you were asked to categorize "ice cream" as good or bad, you would quickly categorize it as good. However, imagine if every time you ate ice cream, you got a brain freeze. When it comes time to categorize ice cream as good or bad, you may still categorize it as "good," but you will likely be a little slower in doing so compared to someone who has nothing but positive thoughts about ice cream. Related to group biases, people may explicitly claim they don't discriminate against outgroups—and this is very likely true. However, when they're given this computer task to categorize people from these outgroups, that automatic or unconscious hesitation (a result of having mixed evaluations about the outgroup) will show up in the test. And as countless studies have revealed, people are mostly faster at pairing their own group with good categories, compared to pairing others' groups. In fact, this finding generally holds regardless if one's group is measured according race, age, religion, nationality, and even temporary, insignificant memberships.

This all-too-human tendency would remain a mere interesting discovery except that people's reaction time on the IAT predicts actual feelings about individuals from other groups, decisions about them, and behavior toward them, especially nonverbal behavior (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). For example, although a job interviewer may not be "blatantly biased," his or her "automatic or implicit biases" may result in unconsciously acting distant and indifferent, which can have devastating effects on the hopeful interviewee's ability to perform well (Word, Zanna, & Cooper, 1973). Although this is unfair, sometimes the automatic associations—often driven by society's stereotypes—trump our own, explicit values (Devine, 1989). And sadly, this can result in consequential discrimination, such as allocating fewer resources to disliked outgroups (Rudman & Ashmore, 2009). See Table 13.2 for a summary of this section and the next two sections on subtle biases.

Type of Bias	Example	What It Shows
Automatic	Implicit Association Test	People link "good" & ingroup, "bad" & outgroup
Ambiguous	Social identity theory Self-categorized theory Aversive racism	People favor ingroup, distance from outgroup Same but emphasizes self as a member of ingroup People avoid outgroup, avoid their own prejudices
Ambivalent	Stereotype Content Model	People divide groups by warmth and competence

Table 13.2 Subtle Biases

Ambiguous Biases



Figure 13.24 Whether we are aware of it or not (and usually we're not), we sort the world into "us" and "them" categories. We are more likely to treat with bias or discrimination anyone we feel is outside our own group.

As the IAT indicates, people's biases often stem from the spontaneous tendency to favor their own, at the expense of the other. **Social identity theory** (Tajfel, Billig, Bundy, & Flament, 1971) describes this tendency to favor one's own in-group over another's outgroup. And as a result, outgroup disliking stems from this in-group liking (Brewer & Brown, 1998). For example, if two classes of children want to play on the same soccer field, the classes will come to dislike each other not because of any real, objectionable traits about the other group. The dislike originates from each class's favoritism toward itself and the fact that only one group can play on the soccer field at a time. With this preferential perspective for one's own group, people are not punishing the other one so much as neglecting it in favor of their own. However, to justify this preferential treatment, people will often exaggerate the differences between their in-group and the outgroup. In turn, people see the outgroup as more similar in personality than they are. This results in the perception that "they" really differ from us, and "they" are all alike. Spontaneously, people categorize people into groups just as we categorize furniture or food into one type or another. The difference is that we people inhabit categories ourselves, as **self-categorization theory** points out (Turner, 1975). Because the attributes of group categories can be either good or bad, we tend to favor the groups with people like us and incidentally disfavor the others. In-group favoritism is an ambiguous form of bias because it disfavors the outgroup by exclusion. For example, if a politician has to decide between funding one program or another, s/he may be more likely to give resources to the group that more closely represents his in-group. And this life-changing decision stems from the simple, natural human tendency to be more comfortable with people like yourself.

A specific case of comfort with the ingroup is called aversive racism, so-called because people do not like to admit their own racial biases to themselves or others (Dovidio & Gaertner, 2010). Tensions between, say, a White person's own good intentions and discomfort with the perhaps novel situation of interacting closely with a Black person may cause the White person to feel uneasy, behave stiffly, or be distracted. As a result, the White person may give a good excuse to avoid the situation altogether and prevent any awkwardness that could have come from it. However, such a reaction will be ambiguous to both parties and hard to interpret. That is, was the White person right to avoid the situation so that neither person would feel uncomfortable? Indicators of **aversive racism** correlate with discriminatory behavior, despite being the ambiguous result of good intentions gone bad.

Bias Can Be Complicated – Ambivalent Biases

Not all stereotypes of outgroups are all bad. For example, ethnic Asians living in the United States are commonly referred to as the "model minority" because of their perceived success in areas such as education, income, and social stability. Another example includes people who feel benevolent toward traditional women but hostile toward nontraditional women. Or even ageist people who feel respect toward older adults but, at the same time, worry about the burden they place on public welfare programs. A simple way to understand these mixed feelings, across a variety of groups, results from the **Stereotype Content Model** (Fiske, Cuddy, & Glick, 2007).

When people learn about a new group, they first want to know if its intentions of the people in this group are for good or ill. Like the guard at night: "Who goes there, friend or foe?" If the other group has good, cooperative intentions, we view them as warm and trustworthy and often consider them part of "our side." However, if the other group is cold and competitive or full of exploiters, we often view them as a threat and treat them accordingly. After learning the group's intentions, though, we also want to know whether they are competent enough to act on them (if they are incompetent, or unable, their intentions matter less). These two simple dimensions—warmth and competence—together map how groups relate to each other in society.

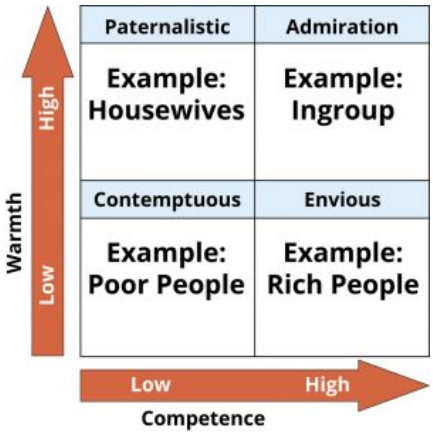


Figure 13.25 Stereotype Content Model – 4 kinds of stereotypes that form from perceptions of competence and warmth

There are common stereotypes of people from all sorts of categories and occupations that lead them to be classified along these two dimensions. For example, a stereotypical "housewife" would be seen as high in warmth but lower in competence. This is not to suggest that actual housewives are not competent, of course, but that they are not widely admired for their competence in the same way as scientific pioneers, trendsetters, or captains of industry. At another end of the spectrum are homeless people and drug addicts, stereotyped as not having good intentions (perhaps exploitative for not trying to play by the rules), and likewise being incompetent (unable) to do anything useful. These groups reportedly make society more disgusted than any other groups do.

Some group stereotypes are mixed, high on one dimension and low on the other. Groups stereotyped as competent but not warm, for example, include rich people and outsiders good at business. These groups that are seen as "competent but cold" make people feel some envy, admitting that these others may have some talent but resenting them for not being "people like us." The "model minority" stereotype mentioned earlier includes people with this excessive competence but deficient sociability.

The other mixed combination is high warmth but low competence. Groups who fit this combination include older people and disabled people. Others report pitying them, but only so long as they stay in their place. In an effort to combat this negative stereotype, disability- and elderly-rights activists try to eliminate that pity, hopefully gaining respect in the process.

Altogether, these four kinds of stereotypes and their associated emotional prejudices (pride, disgust, envy, pity) occur all over the world for each of society's own groups. These maps of the group terrain predict specific types of discrimination for specific kinds of groups, underlining how bias is not exactly equal opportunity.

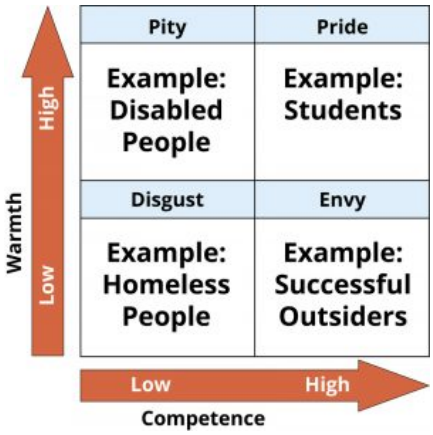


Figure 13.26 Combinations of perceived warmth and confidence and the associated behaviors/emotional prejudices.

Conclusion: 21st Century Prejudices

As the world becomes more interconnected—more collaborations between countries, more intermarrying between different groups—more and more people are encountering greater diversity of others in everyday life. Just ask yourself if you've ever been asked, "What *are* you?" Such a question would be preposterous if you were only surrounded by members of your own group. Categories, then, are becoming more and more uncertain, unclear, volatile, and complex (Bodenhausen & Peery, 2009). People's identities are multifaceted, intersecting across gender, race, class, age, region, and more. Identities are not so simple, but maybe as the 21st century unfurls, we will recognize each other by the content of our character instead of the cover on our outside.

Outside Resources

Web: Website exploring the causes and consequences of prejudice. http://www.understandingprejudice.org/

Discussion Questions

1. Do you know more people from different kinds of social groups than your parents did?
2. How often do you hear people criticizing groups without knowing anything about them?
3. Take the IAT. Could you feel that some associations are easier than others?
4. What groups illustrate ambivalent biases, seemingly competent but cold, or warm but incompetent?
5. Do you or someone you know believe that group hierarchies are inevitable? Desirable?
6. How can people learn to get along with people who seem different from them?

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13.6: Helping and Prosocial Behavior

Dennis L. Poepsel and David A. Schroeder

People often act to benefit other people, and these acts are examples of prosocial behavior. Such behaviors may come in many guises: helping an individual in need; sharing personal resources; volunteering time, effort, and expertise; cooperating with others to achieve some common goals. The focus of this module is on helping—prosocial acts in dyadic situations in which one person is in need and another provides the necessary assistance to eliminate the other's need. Although people are often in need, help is not always given. Why not? The decision of whether or not to help is not as simple and straightforward as it might seem, and many factors need to be considered by those who might help. In this module, we will try to understand how the decision to help is made by answering the question: Who helps when and why?

Learning Objectives

- Learn which situational and social factors affect when a bystander will help another in need.
- Understand which personality and individual difference factors make some people more likely to help than others.
- Discover whether we help others out of a sense of altruistic concern for the victim, for more self-centered and egoistic motives, or both.

Introduction



Figure 13.27 People often overestimate their willingness to help others in need especially when they are asked about a hypothetical situation rather than encountering one in real life.

Go to YouTube and search for episodes of "Primetime: What Would You Do?" You will find video segments in which apparently innocent individuals are victimized, while onlookers typically fail to intervene. The events are all staged, but they are very real to the bystanders on the scene. The entertainment offered is the nature of the bystanders' responses, and viewers are outraged when bystanders fail to intervene. They are convinced that they would have helped. But would they? Viewers are overly optimistic in their beliefs that they would play the hero. Helping may occur frequently, but help is not always given to those in need. So *when* do people help, and when do they not? All people are not equally helpful—*who* helps? *Why* would a person help another in the first place? Many factors go into a person's decision to help—a fact that the viewers do not fully appreciate. This module will answer the question: Who helps when and why?

When Do People Help?

Social psychologists began trying to answer this question following the unfortunate murder of Kitty Genovese in 1964 (Dovidio, Piliavin, Schroeder, & Penner, 2006; Penner, Dovidio, Piliavin, & Schroeder, 2005). A knife-wielding assailant attacked Kitty repeatedly as she was returning to her apartment early one morning. At least 38 people may have been aware of the attack, but no one came to save her. More recently, in 2010, Hugo Alfredo Tale-Yax was stabbed when he apparently tried to intervene in an argument between a man and woman. As he lay dying in the street, only one man checked his status, but many others simply glanced at the scene and continued on their way. (One passerby did stop to take a cellphone photo, however.) Unfortunately, failures to come to the aid of someone in need are not unique, as the segments on "What Would You Do?" show. Help is not always forthcoming for those who may need it the most. Trying to understand why people do not always help became the focus of **bystander intervention** research (e.g., Latané & Darley, 1970).

To answer the question regarding when people help, researchers have focused on

1. how bystanders come to define emergencies,
2. when they decide to take responsibility for **helping**, and
3. how the costs and benefits of intervening affect their decisions of whether to help.

Defining the situation: The role of pluralistic ignorance

The decision to help is not a simple yes/no proposition. In fact, a series of questions must be addressed before help is given—even in emergencies in which time may be of the essence. Sometimes help comes quickly; an onlooker recently jumped from a Philadelphia subway platform to help a stranger who had fallen on the track. Help was clearly needed and was quickly given. But some situations are ambiguous, and potential helpers may have to decide whether a situation is one in which help, in fact, *needs* to be given.

To define ambiguous situations (including many emergencies), potential helpers may look to the action of others to decide what should be done. But those others are looking around too, also trying to figure out what to do. Everyone is looking, but no one is acting! Relying on others to define the situation and to then erroneously conclude that no intervention is necessary when help is actually needed is called **pluralistic ignorance** (Latané & Darley, 1970). When people use the *inactions* of others to define their own course of action, the resulting pluralistic ignorance leads to less help being given.

Do I have to be the one to help?: Diffusion of responsibility



Figure 13.28 How does being in a crowd decrease someone's chance of being helped? How does being in a crowd increase someone's chance of being helped?

Simply being with others may facilitate or inhibit whether we get involved in other ways as well. In situations in which help is needed, the presence or absence of others may affect whether a bystander will assume personal responsibility to give the assistance. If the bystander is alone, personal responsibility to help falls solely on the shoulders of that person. But what if others are present? Although it might seem that having more potential helpers around would increase the chances of the victim getting help, the opposite is often the case. Knowing that someone else *could* help seems to relieve bystanders of personal responsibility, so bystanders do not intervene. This phenomenon is known as **diffusion of responsibility** (Darley & Latané, 1968).

On the other hand, watch the video of the race officials following the 2013 Boston Marathon after two bombs exploded as runners crossed the finish line. Despite the presence of many spectators, the yellow-jacketed race officials immediately rushed to give aid and comfort to the victims of the blast. Each one no doubt felt a personal responsibility to help by virtue of their official capacity in the event; fulfilling the obligations of their roles overrode the influence of the diffusion of responsibility effect.

There is an extensive body of research showing the negative impact of pluralistic ignorance and diffusion of responsibility on helping (Fisher et al., 2011), in both emergencies and everyday need situations. These studies show the tremendous importance potential helpers place on the social situation in which unfortunate events occur, especially when it is not clear what should be done and who should do it. Other people provide important social information about how we should act and what our personal

obligations might be. But does knowing a person needs help and accepting responsibility to provide that help mean the person will get assistance? Not necessarily.

The costs and rewards of helping

The nature of the help needed plays a crucial role in determining what happens next. Specifically, potential helpers engage in a **cost–benefit analysis** before getting involved (Dovidio et al., 2006). If the needed help is of relatively low cost in terms of time, money, resources, or risk, then help is more likely to be given. Lending a classmate a pencil is easy; confronting the knife-wielding assailant who attacked Kitty Genovese is an entirely different matter. As the unfortunate case of Hugo Alfredo Tale-Yax demonstrates, intervening may cost the life of the helper.

The potential rewards of helping someone will also enter into the equation, perhaps offsetting the cost of helping. Thanks from the recipient of help may be a sufficient reward. If helpful acts are recognized by others, helpers may receive social rewards of praise or monetary rewards. Even avoiding feelings of guilt if one does not help may be considered a benefit. Potential helpers consider how much helping will cost and compare those costs to the rewards that might be realized; it is the economics of helping. If costs outweigh the rewards, helping is less likely. If rewards are greater than cost, helping is more likely.

Who Helps?

Do you know someone who always seems to be ready, willing, and able to help? Do you know someone who never helps out? It seems there are personality and individual differences in the helpfulness of others. To answer the question of who chooses to help, researchers have examined 1) the role that sex and gender play in helping, 2) what personality traits are associated with helping, and 3) the characteristics of the "prosocial personality."

Who are more helpful—men or women?



Figure 13.29 Sometimes there are situations that override the gender divide between the helpfulness of men and women and they offer help in equal numbers – for example, volunteering.

In terms of individual differences that might matter, one obvious question is whether men or women are more likely to help. In one of the "What Would You Do?" segments, a man takes a woman's purse from the back of her chair and then leaves the restaurant. Initially, no one responds, but as soon as the woman asks about her missing purse, a group of men immediately rush out the door to catch the thief. So, are men more helpful than women? The quick answer is "not necessarily." It all depends on the type of help needed. To be very clear, the general level of helpfulness may be pretty much equivalent between the sexes, but men and women help in different ways (Becker & Eagly, 2004; Eagly & Crowley, 1986). What accounts for these differences?

Two factors help to explain sex and gender differences in helping. The first is related to the cost–benefit analysis process discussed previously. Physical differences between men and women may come into play (e.g., Wood & Eagly, 2002); the fact that men tend to have greater upper body strength than women makes the cost of intervening in some situations less for a man. Confronting a thief is a risky proposition, and some strength may be needed in case the perpetrator decides to fight. A bigger, stronger bystander is less likely to be injured and more likely to be successful.

The second explanation is simple socialization. Men and women have traditionally been raised to play different social roles that prepare them to respond differently to the needs of others, and people tend to help in ways that are most consistent with their gender roles. Female gender roles encourage women to be compassionate, caring, and nurturing; male gender roles encourage men to take physical risks, to be heroic and chivalrous, and to be protective of those less powerful. As a consequence of social training and the gender roles that people have assumed, men may be more likely to jump onto subway tracks to save a fallen passenger, but women are more likely to give comfort to a friend with personal problems (Diekman & Eagly, 2000; Eagly & Crowley, 1986). There may be some specialization in the types of help given by the two sexes, but it is nice to know that there is someone out there—man or woman—who is able to give you the help that you need, regardless of what kind of help it might be.

A trait for being helpful: Agreeableness

Graziano and his colleagues (e.g., Graziano & Tobin, 2009; Graziano, Habishi, Sheese, & Tobin, 2007) have explored how **agreeableness**—one of the Big Five personality dimensions (e.g., Costa & McCrae, 1988)—plays an important role in **prosocial behavior**. Agreeableness is a core trait that includes such dispositional characteristics as being sympathetic, generous, forgiving, and helpful, and behavioral tendencies toward harmonious social relations and likeability. At the conceptual level, a positive relationship between agreeableness and helping may be expected, and research by Graziano et al. (2007) has found that those higher on the agreeableness dimension are, in fact, more likely than those low on agreeableness to help siblings, friends, strangers, or members of some other group. Agreeable people seem to expect that others will be similarly cooperative and generous in interpersonal relations, and they, therefore, act in helpful ways that are likely to elicit positive social interactions.

Searching for the prosocial personality

Rather than focusing on a single trait, Penner and his colleagues (Penner, Fritzsche, Craiger, & Freifeld, 1995; Penner & Orom, 2010) have taken a somewhat broader perspective and identified what they call the **prosocial personality orientation**. Their research indicates that two major characteristics are related to the prosocial personality and prosocial behavior. The first characteristic is called **other-oriented empathy**: People high on this dimension have a strong sense of social responsibility, empathize with and feel emotionally tied to those in need, understand the problems the victim is experiencing, and have a heightened sense of moral obligation to be helpful. This factor has been shown to be highly correlated with the trait of agreeableness discussed previously. The second characteristic, **helpfulness**, is more behaviorally oriented. Those high on the helpfulness factor have been helpful in the past, and because they believe they can be effective with the help they give, they are more likely to be helpful in the future.

Why Help?

Finally, the question of *why* a person would help needs to be asked. What motivation is there for that behavior? Psychologists have suggested that 1) evolutionary forces may serve to predispose humans to help others, 2) egoistic concerns may determine if and when help will be given, and 3) selfless, altruistic motives may also promote helping in some cases.

Evolutionary roots for prosocial behavior



Figure 13.30 Evolutionary theory suggests that being a good helper was a benefit for survival and reproductive success. And we don't just help our family members, reciprocal altruism has also been a benefit to our survival.

Our evolutionary past may provide keys about why we help (Buss, 2004). Our very survival was no doubt promoted by the prosocial relations with clan and family members, and, as a hereditary consequence, we may now be especially likely to help those closest to us—blood-related relatives with whom we share a genetic heritage. According to evolutionary psychology, we are helpful in ways that increase the chances that our DNA will be passed along to future generations (Burnstein, Crandall, & Kitayama, 1994)—the goal of the "selfish gene" (Dawkins, 1976). Our personal DNA may not always move on, but we can still be successful in getting some portion of our DNA transmitted if our daughters, sons, nephews, nieces, and cousins survive to produce offspring. The favoritism shown for helping our blood relatives is called **kin selection** (Hamilton, 1964).

But, we do not restrict our relationships just to our own family members. We live in groups that include individuals who are unrelated to us, and we often help them too. Why? **Reciprocal altruism** (Trivers, 1971) provides the answer. Because of reciprocal altruism, we are all better off in the long run if we help one another. If helping someone now increases the chances that you will be helped later, then your overall chances of survival are increased. There is the chance that someone will take advantage of your help and not return your favors. But people seem predisposed to identify those who fail to reciprocate, and punishments including social exclusion may result (Buss, 2004). Cheaters will not enjoy the benefit of help from others, reducing the likelihood of the survival of themselves and their kin.

Evolutionary forces may provide a general inclination for being helpful, but they may not be as good an explanation for why we help in the here and now. What factors serve as proximal influences for decisions to help?

Egoistic motivation for helping

Most people would like to think that they help others because they are concerned about the other person's plight. In truth, the reasons why we help may be more about ourselves than others: Egoistic or selfish motivations may make us help. Implicitly, we may ask, "What's in it *for me*?" There are two major theories that explain what types of reinforcement helpers may be seeking. The **negative state relief model** (e.g., Cialdini, Darby, & Vincent, 1973; Cialdini, Kenrick, & Baumann, 1982) suggests that people sometimes help in order to make themselves feel better. Whenever we are feeling sad, we can use helping someone else as a positive mood boost to feel happier. Through socialization, we have learned that helping can serve as a secondary reinforcement that will relieve negative moods (Cialdini & Kenrick, 1976).

The **arousal: cost–reward model** provides an additional way to understand why people help (e.g., Piliavin, Dovidio, Gaertner, & Clark, 1981). This model focuses on the aversive feelings aroused by seeing another in need. If you have ever heard an injured puppy yelping in pain, you know that feeling, and you know that the best way to relieve that feeling is to help and to comfort the puppy. Similarly, when we see someone who is suffering in some way (e.g., injured, homeless, hungry), we vicariously experience a sympathetic arousal that is unpleasant, and we are motivated to eliminate that aversive state. One way to do that is to help the person in need. By eliminating the victim's pain, we eliminate our own aversive arousal. Helping is an effective way to alleviate our own discomfort.

As an egoistic model, the arousal: cost–reward model explicitly includes the cost/reward considerations that come into play. Potential helpers will find ways to cope with the aversive arousal that will minimize their costs—maybe by means other than direct involvement. For example, the costs of directly confronting a knife-wielding assailant might stop a bystander from getting involved, but the cost of some *indirect* help (e.g., calling the police) may be acceptable. In either case, the victim's need is addressed. Unfortunately, if the costs of helping are too high, bystanders may reinterpret the situation to justify not helping at all. We now know that the attack of Kitty Genovese was a murderous assault, but it may have been misperceived as a lover's spat by someone who just wanted to go back to sleep. For some, fleeing the situation causing their distress may do the trick (Piliavin et al., 1981).

The egoistically based negative state relief model and the arousal: cost–reward model see the primary motivation for helping as being the helper's own outcome. Recognize that the victim's outcome is of relatively little concern to the helper—benefits to the victim are incidental byproducts of the exchange (Dovidio et al., 2006). The victim may be helped, but the helper's real motivation according to these two explanations is egoistic: Helpers help to the extent that it makes them feel better.



Figure 13.31 Altruism is helping with the aim of improving the wellbeing of others. Having a feeling of empathy for others is an important aspect of altruism.

Although many researchers believe that **egoism** is the only motivation for helping, others suggest that **altruism**—helping that has as its ultimate goal the improvement of another's welfare—may also be a motivation for helping under the right circumstances. Batson (2011) has offered the **empathy–altruism model** to explain altruistically motivated helping for which the helper expects no benefits. According to this model, the key for altruism is empathizing with the victim, that is, putting oneself in the shoes of the victim and imagining how the victim must feel. When taking this perspective and having **empathic concern**, potential helpers become primarily interested in increasing the well-being of the victim, even if the helper must incur some costs that might otherwise be easily avoided. The empathy–altruism model does not dismiss egoistic motivations; helpers not empathizing with a victim may experience **personal distress** and have an egoistic motivation, not unlike the feelings and motivations explained by the arousal: cost–reward model. Because egoistically motivated individuals are primarily concerned with their own cost–benefit outcomes, they are less likely to help if they think they can escape the situation with no costs to themselves. In contrast, altruistically motivated helpers are willing to accept the cost of helping to benefit a person with whom they have empathized—this "self-sacrificial" approach to helping is the hallmark of altruism (Batson, 2011).

Although there is still some controversy about whether people can ever act for purely altruistic motives, it is important to recognize that, while helpers may derive some personal rewards by helping another, the help that has been given is also benefitting someone who was in need. The residents who offered food, blankets, and shelter to stranded runners who were unable to get back to their hotel rooms because of the Boston Marathon bombing undoubtedly received positive rewards because of the help they gave, but those stranded runners who were helped got what they needed badly as well. "In fact, it is quite remarkable how the fates of people who have never met can be so intertwined and complementary. Your benefit is mine; and mine is yours" (Dovidio et al., 2006, p. 143).

Conclusion



Figure 13.32 Helping feels good to the one who helps and the one who is being helped.

We started this module by asking the question, “Who helps when and why?” As we have shown, the question of when help will be given is not quite as simple as the viewers of “What Would You Do?” believe. The power of the situation that operates on potential helpers in real time is not fully considered. What might appear to be a split-second decision to help is actually the result of consideration of multiple situational factors (e.g., the helper’s interpretation of the situation, the presence and ability of others to provide the help, the results of a cost–benefit analysis) (Dovidio et al., 2006). We have found that men and women tend to help in different ways—men are more impulsive and physically active, while women are more nurturing and supportive. Personality characteristics such as agreeableness and the prosocial personality orientation also affect people’s likelihood of giving assistance to others. And, why would people help in the first place? In addition to evolutionary forces (e.g., kin selection, reciprocal altruism), there is extensive evidence to show that helping and prosocial acts may be motivated by selfish, egoistic desires; by selfless, altruistic goals; or by some combination of egoistic and altruistic motives. (For a fuller consideration of the field of prosocial behavior, we refer you to Dovidio et al. [2006].)

Outside Resources

Article: Alden, L. E., & Trew, J. L. (2013). If it makes you happy: Engaging in kind acts increases positive affect in socially anxious individuals. Emotion, 13, 64-75. doi:10.1037/a0027761 Review available at: http://nymag.com/scienceofus/2015/07/one-way-to-get-over-your-social-anxiety-be-nice.html

Book: Batson, C.D. (2009). *Altruism in humans*. New York, NY: Oxford University Press.Book: Dovidio, J. F., Piliavin, J. A., Schroeder, D. A., & Penner, L. A. (2006). *The social psychology of prosocial behavior*. Mahwah, NJ: Erlbaum.

Book: Mikuliner, M., & Shaver, P. R. (2010). *Prosocial motives, emotions, and behavior: The better angels of our nature*. Washington, DC: American Psychological Association.

Book: Schroeder, D. A. & Graziano, W. G. (forthcoming). *The Oxford handbook of prosocial behavior*. New York, NY: Oxford University Press.Institution: Center for Generosity, University of Notre Dame, 936 Flanner Hall, Notre Dame, IN 46556. http://www.generosityresearch.nd.edu

Institution: The Greater Good Science Center, University of California, Berkeley. http://www.greatergood.berkeley.edu

News Article: Bystanders Stop Suicide Attempt http://jfmueller.faculty.noctrl.edu/crow/bystander.pdf

Social Psychology Network (SPN) http://www.socialpsychology.org/social.htm#prosocial

Video: Episodes (individual) of “Primetime: What Would You Do?” http://www.YouTube.com

Video: Episodes of “Primetime: What Would You Do?” that often include some commentary from experts in the field may be available at http://www.abc.com

Video: From The Inquisitive Mind website, a great overview of different aspects of helping and pro-social behavior including – pluralistic ignorance, diffusion of responsibility, the bystander effect, and empathy.



Discussion Questions

1. Pluralistic ignorance suggests that inactions by other observers of an emergency will decrease the likelihood that help will be given. What do you think will happen if even one other observer begins to offer assistance to a victim?
2. In addition to those mentioned in the module, what other costs and rewards might affect a potential helper's decision of whether to help? Receiving help to solve some problem is an obvious benefit for someone in need; are there any costs that a person might have to bear as a result of receiving help from someone?
3. What are the characteristics possessed by your friends who are most helpful? By your friends who are least helpful? What has made your helpful friends and your unhelpful friends so different? What kinds of help have they given to you, and what kind of help have you given to them? Are you a helpful person?
4. Do you think that sex and gender differences in the frequency of helping and the kinds of helping have changed over time? Why? Do you think that we might expect more changes in the future?
5. What do you think is the primary motive for helping behavior: egoism or altruism? Are there any professions in which people are being "pure" altruists, or are some egoistic motivations always playing a role?
6. There are other prosocial behaviors in addition to the kind of helping discussed here. People volunteer to serve many different causes and organizations. People come together to cooperate with one another to achieve goals that no one individual could reach alone. How do you think the factors that affect helping might affect prosocial actions such as volunteering and cooperating? Do you think that there might be other factors that make people more or less likely to volunteer their time and energy or to cooperate in a group?

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13.7: Summary, Key Terms, and Self-Test

Jorden A. Cummings

Summary

Social psychology is the branch of psychological science mainly concerned with understanding how the presence of others affects our thoughts, feelings, and behaviours. It is one of the largest sub-disciplines within psychology. There are many specific ways that social psychologists conduct their research.

Attraction, attitudes, peace and conflict, social influence, and social cognition are all important areas of social psychology.

Social cognition focuses on how people think about others and our social worlds. It studies how people make sense of themselves and others, make judgments and form attitudes. One important area of social cognition is understanding how we simplify all of the many sources of information we come across every day. One way we deal with this amount of information is to use heuristics, which are mental short cuts that reduce complex problem-solving to simple rule-based decisions. There are many types of heuristics. Another area of social cognition examines how we make predictions about others and the number of biases in our predictions.

Motivations, moods, and desires can influence our social judgement – our thinking isn't always logical! Social psychologists also know that much of our behaviour is automatic and outside of our conscious awareness.
Conformity refers to the tendency we have to act and think like the people around us. Normative influence means we go along with others because we are concerned about what they will think of us. Informational influence means that other people are often an important source of information.

Obedience research examines how people react when given an order or a command from someone in a position of authority. Stanley Milgram's work is some of the most famous work in psychology, and it examines obedience to authority.

Prejudices, stereotypes, and discrimination are another important area of social psychology research. Prejudice refers to our emotions toward other groups, stereotypes are how we think about them, and discrimination is how we behave in regards to those other groups. Old fashioned, or blatant biases, are decreasing. But more subtle biases still exist and are somewhat automatic.

Bystander intervention research studies how and when people help others. A lot of helping behaviour depends upon the diffusion of responsibility. Some psychologists believe evolutionary roots explain our prosocial and altruistic reasons for helping others.

Key Terms

- Affective Forecasting
- Agreeableness
- Altruism
- Arousal Cost–Reward Model
- Attitudes
- Attraction
- Automatic
- Availability Heuristic
- Aversive Racism
- Blatant Biases
- Blind to the Research Hypothesis
- Bystander Intervention
- Chameleon Effect
- Conformity
- Cost–Benefit Analysis
- Culture of Honor
- Descriptive Norms
- Diffusion of Responsibility
- Directional Goals
- Discrimination
- Durability Bias
- Egoism
- Empathic Concern
- Empathy–Altruism Model
- Evaluative Priming Task
- Explicit Attitude
- Fundamental Attribution Error
- Helpfulness
- Helping
- Heuristics
- Hot Cognition
- Hypothesis
- Impact Bias
- Implicit Association Test (IAT)
- Implicit Attitude
- Implicit Measures of Attitudes
- Informational Influence
- Kin Selection
- Levels of Analysis
- Mood-Congruent Memory
- Motivated Skepticism
- Need for Closure
- Need to Belong
- Negative State Relief Model
- Normative Influence
- Obedience
- Observational Learning
- Other-Oriented Empathy
- Personal distress
- Planning Fallacy
- Pluralistic Ignorance
- Prejudice
- Primed
- Prosocial Behavior
- Prosocial Personality Orientation
- Reciprocal Altruism
- Reciprocity
- Representativeness Heuristic
- Research Confederate
- Research Participant
- Right-Wing Authoritarianism (RWA)
- Schema
- Self-Categorization Theory
- Social Attribution
- Social Cognition
- Social Dominance Orientation (SDO)
- Social Identity Theory
- Social Influence
- Social Psychology
- Stereotype Content Model
- Stereotypes
- Stereotyping
- Stigmatized Groups
- Subtle Biases

Self Test

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CHAPTER OVERVIEW

14: Growing and Developing

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14.1: Introduction

Charles Stangor, Jennifer Walinga, and Jorden A. Cummings

The Repository for Germinal Choice

During the 1970s, American millionaire Robert Klark Graham began one of the most controversial and unique sperm banks in the world. He called it the Repository for Germinal Choice. The sperm bank was part of a project that attempted to combat the "genetic decay" Graham saw all around him. He believed human reproduction was experiencing a genetic decline, making for a population of "retrograde humans," and he was convinced that the way to save the human race was to breed the best genes of his generation (Plotz, 2001).

Graham began his project by collecting sperm samples from the most intelligent and highly achieving people he could find, including scientists, entrepreneurs, athletes, and even Nobel Prize winners. Then he advertised for potential mothers, who were required to be married to infertile men, educated, and financially well-off. Graham mailed out catalogues to the potential mothers, describing the donors using code names such as "Mr. Grey-White," who was "ruggedly handsome, outgoing, and positive, a university professor, expert marksman who enjoys the classics," and "Mr. Fuchsia," who was an "Olympic gold medalist, tall, dark, handsome, bright, a successful businessman and author" (Plotz, 2001). When the mother had made her choice, the sperm sample was delivered by courier and insemination was carried out at home. Before it closed following Graham's death in 1999, the repository claimed responsibility for the birth of 228 children.

But did Graham's project actually create superintelligent babies? Although it is difficult to be sure, because very few interviews with the offspring have been permitted, at least some of the repository's progeny are indeed smart. Reporter for *Slate* magazine David Plotz (2001) spoke to nine families who benefited from the repository, and they proudly touted their children's achievements. He found that most of the offspring in the families interviewed seem to resemble their genetic fathers. Three from donor Mr. Fuchsia, the Olympic gold medallist, are reportedly gifted athletes. Several who excel in math and science were fathered by professors of math and science.

And the offspring, by and large, seem to be doing well, often attending excellent schools and maintaining very high grade-point averages. One of the offspring, now 26 years old, is particularly intelligent. In infancy, he could mark the beat of classical music with his hands. In kindergarten, he could read *Hamlet* and was learning algebra, and at age six his IQ was already 180. But he refused to apply to prestigious universities, such as Harvard or Yale, opting instead to study at a smaller progressive college and to major in comparative religion, with the aim of becoming an elementary schoolteacher. He is now an author of children's books.

Although it is difficult to know for sure, it appears that at least some of the children of the repository are indeed outstanding. But can the talents, characteristics, and skills of this small repository sample be attributed to genetics alone? After all, consider the parents of these children: Plotz reported that the parents, particularly the mothers, were highly involved in their children's development and took their parental roles very seriously. Most of the parents studied child care manuals, coached their children's sports teams, practised reading with their kids, and either home-schooled them or sent them to the best schools in their areas. And the families were financially well-off. Furthermore, the mothers approached the repository at a relatively older child-bearing age, when all other options were exhausted. These children were desperately wanted and very well loved. It is undeniable that, in addition to their genetic backgrounds, all this excellent nurturing played a significant role in the development of the repository children.

Although the existence of the repository provides interesting insight into the potential importance of genetics on child development, the results of Graham's experiment are inconclusive. The offspring interviewed are definitely smart and talented, but only one of them was considered a true genius and child prodigy. And nurture may have played as much a role as nature in their outcomes (Olding, 2006; Plotz, 2001).

The goal of this chapter is to investigate the fundamental, complex, and essential process of human development. **Development** refers to *the physiological, behavioural, cognitive, and social changes that occur throughout human life, which are guided by both genetic predispositions (nature) and by environmental influences (nurture)*. We will begin our study of development at the moment of conception, when the father's sperm unites with the mother's egg, and then consider prenatal development in the womb. Next we

will focus on **infancy**, *the developmental stage that begins at birth and continues to one year of age*, and **childhood**, *the period between infancy and the onset of puberty*. Finally, we will consider the developmental changes that occur during **adolescence** — *the years between the onset of puberty and the beginning of adulthood*; the stages of adulthood itself, including *emerging*, *early*, *middle*, and *older adulthood*; and the preparations for and eventual facing of death. Last, we will discuss how gender and its related concepts such as sex, gender roles, gender identity, sexual orientation, and sexism develop and influence our lives. As we will learn, there are very few significant gender differences but lots of stereotypes about them!

Each of the stages of development has its unique physical, cognitive, and emotional changes that define the stage and that make each one unique from the others. The psychologist and psychoanalyst Erik Erikson (1963, p. 202) proposed a model of life-span development that provides a useful guideline for thinking about the changes we experience throughout life. As you can see in Table 14.1, "Challenges of Development as Proposed by Erik Erikson," Erikson believed that each life stage has a unique challenge that the person who reaches it must face. And according to Erikson, successful development involves dealing with and resolving the goals and demands of each of the life stages in a positive way.

Table 14.1 Challenges of Development as Proposed by Erik Erikson.

Stage	Age range	Key challenge	Positive resolution of challenge
Oral-sensory	Birth to 12 to 18 months	Trust versus mistrust	The child develops a feeling of trust in his or her caregivers.
Muscular-anal	18 months to 3 years	Autonomy versus shame/doubt	The child learns what he or she can and cannot control and develops a sense of free will.
Locomotor	3 to 6 years	Initiative versus guilt	The child learns to become independent by exploring, manipulating, and taking action.
Latency	6 to 12 years	Industry versus inferiority	The child learns to do things well or correctly according to standards set by others, particularly in school.
Adolescence	12 to 18 years	Identity versus role confusion	The adolescent develops a well-defined and positive sense of self in relationship to others.
Young adulthood	19 to 40 years	Intimacy versus isolation	The person develops the ability to give and receive love and to make long-term commitments.
Middle adulthood	40 to 65 years	Generativity versus stagnation	The person develops an interest in guiding the development of the next generation, often by becoming a parent.
Late adulthood	65 to death	Ego integrity versus despair	The person develops acceptance of his or her life as it was lived.

Adapted from Erikson (1963).

As we progress through this chapter, we will see that Robert Klark Graham was in part right — nature does play a substantial role in development (it has been found, for instance, that identical twins, who share all of their genetic code, usually begin sitting up and walking on the exact same days). But nurture is also important — we begin to be influenced by our environments even while still in the womb, and these influences remain with us throughout our development. Furthermore, we will see that we play an active role in shaping our own lives. Our own behaviour influences how and what we learn, how people respond to us, and how we develop as individuals. As you read the chapter, you will no doubt get a broader view of how we each pass through our own lives. You will see

how we learn and adapt to life's changes, and this new knowledge may help you better understand and better guide your own personal life journey.

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14.2: Conception and Prenatal Development

Charles Stangor and Jennifer Walinga

Learning Objectives

- Review the stages of prenatal development.
- Explain how the developing embryo and fetus may be harmed by the presence of teratogens and describe what a mother can do to reduce her risk.

Conception *occurs when an egg from the mother is fertilized by a sperm from the father*. In humans, the conception process begins with **ovulation**, *when an ovum, or egg (the largest cell in the human body), which has been stored in one of the mother's two ovaries, matures and is released into the fallopian tube*. Ovulation occurs about halfway through the woman's menstrual cycle and is aided by the release of a complex combination of hormones. In addition to helping the egg mature, the hormones also cause the lining of the uterus to grow thicker and more suitable for implantation of a fertilized egg.

If the woman has had sexual intercourse within one or two days of the egg's maturation, one of the up to 500 million sperm deposited by the man's ejaculation, which are travelling up the fallopian tube, may fertilize the egg. Although few of the sperm are able to make the long journey, some of the strongest swimmers succeed in meeting the egg. As the sperm reach the egg in the fallopian tube, they release enzymes that attack the outer jellylike protective coating of the egg, each trying to be the first to enter. As soon as one of the millions of sperm enters the egg's coating, the egg immediately responds by both blocking out all other challengers and at the same time pulling in the single successful sperm.

The Zygote

Within several hours of conception, half of the 23 chromosomes from the egg and half of the 23 chromosomes from the sperm fuse together, creating a **zygote** — *a fertilized ovum*. The zygote continues to travel down the fallopian tube to the uterus. Although the uterus is only about four inches away in the woman's body, the zygote's journey is nevertheless substantial for a microscopic organism, and fewer than half of zygotes survive beyond this earliest stage of life. If the zygote is still viable when it completes the journey, it will attach itself to the wall of the uterus, but if it is not, it will be flushed out in the woman's menstrual flow. During this time, the cells in the zygote continue to divide: the original two cells become four, those four become eight, and so on, until there are thousands (and eventually trillions) of cells. Soon the cells begin to *differentiate*, each taking on a separate function. The earliest differentiation is between the cells on the inside of the zygote, which will begin to form the developing human being, and the cells on the outside, which will form the protective environment that will provide support for the new life throughout the pregnancy.

The Embryo

Once the zygote attaches to the wall of the uterus, it is known as the **embryo**. During the embryonic phase, which will last for the next six weeks, the major internal and external organs are formed, each beginning at the microscopic level, with only a few cells. The changes in the embryo's appearance will continue rapidly from this point until birth.

While the inner layer of embryonic cells is busy forming the embryo itself, the outer layer is forming the surrounding protective environment that will help the embryo survive the pregnancy. This environment consists of three major structures: The **amniotic sac** is *the fluid-filled reservoir in which the embryo (soon to be known as a fetus) will live until birth, and which acts as both a cushion against outside pressure and as a temperature regulator*. The **placenta** is *an organ that allows the exchange of nutrients between the embryo and the mother, while at the same time filtering out harmful material*. The filtering occurs through a thin membrane that separates the mother's blood from the blood of the fetus, allowing them to share only the material that is able to pass through the filter. Finally, the **umbilical cord** *links the embryo directly to the placenta and transfers all material to the fetus*. Thus the placenta and the umbilical cord protect the fetus from many foreign agents in the mother's system that might otherwise pose a threat.

The Fetus

Beginning in the ninth week after conception, the embryo becomes a fetus. The defining characteristic of the fetal stage is growth. All the major aspects of the growing organism have been formed in the embryonic phase, and now the fetus has approximately six months to go from weighing less than an ounce to weighing an average of six to eight pounds. That's quite a growth spurt.

The fetus begins to take on many of the characteristics of a human being, including moving (by the third month the fetus is able to curl and open its fingers, form fists, and wiggle its toes), sleeping, as well as early forms of swallowing and breathing. The fetus begins to develop its senses, becoming able to distinguish tastes and respond to sounds. Research has found that the fetus even develops some initial preferences. A newborn prefers the mother's voice to that of a stranger, the languages heard in the womb over other languages (DeCasper & Fifer, 1980; Moon, Cooper, & Fifer, 1993), and even the kinds of foods that the mother ate during the pregnancy (Mennella, Jagnow, & Beauchamp, 2001). By the end of the third month of pregnancy, the sexual organs are visible.

How the Environment Can Affect the Vulnerable Fetus

Prenatal development is a complicated process and may not always go as planned. About 45% of pregnancies result in a miscarriage, often without the mother ever being aware it has occurred (Moore & Persaud, 1993). Although the amniotic sac and the placenta are designed to protect the embryo, *substances that can harm the fetus*, known as **teratogens**, may nevertheless cause problems. Teratogens include general environmental factors, such as air pollution and radiation, but also the cigarettes, alcohol, and drugs that the mother may use. Teratogens do not always harm the fetus, but they are more likely to do so when they occur in larger amounts, for longer time periods, and during the more sensitive phases, as when the fetus is growing most rapidly. The most vulnerable period for many of the fetal organs is very early in the pregnancy — before the mother even knows she is pregnant.

Harmful substances that the mother ingests may harm the child. Cigarette smoking, for example, reduces the blood oxygen for both the mother and child and can cause a fetus to be born severely underweight. Another serious threat is **fetal alcohol syndrome** (FAS), *a condition caused by maternal alcohol drinking that can lead to numerous detrimental developmental effects, including limb and facial abnormalities, genital anomalies, and mental retardation*. Each year in Canada, it is estimated that nine babies in every 1,000 are born with fetal alcohol spectrum disorder (FASD), and it is considered one of the leading causes of retardation in the world today (Health Canada, 2006; Niccols, 1994). Because there is no known safe level of alcohol consumption for a pregnant woman, the Public Health Agency of Canada (2011) states that there is no safe amount or safe time to drink alcohol during pregnancy. Therefore, the best approach for expectant mothers is to avoid alcohol completely. Maternal drug abuse is also of major concern and is considered one of the greatest risk factors facing unborn children.



Figure 14.1 Performing Prenatal Screening. Prenatal screenings, including a sonogram, help detect potential birth defects and other potentially dangerous conditions.

The environment in which the mother is living also has a major impact on infant development (Duncan & Brooks-Gunn, 2000; Haber & Toro, 2004). Children born into homelessness or poverty are more likely to have mothers who are malnourished, who suffer from domestic violence, stress, and other psychological problems, and who smoke or abuse drugs. And children born into poverty are also more likely to be exposed to teratogens. Poverty's impact may also amplify other issues, creating substantial problems for healthy child development (Evans & English, 2002; Gunnar & Quevedo, 2007).

Mothers normally receive genetic and blood tests during the first months of pregnancy to determine the health of the embryo or fetus. They may undergo sonogram, ultrasound, amniocentesis, or other testing (Figure 14.1). The screenings detect potential birth

defects, including neural tube defects, chromosomal abnormalities (such as Down syndrome), genetic diseases, and other potentially dangerous conditions. Early diagnosis of prenatal problems can allow medical treatment to improve the health of the fetus.

Key Takeaways

- Development begins at the moment of conception, when the sperm from the father merges with the egg from the mother.
- Within a span of nine months, development progresses from a single cell into a zygote and then into an embryo and fetus.
- The fetus is connected to the mother through the umbilical cord and the placenta, which allow the fetus and mother to exchange nourishment and waste. The fetus is protected by the amniotic sac.
- The embryo and fetus are vulnerable and may be harmed by the presence of teratogens.
- Smoking, alcohol use, and drug use are all likely to be harmful to the developing embryo or fetus, and the mother should entirely refrain from these behaviours during pregnancy or if she expects to become pregnant.
- Environmental factors, especially homelessness and poverty, have a substantial negative effect on healthy child development.

Exercises and Critical Thinking

1. What behaviours must a woman avoid engaging in when she decides to try to become pregnant, or when she finds out she is pregnant? Do you think the ability of a mother to engage in healthy behaviours should influence her choice to have a child?
2. Given the negative effects of poverty on human development, what steps do you think societies should take to try to reduce poverty?

Image Attributions

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14.3: Infancy and Childhood- Exploring and Learning

Charles Stangor and Jennifer Walinga

Learning Objectives

- Describe the abilities that newborn infants possess and how they actively interact with their environments.
- List the stages in Piaget's model of cognitive development and explain the concepts that are mastered in each stage.
- Critique Piaget's theory of cognitive development and describe other theories that complement and expand on it.
- Summarize the important processes of social development that occur in infancy and childhood.

If all has gone well, a baby is born sometime around the 38th week of pregnancy. The fetus is responsible, at least in part, for its own birth because chemicals released by the developing fetal brain trigger the muscles in the mother's uterus to start the rhythmic contractions of childbirth. The contractions are initially spaced at about 15-minute intervals but come more rapidly with time. When the contractions reach an interval of two to three minutes, the mother is requested to assist in the labour and help push the baby out.

The Newborn Arrives With Many Behaviours Intact

Newborns are already prepared to face the new world they are about to experience. As you can see in Table 14.2, "Survival Reflexes in Newborns," babies are equipped with a variety of reflexes, each providing an ability that will help them survive their first few months of life as they continue to learn new routines to help them survive in and manipulate their environments.

Table 14.2 Survival Reflexes in Newborns.

Name	Stimulus	Response	Significance	Video Example
Rooting reflex	The baby's cheek is stroked.	The baby turns its head toward the stroking, opens its mouth, and tries to suck.	Ensures the infant's feeding will be a reflexive habit	Watch "The Rooting Reflex" [https://youtu.be/v7_Y_jg2soc]
Blink reflex	A light is flashed in the baby's eyes.	The baby closes both eyes.	Protects eyes from strong and potentially dangerous stimuli	Watch "Light Blink Reflex" [https://youtu.be/htGRKE8tGa4]
Withdrawal reflex	A soft pinprick is applied to the sole of the baby's foot.	The baby flexes the leg.	Keeps the exploring infant away from painful stimuli	Watch "Flexor Withdrawal Reflect" [https://youtu.be/p4vM8ca8QZU]
Tonic neck reflex	The baby is laid down on its back.	The baby turns its head to one side and extends the arm on the same side.	Helps develop hand-eye coordination	Watch "Tonic Neck Reflex" [https://youtu.be/LtMe3b0OX0Q]
Grasp reflex	An object is pressed into the palm of the baby.	The baby grasps the object pressed and can even hold its own weight for a brief period.	Helps in exploratory learning	Watch "Palmar Grasp Reflex" [https://youtu.be/tZa9XxRthdA]
Moro reflex	Loud noises or a sudden drop in height while holding the baby.	The baby extends arms and legs and quickly brings them in as if trying to grasp something.	Protects from falling; could have assisted infants in holding on to their mothers during rough travelling	Watch "Newborn Startle Reflex" [https://youtu.be/zOGsaTmr9Ic]
Stepping reflex	The baby is suspended with bare feet just above a surface and is moved forward.	Baby makes stepping motions as if trying to walk.	Helps encourage motor development	Watch "Stepping Reflex" [https://youtu.be/6Gqs-CTOzuY]

In addition to reflexes, newborns have preferences — they like sweet-tasting foods at first, while becoming more open to salty items by four months of age (Beauchamp, Cowart, Menellia, & Marsh, 1994; Blass & Smith, 1992). Newborns also prefer the smell of their mothers. An infant only six days old is significantly more likely to turn toward its own mother's breast pad than to the breast pad of another baby's mother (Porter, Makin, Davis, & Christensen, 1992), and a newborn also shows a preference for the face of its own mother (Bushnell, Sai, & Mullin, 1989).

Although infants are born ready to engage in some activities, they also contribute to their own development through their own behaviours. The child's knowledge and abilities increase as it babbles, talks, crawls, tastes, grasps, plays, and interacts with the objects in the environment (Gibson, Rosenzweig, & Porter, 1988; Gibson & Pick, 2000; Smith & Thelen, 2003). Parents may help in this process by providing a variety of activities and experiences for the child. Research has found that animals raised in environments with more novel objects and that engage in a variety of stimulating activities have more brain synapses and larger cerebral cortexes, and they perform better on a variety of learning tasks compared with animals raised in more impoverished environments (Juraska, Henderson, & Müller, 1984). Similar effects are likely occurring in children who have opportunities to play, explore, and interact with their environments (Soska, Adolph, & Johnson, 2010).

Research Focus: Using the Habituation Technique to Study What Infants Know

It may seem to you that babies have little ability to view, hear, understand, or remember the world around them. Indeed, the famous psychologist William James presumed that the newborn experiences a "blooming, buzzing confusion" (James, 1890, p. 462). And you may think that, even if babies do know more than James gave them credit for, it might not be possible to find out what they know. After all, infants can't talk or respond to questions, so how would we ever find out? But over the past two decades, developmental psychologists have created new ways to determine what babies know, and they have found that they know much more than you, or William James, might have expected.

One way that we can learn about the cognitive development of babies is by measuring their behaviour in response to the stimuli around them. For instance, some researchers have given babies the chance to control which shapes they get to see or which sounds they get to hear according to how hard they suck on a pacifier (Trehub & Rabinovitch, 1972). The sucking behaviour is used as a measure of the infants' interest in the stimuli — the sounds or images they suck hardest in response to are the ones we can assume they prefer.

Another approach to understanding cognitive development by observing the behaviour of infants is through the use of the habituation technique. **Habituation** refers to *the decreased responsiveness toward a stimulus after it has been presented numerous times in succession*. Organisms, including infants, tend to be more interested in things the first few times they experience them and become less interested in them with more frequent exposure. Developmental psychologists have used this general principle to help them understand what babies remember and understand.

In the **habituation procedure**,[1] a baby is placed in a high chair and presented with visual stimuli while a video camera records the infant's eye and face movements. When the experiment begins, a stimulus (e.g., the face of an adult) appears in the baby's field of view, and the amount of time the baby looks at the face is recorded by the camera. Then the stimulus is removed for a few seconds before it appears again and the gaze is again measured. Over time, the baby starts to habituate to the face, such that each presentation elicits less gazing at the stimulus. Then a new stimulus (e.g., the face of a different adult or the same face looking in a different direction) is presented, and the researchers observe whether the gaze time significantly increases. You can see that if the infant's gaze time increases when a new stimulus is presented, this indicates that the baby can differentiate the two stimuli.

Although this procedure is very simple, it allows researchers to create variations that reveal a great deal about a newborn's cognitive ability. The trick is simply to change the stimulus in controlled ways to see if the baby "notices the difference." Research using the habituation procedure has found that babies can notice changes in colours, sounds, and even principles of numbers and physics. For instance, in one experiment reported by Karen Wynn (1995), six-month-old babies were shown a presentation of a puppet that repeatedly jumped up and down either two or three times, resting for a couple of seconds between sequences (the length of time and the speed of the jumping were controlled). After the infants habituated to this display, the presentation was changed such that the puppet jumped a different number of times. As you can see in Figure 14.2, "Can Infants Do Math?" the infants' gaze time increased when Wynn changed the presentation, suggesting that the infants could tell the difference between the number of jumps.

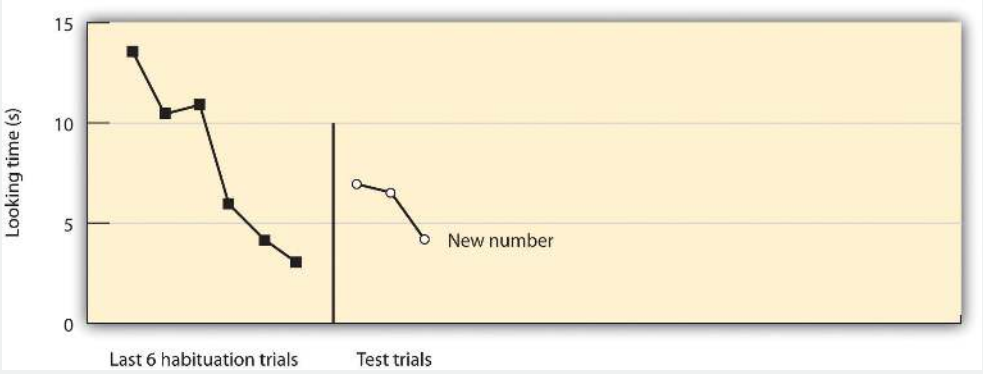


Figure 14.2 Can Infants Do Math? Karen Wynn found that babies that had habituated to a puppet jumping either two or three times significantly increased their gaze when the puppet began to jump a different number of times.

Cognitive Development During Childhood

Childhood is a time in which changes occur quickly. The child is growing physically, and cognitive abilities are also developing. During this time the child learns to actively manipulate and control the environment, and is first exposed to the requirements of society, particularly the need to control the bladder and bowels. According to Erik Erikson, the challenges that the child must attain in childhood relate to the development of *initiative*, *competence*, and *independence*. Children need to learn to explore the world, to become self-reliant, and to make their own way in the environment.



Figure 14.3 Portrait of Jean Piaget. Jean Piaget developed his theories of child development by observing the behaviours of children.

These skills do not come overnight. Neurological changes during childhood provide children the ability to do some things at certain ages, and yet make it impossible for them to do other things. This fact was made apparent through the groundbreaking work of the Swiss psychologist Jean Piaget (Figure 7.3). During the 1920s, Piaget was administering intelligence tests to children in an attempt to determine the kinds of logical thinking that children were capable of. In the process of testing them, Piaget became intrigued, not so much by the answers that the children got right, but more by the answers they got wrong. Piaget believed that the incorrect answers the children gave were not mere shots in the dark but rather represented specific ways of thinking unique to the children's developmental stage. Just as almost all babies learn to roll over before they learn to sit up by themselves, and learn to crawl before they learn to walk, Piaget believed that children gain their cognitive ability in a developmental order. These insights — that children at different ages think in fundamentally different ways — led to Piaget's *stage model of cognitive development*.

Piaget argued that children do not just passively learn but also actively try to make sense of their worlds. He argued that, as they learn and mature, children develop **schemas** — *patterns of knowledge in long-term memory — that help them remember, organize, and respond to information*. Furthermore, Piaget thought that when children experience new things, they attempt to reconcile the new knowledge with existing schemas. Piaget believed that children use two distinct methods in doing so, methods that he called *assimilation* and *accommodation* (see Figure 14.4, "Assimilation and Accommodation").

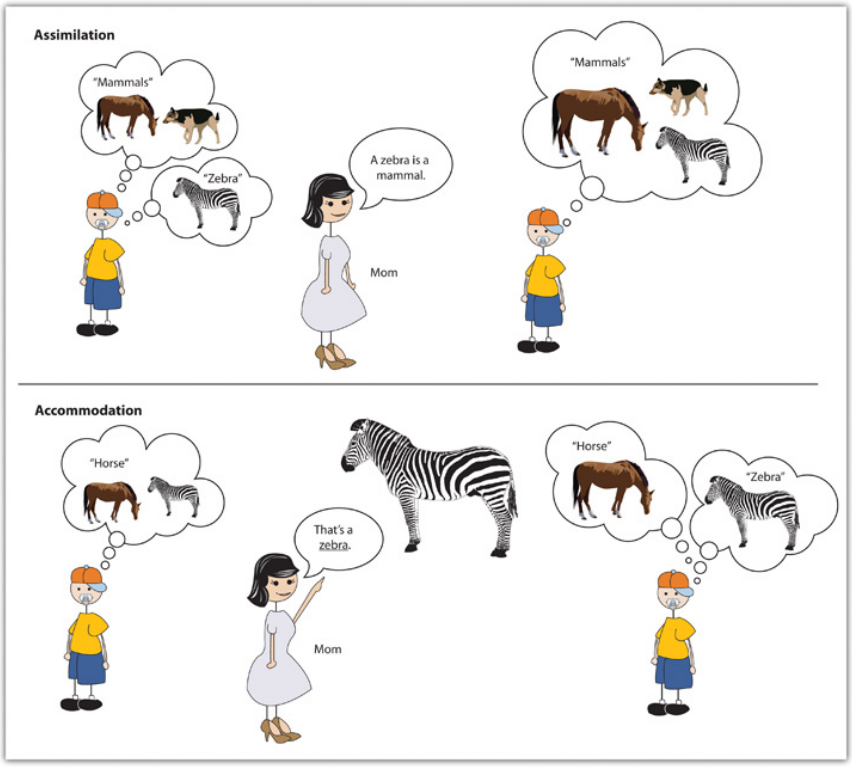


Figure 14.4 Assimilation and Accommodation.

When children employ **assimilation**, they *use already developed schemas to understand new information*. If children have learned a schema for horses, then they may call the striped animal they see at the zoo a horse rather than a zebra. In this case, children fit the existing schema to the new information and label the new information with the existing knowledge. **Accommodation**, on the other hand, involves *learning new information and thus changing the schema*. When a mother says, "No, honey, that's a zebra, not a horse," the child may adapt the schema to fit the new stimulus, learning that there are different types of four-legged animals, only one of which is a horse.

Piaget's most important contribution to understanding cognitive development, and the fundamental aspect of his theory, was the idea that development occurs in unique and distinct stages, with each stage occurring at a specific time, in a sequential manner, and in a way that allows the child to think about the world using new capacities. Piaget's stages of cognitive development are summarized in Table 14.3, "Piaget's Stages of Cognitive Development."

Table 14.3 Piaget's Stages of Cognitive Development.

Stage	Approximate age range	Characteristics	Stage attainments
Sensorimotor	Birth to about 2 years	The child experiences the world through the fundamental senses of seeing, hearing, touching, and tasting.	Object permanence
Preoperational	2 to 7 years	Children acquire the ability to internally represent the world through language and mental imagery. They also start to see the world from other people's perspectives.	Theory of mind; rapid increase in language ability
Concrete operational	7 to 11 years	Children become able to think logically. They can increasingly perform operations on objects that are only imagined.	Conservation
Formal operational	11 years to adulthood	Adolescents can think systematically, can reason about abstract concepts, and can understand ethics and scientific reasoning.	Abstract logic

The first developmental stage for Piaget was the **sensorimotor stage**, *the cognitive stage that begins at birth and lasts until around the age of two. It is defined by the direct physical interactions that babies have with the objects around them.* During this stage, babies form their first schemas by using their primary senses — they stare at, listen to, reach for, hold, shake, and taste the things in their environments.

During the sensorimotor stage, babies' use of their senses to perceive the world is so central to their understanding that whenever babies do not directly perceive objects, as far as they are concerned, the objects do not exist. Piaget found, for instance, that if he first interested babies in a toy and then covered the toy with a blanket, children who were younger than six months of age would act as if the toy had disappeared completely — they never tried to find it under the blanket but would nevertheless smile and reach for it when the blanket was removed. Piaget found that it was not until about eight months that the children realized that the object was merely covered and not gone. Piaget used the term **object permanence** to refer to *the child's ability to know that an object exists even when the object cannot be perceived.*

Video: *Object Permanence* [https://youtu.be/nwXd7WyWNHY]. Children younger than about eight months of age do not understand object permanence.

At about two years of age, and until about seven years of age, children move into the **preoperational stage**. During this stage, *children begin to use language and to think more abstractly about objects, with capacity to form mental images; however, their understanding is more intuitive and they lack much ability to deduce or reason.* The thinking is preoperational, meaning that the child lacks the ability to operate on or transform objects mentally. In one study that showed the extent of this inability, Judy DeLoache (1987) showed children a room within a small dollhouse. Inside the room, a small toy was visible behind a small couch. The researchers took the children to another lab room, which was an exact replica of the dollhouse room, but full-sized. When children who were 2.5 years old were asked to find the toy, they did not know where to look — they were simply unable to make

the transition across the changes in room size. Three-year-old children, on the other hand, immediately looked for the toy behind the couch, demonstrating that they were improving their operational skills.

The inability of young children to view transitions also leads them to be **egocentric** — *unable to readily see and understand other people's viewpoints*. Developmental psychologists define the **theory of mind** as *the ability to take another person's viewpoint*, and the ability to do so increases rapidly during the preoperational stage. In one demonstration of the development of theory of mind, a researcher shows a child a video of another child (let's call her Anna) putting a ball in a red box. Then Anna leaves the room, and the video shows that while she is gone, a researcher moves the ball from the red box into a blue box. As the video continues, Anna comes back into the room. The child is then asked to point to the box where Anna will probably look to find her ball. Children who are younger than four years of age typically are unable to understand that Anna does not know that the ball has been moved, and they predict that she will look for it in the blue box. After four years of age, however, children have developed a theory of mind — they realize that different people can have different viewpoints and that (although she will be wrong) Anna will nevertheless think that the ball is still in the red box.

After about seven years of age until 11, the child moves into the **concrete operational stage**, which is *marked by more frequent and more accurate use of transitions, operations, and abstract concepts, including those of time, space, and numbers*. An important milestone during the concrete operational stage is the development of conservation — *the understanding that changes in the form of an object do not necessarily mean changes in the quantity of the object*. Children younger than seven years generally think that a glass of milk that is tall holds more milk than a glass of milk that is shorter and wider, and they continue to believe this even when they see the same milk poured back and forth between the glasses. It appears that these children focus only on one dimension (in this case, the height of the glass) and ignore the other dimension (width). However, when children reach the concrete operational stage, their abilities to understand such transformations make them aware that, although the milk looks different in the different glasses, the amount must be the same.

Video: *Conservation* [https://youtu.be/YtLEWVu815o]. Children younger than about seven years of age do not understand the principles of conservation.



At about 11 years of age, children enter the **formal operational stage**, which is *marked by the ability to think in abstract terms and to use scientific and philosophical lines of thought*. Children in the formal operational stage are better able to systematically test

alternative ideas to determine their influences on outcomes. For instance, rather than haphazardly changing different aspects of a situation that allows no clear conclusions to be drawn, they systematically make changes in one thing at a time and observe what difference that particular change makes. They learn to use deductive reasoning, such as "if this, then that," and they become capable of imagining situations that "might be," rather than just those that actually exist.

Piaget's theories have made a substantial and lasting contribution to developmental psychology. His contributions include the idea that children are not merely passive receptacles of information but rather actively engage in acquiring new knowledge and making sense of the world around them. This general idea has generated many other theories of cognitive development, each designed to help us better understand the development of the child's information-processing skills (Klahr & MacWhinney, 1998; Shrager & Siegler, 1998). Furthermore, the extensive research that Piaget's theory has stimulated has generally supported his beliefs about the order in which cognition develops. Piaget's work has also been applied in many domains — for instance, many teachers make use of Piaget's stages to develop educational approaches aimed at the level children are developmentally prepared for (Driscoll, 1994; Levin, Siegler, & Druyan, 1990).

Over the years, Piagetian ideas have been refined. For instance, it is now believed that object permanence develops gradually, rather than more immediately, as a true stage model would predict, and that it can sometimes develop much earlier than Piaget expected. Renée Baillargeon and her colleagues (Baillargeon, 2004; Wang, Baillargeon, & Brueckner, 2004) placed babies in a habituation setup, having them watch as an object was placed behind a screen, entirely hidden from view. The researchers then arranged for the object to reappear from behind another screen in a different place. Babies who saw this pattern of events looked longer at the display than did babies who witnessed the same object physically being moved between the screens. These data suggest that the babies were aware that the object still existed even though it was hidden behind the screen, and thus that they were displaying object permanence as early as three months of age, rather than the eight months that Piaget predicted.

Another factor that might have surprised Piaget is the extent to which a child's social surroundings influence learning. In some cases, children progress to new ways of thinking and retreat to old ones depending on the type of task they are performing, the circumstances they find themselves in, and the nature of the language used to instruct them (Courage & Howe, 2002). And children in different cultures show somewhat different patterns of cognitive development. Dasen (1972) found that children in non-Western cultures moved to the next developmental stage about a year later than did children from Western cultures, and that level of schooling also influenced cognitive development. In short, Piaget's theory probably understated the contribution of environmental factors to social development.

More recent theories (Cole, 1996; Rogoff, 1990; Tomasello, 1999), based in large part on the **sociocultural theory** of the Russian scholar Lev Vygotsky (1962, 1978), argue that *cognitive development is not isolated entirely within the child but occurs at least in part through social interactions*. These scholars argue that children's thinking develops through constant interactions with more competent others, including parents, peers, and teachers.

An extension of Vygotsky's sociocultural theory is the idea of **community learning**, in which *children serve as both teachers and learners*. This approach is frequently used in classrooms to improve learning as well as to increase responsibility and respect for others. When children work cooperatively in groups to learn material, they can help and support each other's learning as well as learn about each other as individuals, thereby reducing prejudice (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978; Brown, 1997).

Social Development During Childhood

It is through the remarkable increases in cognitive ability that children learn to interact with and understand their environments. But these cognitive skills are only part of the changes that are occurring during childhood. Equally crucial is the development of the child's social skills — the ability to understand, predict, and create bonds with the other people in their environments.

Knowing the Self: The Development of the Self-Concept

One of the important milestones in a child's social development is learning about his or her own self-existence (Figure 14.5). This self-awareness is known as *consciousness*, and the content of consciousness is known as the *self-concept*. The **self-concept** is *a knowledge representation or schema that contains knowledge about us, including our beliefs about our personality traits, physical characteristics, abilities, values, goals, and roles, as well as the knowledge that we exist as individuals* (Kagan, 1991).



Figure 14.5 Recognizing Oneself in a Mirror. A simple test of self-awareness is the ability to recognize oneself in a mirror. Humans and chimpanzees can pass the test; dogs never do.

Some animals, including chimpanzees, orangutans, and perhaps dolphins, have at least a primitive sense of self (Boysen & Himes, 1999). In one study (Gallup, 1970), researchers painted a red dot on the foreheads of anesthetized chimpanzees and then placed each animal in a cage with a mirror. When the chimps woke up and looked in the mirror, they touched the dot on their faces, not the dot on the faces in the mirror. These actions suggest that the chimps understood that they were looking at themselves and not at other animals, and thus we can assume that they are able to realize that they exist as individuals. On the other hand, most other animals, including, for instance, dogs, cats, and monkeys, never realize that it is themselves in the mirror.

Infants who have a similar red dot painted on their foreheads recognize themselves in a mirror in the same way that the chimps do, and they do this by about 18 months of age (Povinelli, Landau, & Perilloux, 1996). The child's knowledge about the self continues to develop as the child grows. By age two, the infant becomes aware of his or her sex, as a boy or a girl. By age four, self-descriptions are likely to be based on physical features, such as hair colour and possessions, and by about age six, the child is able to understand basic emotions and the concepts of traits, being able to make statements such as "I am a nice person" (Harter, 1998).

Soon after children enter school (at about age five or six), they begin to *make comparisons with other children, a process known as* **social comparison**. For example, a child might describe himself as being faster than one boy but slower than another (Moretti & Higgins, 1990). According to Erikson, the important component of this process is the development of **competence** and **autonomy** — *the recognition of one's own abilities relative to other children*. And children increasingly show awareness of social situations — they understand that other people are looking at and judging them the same way that they are looking at and judging others (Doherty, 2009).

Successfully Relating to Others: Attachment

One of the most important behaviours a child must learn is how to be accepted by others — the development of close and meaningful social relationships. *The emotional bonds that we develop with those with whom we feel closest, and particularly the bonds that an infant develops with the mother or primary caregiver*, are referred to as **attachment** (Cassidy & Shaver, 1999). See examples in Figure 14.6.



Figure 14.6 Children's Attachment to Caregivers. Children develop appropriate attachment styles through their interactions with caregivers.

As late as the 1930s, psychologists believed that children who were raised in institutions such as orphanages, and who received good physical care and proper nourishment, would develop normally, even if they had little interaction with their caretakers. But studies by the developmental psychologist John Bowlby (1953) and others showed that these children did not develop normally —

they were usually sickly, emotionally slow, and generally unmotivated. These observations helped make it clear that normal infant development requires successful attachment with a caretaker.

In one classic study showing the importance of attachment, Wisconsin University psychologists Harry and Margaret Harlow investigated the responses of young monkeys, separated from their biological mothers, to two surrogate mothers introduced to their cages. One — the wire mother — consisted of a round wooden head, a mesh of cold metal wires, and a bottle of milk from which the baby monkey could drink. The second mother was a foam-rubber form wrapped in a heated terry-cloth blanket. The Harlows found that although the infant monkeys went to the wire mother for food, they overwhelmingly preferred and spent significantly more time with the warm terry-cloth mother that provided no food but did provide comfort (Harlow, 1958).



Video: *Harlow's Monkeys* [https://youtu.be/MmbbfisRiwA]. The studies by the Harlows showed that young monkeys preferred the warm mother that provided a secure base to the cold mother that provided food.

The Harlows's studies confirmed that babies have social as well as physical needs. Both monkeys and human babies need a **secure base** that *allows them to feel safe*. From this base, they can gain the confidence they need to venture out and explore their worlds. Erikson (Table 14.1, "Challenges of Development as Proposed by Erik Erikson") was in agreement on the importance of a secure base, arguing that the most important goal of infancy was the development of a basic sense of trust in one's caregivers.

Developmental psychologist Mary Ainsworth, a student of John Bowlby, was interested in studying the development of attachment in infants. Ainsworth created a laboratory test that measured an infant's attachment to his or her parent. The test is called the **strange situation** — *a measure of attachment in young children in which the child's behaviours are assessed in a situation in which the caregiver and a stranger move in and out of the environment* — because it is conducted in a context that is unfamiliar to the child and therefore likely to heighten the child's need for his or her parent (Ainsworth, Blehar, Waters, & Wall, 1978). During the procedure, which lasts about 20 minutes, the parent and the infant are first left alone, while the infant explores the room full of toys. Then a strange adult enters the room and talks for a minute to the parent, after which the parent leaves the room. The stranger stays with the infant for a few minutes, and then the parent again enters and the stranger leaves the room. During the entire session, a video camera records the child's behaviours, which are later coded by trained coders.



Video: *The Strange Situation* [https://youtu.be/QTsewNrHUHU]. In the strange situation, children are observed responding to the comings and goings of parents and unfamiliar adults in their environments.



On the basis of their behaviours, the children are categorized into one of four groups, where each group reflects a different kind of attachment relationship with the caregiver. A child with a **secure attachment style** usually *explores freely while the mother is present and engages with the stranger*. The child may be upset when the mother departs but is also happy to see the mother return. A child with an **ambivalent** (sometimes called *insecure-resistant*) **attachment style** is *wary about the situation in general, particularly the stranger, and stays close or even clings to the mother rather than exploring the toys*. When the mother leaves, the child is extremely distressed and is ambivalent when she returns. The child may rush to the mother but then fail to cling to her when she picks up the child. A child with an **avoidant** (sometimes called *insecure-avoidant*) **attachment style** will *avoid or ignore the mother, showing little emotion when the mother departs or returns*. The child may run away from the mother when she approaches. The child will not explore very much, regardless of who is there, and the stranger will not be treated much differently from the mother.

Finally, a child with a **disorganized attachment style** seems to have *no consistent way of coping with the stress of the strange situation* — the child may cry during the separation but avoid the mother when she returns, or the child may approach the mother but then freeze or fall to the floor. Although some cultural differences in attachment styles have been found (Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000), research has also found that the proportion of children who fall into each of the attachment categories is relatively constant across cultures (see Figure 14.7, “Proportion of Children With Different Attachment Styles”).

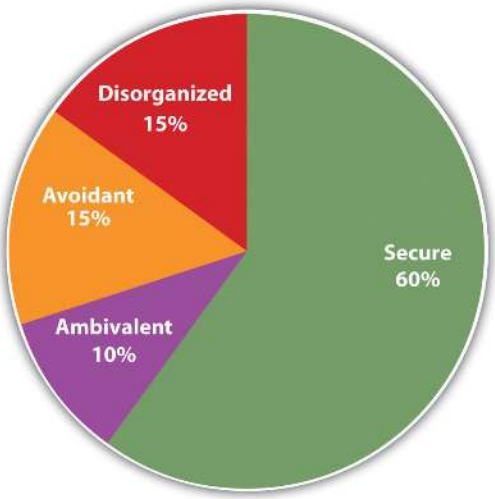


Figure 14.7 Proportion of Children With Different Attachment Styles. The graph shows the approximate proportion of children who have each of the four attachment styles. These proportions are fairly constant across cultures. [Long Description]

You might wonder whether differences in attachment style are determined more by the child (nature) or more by the parents (nurture). Most developmental psychologists believe that socialization is primary, arguing that a child becomes securely attached when the mother is available and able to meet the needs of the child in a responsive and appropriate manner, but that the insecure styles occur when the mother is insensitive and responds inconsistently to the child's needs. In a direct test of this idea, Dutch researcher Dymphna van den Boom (1994) randomly assigned some babies' mothers to a training session in which they learned to better respond to their children's needs. The research found that these mothers' babies were more likely to show a secure attachment style compared with the babies of the mothers in a control group that did not receive training.

But the attachment behaviour of the child is also likely influenced, at least in part, by **temperament**, *the innate personality characteristics of the infant*. Some children are warm, friendly, and responsive, whereas others tend to be more irritable, less manageable, and difficult to console. These differences may also play a role in attachment (Gillath, Shaver, Baek, & Chun, 2008; Seifer, Schiller, Sameroff, Resnick, & Riordan, 1996). Taken together, it seems safe to say that attachment, like most other developmental processes, is affected by an interplay of genetic and socialization influences.

Research Focus: Using a Longitudinal Research Design to Assess the Stability of Attachment

You might wonder whether the attachment style displayed by infants has much influence later in life. In fact, research has found that the attachment styles of children predict their emotions and their behaviours many years later (Cassidy & Shaver, 1999). Psychologists have studied the persistence of attachment styles over time using **longitudinal research designs** — *research designs in which individuals in the sample are followed and contacted over an extended period of time, often over multiple developmental stages*.

In one such study, Waters, Merrick, Treboux, Crowell, and Albersheim (2000) examined the extent of stability and change in attachment patterns from infancy to early adulthood. In their research, 60 middle-class infants who had been tested in the strange situation at one year of age were recontacted 20 years later and interviewed using a measure of adult attachment. Waters and colleagues found that 72% of the participants received the same secure versus insecure attachment classification in early adulthood as they had received as infants. The adults who changed categorization (usually from secure to insecure) were primarily those who had experienced traumatic events, such as the death or divorce of parents, severe illnesses (contracted by the parents or the children themselves), or physical or sexual abuse by a family member.

In addition to finding that people generally display the same attachment style over time, longitudinal studies have also found that the attachment classification received in infancy (as assessed using the strange situation or other measures) predicts many childhood and adult behaviours. Securely attached infants have closer, more harmonious relationships with peers, are less anxious and aggressive, and are better able to understand others' emotions than are those who were categorized as insecure as infants (Lucas-Thompson & Clarke-Stewart, 2007). And securely attached adolescents also have more positive peer and romantic relationships than their less securely attached counterparts (Carlson, Sroufe, & Egeland, 2004).

Conducting longitudinal research is a very difficult task, but one that has substantial rewards. When the sample is large enough and the time frame long enough, the potential findings of such a study can provide rich and important information about how people change over time and the causes of those changes. The drawbacks of longitudinal studies include the cost and the difficulty of finding a large sample that can be tracked accurately over time, and the time (many years) that it takes to get the data. In addition, because the results are delayed over an extended period, the research questions posed at the beginning of the study may become less relevant over time as the research continues.

Cross-sectional research designs represent an alternative to longitudinal designs. In a **cross-sectional research design,** *age comparisons are made between samples of different people at different ages at one time*. In one example, Jang, Livesley, and Vernon (1996) studied two groups of identical and nonidentical (fraternal) twins, one group in their 20s and the other group in their 50s, to determine the influence of genetics on personality. They found that genetics played a more significant role in the older group of twins, suggesting that genetics became more significant for personality in later adulthood.

Cross-sectional studies have a major advantage in that the scientist does not have to wait for years to pass to get results. On the other hand, the interpretation of the results in a cross-sectional study is not as clear as those from a longitudinal study, in which

the same individuals are studied over time. Most important, the interpretations drawn from cross-sectional studies may be confounded by *cohort effects*. **Cohort effects** refer to *the possibility that differences in cognition or behaviour at two points in time may be caused by differences that are unrelated to the changes in age. The differences might instead be due to environmental factors that affect an entire age group*. For instance, in the study by Jang, Livesley, and Vernon (1996) that compared younger and older twins, cohort effects might be a problem. The two groups of adults necessarily grew up in different time periods, and they may have been differentially influenced by societal experiences, such as economic hardship, the presence of wars, or the introduction of new technology. As a result, it is difficult in cross-sectional studies such as this one to determine whether the differences between the groups (e.g., in terms of the relative roles of environment and genetics) are due to age or to other factors.

Key Takeaways

- Babies are born with a variety of skills and abilities that contribute to their survival, and they also actively learn by engaging with their environments.
- The habituation technique is used to demonstrate the newborn's ability to remember and learn from experience.
- Children use both assimilation and accommodation to develop functioning schemas of the world.
- Piaget's theory of cognitive development proposes that children develop in a specific series of sequential stages: sensorimotor, preoperational, concrete operational, and formal operational.
- Piaget's theories have had a major impact, but they have also been critiqued and expanded.
- Social development requires the development of a secure base from which children feel free to explore. Attachment styles refer to the security of this base and more generally to the type of relationship that people, and especially children, develop with those who are important to them.
- Longitudinal and cross-sectional studies are each used to test hypotheses about development, and each approach has advantages and disadvantages.

Exercises and Critical Thinking

1. Give an example of a situation in which you or someone else might show cognitive assimilation and cognitive accommodation. In what cases do you think each process is most likely to occur?
2. Consider some examples of how Piaget's and Vygotsky's theories of cognitive development might be used by teachers who are teaching young children.
3. Consider the attachment styles of some of your friends in terms of their relationships with their parents and other friends. Do you think their style is secure?

Image Attributions

Figure 14.2: Adapted from Wynn (1995).

Figure 14.3: Jean Piaget by Anton Johansson, http://www.flickr.com/photos/mirjoran/455878802 used under CC BY 2.0 license (https://creativecommons.org/licenses/by/2.0/).

Figure 14.5: "Toddler in mirror" by Samantha Steele (http://www.flickr.com/photos/samanth...le/3983047059/) is licensed under CC BY-NC-ND 2.0 license (http://creativecommons.org/licenses/...2.0/deed.en_CA). There's a monkey in my mirror" by Mor (http://www.flickr.com/photos/mmoorr/1921632741/) is licensed under CC BY-NC 2.0 license (http://creativecommons.org/licenses/...2.0/deed.en_CA). "mirror mirror who is the most beautiful dog?" by rromer (http://www.flickr.com/photos/rromer/6309501395/) is licensed under CC BY-NC-SA 2.0 license (http://creativecommons.org/licenses/...2.0/deed.en_CA).

Figure 14.6: Source: "Maternal Bond" by Koivth (http://en.wikipedia.org/wiki/File:MaternalBond.jpg) is licensed under the Creative Commons Attribution-Share Alike 3.0 Unported (http://creativecommons.org/licenses/...3.0/deed.en_CA). "An admirable dad" by Julien Harneis (http://www.flickr.com/photos/julien_...n/photostream/) is licensed under CC BY-SA 2.0 (http://creativecommons.org/licenses/...2.0/deed.en_CA). "Szymon i Krystian" by Joymaster (http://en.wikipedia.org/wiki/File:Sz...ystian_003.JPG) is licensed under the Creative Commons Attribution-Share Alike 3.0 (http://creativecommons.org/licenses/...3.0/deed.en_CA).

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Long Descriptions

Figure 14.7 long description: Childrens' Attachment Styles. 60% are secure. 15% are disorganized. 15% are avoidant. 10% are ambivalent.

1. A procedure that uses the principles of habituation to allow researchers to infer the cognitive processes of newborns.

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14.4: Adolescence- Developing Independence and Identity

Charles Stangor and Jennifer Walinga

Learning Objectives

- Summarize the physical and cognitive changes that occur for boys and girls during adolescence.
- Explain how adolescents develop a sense of morality and of self-identity.

Adolescence is defined as *the years between the onset of puberty and the beginning of adulthood*. In the past, when people were likely to marry in their early 20s or younger, this period might have lasted only 10 years or less — starting roughly between ages 12 and 13 and ending by age 20, at which time the child got a job or went to work on the family farm, married, and started his or her own family. Today, children mature more slowly, move away from home at later ages, and maintain ties with their parents longer. For instance, children may go away to university but still receive financial support from parents, and they may come home on weekends or even to live for extended time periods. Thus the period between puberty and adulthood may well last into the late 20s, merging into adulthood itself. In fact, it is appropriate now to consider the period of adolescence and that of emerging adulthood (*the ages between 18 and the middle or late 20s*) together.

During adolescence, the child continues to grow physically, cognitively, and emotionally, changing from a child into an adult. The body grows rapidly in size, and the sexual and reproductive organs become fully functional. At the same time, as adolescents develop more advanced patterns of reasoning and a stronger sense of self, they seek to forge their own identities, developing important attachments with people other than their parents. Particularly in Western societies, where the need to forge a new independence is critical (Baumeister & Tice, 1986; Twenge, 2006), this period can be stressful for many children, as it involves new emotions, the need to develop new social relationships, and an increasing sense of responsibility and independence.

Although adolescence can be a time of stress for many teenagers, most of them weather the trials and tribulations successfully. For example, the majority of adolescents experiment with alcohol sometime before high school graduation. Although many will have been drunk at least once, relatively few teenagers will develop long-lasting drinking problems or permit alcohol to adversely affect their school or personal relationships. Similarly, a great many teenagers break the law during adolescence, but very few young people develop criminal careers (Farrington, 1995). These facts do not, however, mean that using drugs or alcohol is a good idea. The use of recreational drugs can have substantial negative consequences, and the likelihood of these problems (including dependence, addiction, and even brain damage) is significantly greater for young adults who begin using drugs at an early age.

Physical Changes in Adolescence

Adolescence begins with the onset of **puberty**, *a developmental period in which hormonal changes cause rapid physical alterations in the body, culminating in sexual maturity*. Although the timing varies to some degree across cultures, the average age range for reaching puberty is between nine and 14 years for girls and between 10 and 17 years for boys (Marshall & Tanner, 1986).

Puberty begins when the pituitary gland begins to stimulate the production of the *male sex hormone* **testosterone** in boys and *the female sex hormones* **estrogen** and **progesterone** in girls. The release of these sex hormones triggers the development of the **primary sex characteristics**, *the sex organs concerned with reproduction* (Figure 7.8, “Sex Characteristics”). These changes include the enlargement of the testicles and the penis in boys and the development of the ovaries, uterus, and vagina in girls. In addition, **secondary sex characteristics** (*features that distinguish the two sexes from each other but are not involved in reproduction*) are also developing, such as an enlarged Adam’s apple, a deeper voice, and pubic and underarm hair in boys, and enlargement of the breasts and hips and the appearance of pubic and underarm hair in girls (Figure 14.8, “Sex Characteristics”). The enlargement of breasts is usually the first sign of puberty in girls and, on average, occurs between ages 10 and 12 (Marshall & Tanner, 1986). Boys typically begin to grow facial hair between ages 14 and 16, and both boys and girls experience a rapid growth spurt during this stage. The growth spurt for girls usually occurs earlier than that for boys, with some boys continuing to grow into their 20s.

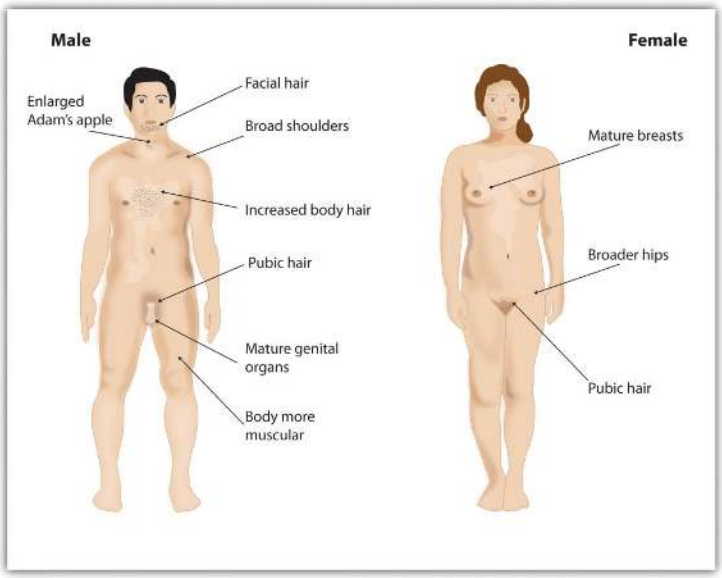


Figure 14.8 Sex Characteristics. Puberty brings dramatic changes in the body, including the development of primary and secondary sex characteristics.

A major milestone in puberty for girls is **menarche**, *the first menstrual period*, typically experienced at around 12 or 13 years of age (Anderson, Dannal, & Must, 2003). The age of menarche varies substantially and is determined by genetics, as well as by diet and lifestyle, since a certain amount of body fat is needed to attain menarche. Girls who are very slim, who engage in strenuous athletic activities, or who are malnourished may begin to menstruate later. Even after menstruation begins, girls whose level of body fat drops below the critical level may stop having their periods. The sequence of events for puberty is more predictable than the age at which they occur. Some girls may begin to grow pubic hair at age 10 but not attain menarche until age 15. In boys, facial hair may not appear until 10 years after the initial onset of puberty.

The timing of puberty in both boys and girls can have significant psychological consequences. Boys who mature earlier attain some social advantages because they are taller and stronger and, therefore, often more popular (Lynne, Graber, Nichols, Brooks-Gunn, & Botvin, 2007). At the same time, however, early-maturing boys are at greater risk for delinquency and are more likely than their peers to engage in antisocial behaviours, including drug and alcohol use, truancy, and precocious sexual activity. Girls who mature early may find their maturity stressful, particularly if they experience teasing or sexual harassment (Mendle, Turkheimer, & Emery, 2007; Pescovitz & Walvoord, 2007). Early-maturing girls are also more likely to have emotional problems, a lower self-image, and higher rates of depression, anxiety, and disordered eating than their peers (Ge, Conger, & Elder, 1996).

Cognitive Development in Adolescence

Although the most rapid cognitive changes occur during childhood, the brain continues to develop throughout adolescence, and even into the 20s (Weinberger, Elvevåg, & Giedd, 2005). During adolescence, the brain continues to form new neural connections, but also casts off unused neurons and connections (Blakemore, 2008). As teenagers mature, the prefrontal cortex, the area of the brain responsible for reasoning, planning, and problem solving, also continues to develop (Goldberg, 2001). And myelin, the fatty tissue that forms around axons and neurons and helps speed transmissions between different regions of the brain, also continues to grow (Rapoport et al., 1999).

Adolescents often seem to act impulsively, rather than thoughtfully, and this may be in part because the development of the prefrontal cortex is, in general, slower than the development of the emotional parts of the brain, including the limbic system (Blakemore, 2008). Furthermore, the hormonal surge that is associated with puberty, which primarily influences emotional responses, may create strong emotions and lead to impulsive behaviour. It has been hypothesized that adolescents may engage in risky behaviour, such as smoking, drug use, dangerous driving, and unprotected sex, in part because they have not yet fully acquired the mental ability to curb impulsive behaviour or to make entirely rational judgments (Steinberg, 2007).

The new cognitive abilities that are attained during adolescence may also give rise to new feelings of egocentrism, in which adolescents believe that they can do anything and that they know better than anyone else, including their parents (Elkind, 1978). Teenagers are likely to be highly self-conscious, often creating an **imaginary audience** in which *they feel that everyone is constantly watching them* (Goossens, Beyers, Emmen, & van Aken, 2002). Because teens think so much about themselves, they mistakenly believe that others must be thinking about them, too (Rycek, Stuhr, McDermott, Benker, & Swartz, 1998). It is no wonder that everything a teen's parents do suddenly feels embarrassing to them when they are in public.

Social Development in Adolescence

Some of the most important changes that occur during adolescence involve the further development of the self-concept and the development of new attachments. Whereas young children are most strongly attached to their parents, the important attachments of adolescents move increasingly away from parents and increasingly toward peers (Harris, 1998). As a result, parents' influence diminishes at this stage.

According to Erikson (Table 14.1, "Challenges of Development as Proposed by Erik Erikson"), the main social task of the adolescent is the search for a unique identity — the ability to answer the question "Who am I?" In the search for identity, the adolescent may experience role confusion in which he or she is balancing or choosing among identities, taking on negative or undesirable identities, or temporarily giving up looking for an identity altogether if things are not going well.

One approach to assessing identity development was proposed by James Marcia (1980). In his approach, adolescents are asked questions regarding their exploration of and commitment to issues related to occupation, politics, religion, and sexual behaviour. The responses to the questions allow the researchers to classify the adolescent into one of four identity categories (see Table 14.4, "James Marcia's Stages of Identity Development").

Table 14.4 James Marcia's Stages of Identity Development.

Identity-diffusion status	The individual does not have firm commitments regarding the issues in question and is not making progress toward them.
Foreclosure status	The individual has not engaged in any identity experimentation and has established an identity based on the choices or values of others.
Moratorium status	The individual is exploring various choices but has not yet made a clear commitment to any of them.
Identity-achievement status	The individual has attained a coherent and committed identity based on personal decisions.

Adapted from Marcia (1980).

Studies assessing how teens pass through Marcia's stages show that, although most teens eventually succeed in developing a stable identity, the path to it is not always easy and there are many routes that can be taken. Some teens may simply adopt the beliefs of their parents or the first role that is offered to them, perhaps at the expense of searching for other, more promising possibilities (foreclosure status). Other teens may spend years trying on different possible identities (moratorium status) before finally choosing one.

To help them work through the process of developing an identity, teenagers may well try out different identities in different social situations. They may maintain one identity at home and a different type of persona when they are with their peers. Eventually, most teenagers do integrate the different possibilities into a single self-concept and a comfortable sense of identity (identity-achievement status).

For teenagers, the peer group provides valuable information about the self-concept. For instance, in response to the question "What were you like as a teenager? (e.g., cool, nerdy, awkward?)," posed on the website Answerbag, one teenager replied in this way:

> *I'm still a teenager now, but from 8th-9th grade I didn't really know what I wanted at all. I was smart, so I hung out with the nerdy kids. I still do; my friends mean the world to me.*

> *But in the middle of 8th I started hanging out with whom you may call the "cool" kids… and I also hung out with some stoners, just for variety. I pierced various parts of my body and kept my grades up. Now, I'm just trying to find who I am. I'm even doing my sophomore year in China so I can get a better view of what I want. (Answerbag, 2007)*

Responses like this one demonstrate the extent to which adolescents are developing their self-concepts and self-identities and how they rely on peers to help them do that. The writer here is trying out several (perhaps conflicting) identities, and the identities any teen experiments with are defined by the group the person chooses to be a part of. The friendship groups (cliques, crowds, or gangs) that are such an important part of the adolescent experience allow the young adult to try out different identities, and these groups provide a sense of belonging and acceptance (Rubin, Bukowski, & Parker, 2006). A big part of what the adolescent is learning is **social identity**, *the part of the self-concept that is derived from one's group memberships*. Adolescents define their social identities according to how they are similar to and differ from others, finding meaning in the sports, religious, school, gender, and ethnic categories they belong to.

Developing Moral Reasoning: Kohlberg's Theory

The independence that comes with adolescence requires independent thinking as well as the development of **morality** — *standards of behaviour that are generally agreed on within a culture to be right or proper*. Just as Piaget believed that children's cognitive development follows specific patterns, Lawrence Kohlberg (1984) argued that children learn their moral values through active thinking and reasoning, and that moral development follows a series of stages. To study moral development, Kohlberg posed moral dilemmas to children, teenagers, and adults, such as the following:

In Europe, a woman was near death from a special kind of cancer. There was one drug that the doctors thought might save her. It was a form of radium that a druggist in the same town had recently discovered. The drug was expensive to make, but the druggist was charging 10 times what the drug cost him to make. He paid $400 for the radium and charged $4,000 for a small dose of the drug. The sick woman's husband, Heinz, went to everyone he knew to borrow the money and tried every legal means, but he could only get together about $2,000, which is half of what it cost. He told the druggist that his wife was dying and asked him to sell it cheaper or let him pay later. But the druggist said, "No, I discovered the drug and I'm going to make money from it." So, having tried every legal means, Heinz gets desperate and considers breaking into the man's store to steal the drug for his wife.

1. Should Heinz steal the drug? Why or why not?
2. Is it actually right or wrong for him to steal the drug? Why is it right or wrong?
3. Does Heinz have a duty or obligation to steal the drug? Why or why not? (Kohlberg, 1984)

Video: *People Being Interviewed About Kohlberg's Stages* [https://youtu.be/zY4etXWYS84]



As you can see in Table 14.5, “Lawrence Kohlberg’s Stages of Moral Reasoning,” Kohlberg concluded, on the basis of their responses to the moral questions, that, as children develop intellectually, they pass through **three stages of moral thinking**: the *preconventional level*, the *conventional level*, and the *postconventional level*.

Table 14.5 Lawrence Kohlberg’s Stages of Moral Reasoning.

Age	Moral Stage	Description
Young children	Preconventional morality	Until about the age of nine, children focus on self-interest. At this stage, punishment is avoided and rewards are sought. A person at this level will argue, “The man shouldn’t steal the drug, as he may get caught and go to jail.”
Older children, adolescents, most adults	Conventional morality	By early adolescence, the child begins to care about how situational outcomes impact others and wants to please and be accepted. At this developmental phase, people are able to value the good that can be derived from holding to social norms in the form of laws or less formalized rules. For example, a person at this level may say, “He should not steal the drug, as everyone will see him as a thief, and his wife, who needs the drug, wouldn’t want to be cured because of thievery,” or, “No matter what, he should obey the law because stealing is a crime.”
Many adults	Postconventional morality	At this stage, individuals employ abstract reasoning to justify behaviours. Moral behaviour is based on self-chosen ethical principles that are generally comprehensive and universal, such as justice, dignity, and equality. Someone with self-chosen principles may say, “The man should steal the drug to cure his wife and then tell the authorities that he has done so. He may have to pay a penalty, but at least he has saved a human life.”

Although research has supported Kohlberg’s idea that moral reasoning changes from an early emphasis on punishment and social rules and regulations to an emphasis on more general ethical principles, as with Piaget’s approach, Kohlberg’s stage model is probably too simple. For one, children may use higher levels of reasoning for some types of problems, but revert to lower levels in situations where doing so is more consistent with their goals or beliefs (Rest, 1979). Second, it has been argued that the stage model is particularly appropriate for Western, rather than non-Western, samples in which allegiance to social norms (such as respect for authority) may be particularly important (Haidt, 2001). And there is frequently little correlation between how children score on the moral stages and how they behave in real life.

Perhaps the most important critique of Kohlberg’s theory is that it may describe the moral development of boys better than it describes that of girls. Carol Gilligan (1982) has argued that, because of differences in their socialization, males tend to value principles of justice and rights, whereas females value caring for and helping others. Although there is little evidence that boys and girls score differently on Kohlberg’s stages of moral development (Turiel, 1998), it is true that girls and women tend to focus more on issues of caring, helping, and connecting with others than do boys and men (Jaffee & Hyde, 2000). If you don’t believe this, ask yourself when you last got a thank-you note from a man.

Key Takeaways

- Adolescence is the period of time between the onset of puberty and emerging adulthood.
- Emerging adulthood is the period from age 18 years until the mid-20s in which young people begin to form bonds outside the family, attend university, and find work. Even so, they tend not to be fully independent and have not taken on all the responsibilities of adulthood. This stage is most prevalent in Western cultures.
- Puberty is a developmental period in which hormonal changes cause rapid physical alterations in the body.
- The cerebral cortex continues to develop during adolescence and early adulthood, enabling improved reasoning, judgment, impulse control, and long-term planning.
- A defining aspect of adolescence is the development of a consistent and committed self-identity. The process of developing an identity can take time but most adolescents succeed in developing a stable identity.
- Kohlberg's theory proposes that moral reasoning is divided into the following stages: preconventional morality, conventional morality, and postconventional morality.
- Kohlberg's theory of morality has been expanded and challenged, particularly by Gilligan, who has focused on differences in morality between boys and girls.

Exercises and Critical Thinking

1. Based on what you learned in this chapter, do you think that people should be allowed to drive at age 16? Why or why not? At what age do you think they should be allowed to vote and to drink alcohol?
2. Think about your experiences in high school. What sort of cliques or crowds were there? How did people express their identities in these groups? How did you use your groups to define yourself and develop your own identity?

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14.5: Early and Middle Adulthood- Building Effective Lives

Charles Stangor and Jennifer Walinga

Learning Objectives

- Review the physical and cognitive changes that accompany early and middle adulthood.

Until the 1970s, psychologists tended to treat adulthood as a single developmental stage, with few or no distinctions made between the various periods that we pass through between adolescence and death. Present-day psychologists realize, however, that physical, cognitive, and emotional responses continue to develop throughout life, with corresponding changes in our social needs and desires. Thus the three stages of *early adulthood*, *middle adulthood*, and *late adulthood* each have their own physical, cognitive, and social challenges.

In this section, we will consider the development of our cognitive and physical aspects that occur during **early adulthood** and **middle adulthood** — roughly *the ages between 25 and 45 and between 45 and 65, respectively*. These stages represent a long period of time — longer, in fact, than any of the other developmental stages — and the bulk of our lives is spent in them. These are also the periods in which most of us make our most substantial contributions to society, by meeting two of Erik Erikson's life challenges: we learn to give and receive love in a close, long-term relationship, and we develop an interest in guiding the development of the next generation, often by becoming parents.

Psychology in Everyday Life: What Makes a Good Parent?

One thing that you may have wondered about as you grew up, and which you may start to think about again if you decide to have children yourself, concerns the skills involved in parenting. Some parents are strict, others are lax; some parents spend a lot of time with their kids, trying to resolve their problems and helping to keep them out of dangerous situations, whereas others leave their children with nannies or in day care. Some parents hug and kiss their kids and say that they love them over and over every day, whereas others never do. Do these behaviours matter? And what makes a "good parent"?

We have already considered two answers to this question, in the form of what all children require: (a) babies need a conscientious mother who does not smoke, drink, or use drugs during her pregnancy, and (b) infants need caretakers who are consistently available, loving, and supportive to help them form a secure base. One case in which these basic goals are less likely to be met is when the mother is an adolescent. Adolescent mothers are more likely to use drugs and alcohol during their pregnancies, to have poor parenting skills in general, and to provide insufficient support for the child (Ekéus, Christensson, & Hjern, 2004). As a result, the babies of adolescent mothers have higher rates of academic failure, delinquency, and incarceration in comparison to children of older mothers (Moore & Brooks-Gunn, 2002).

Normally, it is the mother who provides early attachment, but fathers are not irrelevant. In fact, studies have found that children whose fathers are more involved tend to be more cognitively and socially competent, more empathetic, and psychologically better adjusted, compared with children whose fathers are less involved (Rohner & Veneziano, 2001). In fact, Amato (1994) found that, in some cases, the role of the father can be as important as, or even more important than, that of the mother in the child's overall psychological health and well-being. Amato concluded, "Regardless of the quality of the mother-child relationship, the closer adult offspring were to their fathers, the happier, more satisfied, and less distressed they reported being" (p. 1039).

As the child grows, parents take on one of four types of **parenting styles** — *parental behaviours that determine the nature of parent-child interactions* and that guide their interaction with the child. These styles depend on whether the parent is more or less *demanding* and more or less *responsive* to the child (see Figure 14.9, "Parenting Styles"). **Authoritarian parents** are *demanding but not responsive*. They impose rules and expect obedience, tending to give orders ("Eat your food!") and enforcing their commands with rewards and punishment, without providing any explanation of where the rules came from except "Because I said so!" **Permissive parents**, on the other hand, tend to *make few demands and give little punishment, but they are responsive in the sense that they generally allow their children to make their own rules*. **Authoritative parents** are *demanding* ("You must be home by curfew"), *but they are also responsive to the needs and opinions of the child* ("Let's discuss

what an appropriate curfew might be"). They set rules and enforce them, but they also explain and discuss the reasons behind the rules. Finally, **rejecting-neglecting parents** are *undemanding and unresponsive overall*.

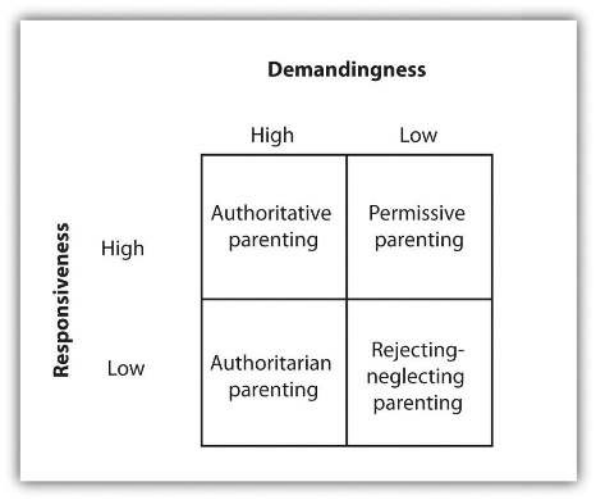


Figure 14.9 Parenting Styles. Parenting styles can be divided into four types, based on the combination of demandingness and responsiveness. The authoritative style, characterized by both responsiveness and also demandingness, is the most effective.
[Long Description]

Many studies of children and their parents, using different methods, measures, and samples, have reached the same conclusion — namely, that authoritative parenting, in comparison to the other three styles, is associated with a wide range of psychological and social advantages for children. Parents who use the authoritative style, with its combination of demands on the children as well as responsiveness to the children's needs, have kids who show better psychological adjustment, school performance, and psychosocial maturity compared with the kids of parents who use the other styles (Baumrind, 1996; Grolnick & Ryan, 1989).On the other hand, there are cultural differences in parenting styles. In a study comparing parenting styles in Canada, France, and Italy, Michael Claes and colleagues at the University of Montreal found Canadian parents to be the most tolerant, having fewer rules and disciplinary actions. Canadian mothers and fathers were seen as less punitive, less coercive, and more tolerant than French and Italian mothers. The French were found to parent in a moderate style. French fathers, however, were perceived by teens as emotionally distant, rigid, and prone to intergenerational conflict. French mothers, for their part, were reported to foster closer bonds as their children grew into adolescence (Claes et al., 2011).

In all three countries, teens experienced a gradual decrease in behavioural control between the ages of 11 and 19: fathers and mothers reduced requirements and disciplinary constraints. "Our study found parental control is dictated by social codes and culture-specific values, which promote certain parental practices and proscribe others," says Dr. Claes, noting that Canadian parents value a democratic conception of education that promotes independence and negotiation, while European parents, especially Italians, advocate for obligations and respect for parental authority (Science Daily, 2010).Despite the fact that different parenting styles are differentially effective overall, every child is different and parents must be adaptable. Some children have particularly difficult temperaments, and these children require more parenting. Because these difficult children demand more parenting, the behaviours of the parents matter more for the children's development than they do for other, less demanding children who require less parenting overall (Pluess & Belsky, 2010). These findings remind us how the behaviour of the child can influence the behaviour of the people in his or her environment.Although the focus is on the child, the parents must never forget about each other. Parenting is time-consuming and emotionally taxing, and the parents must work together to create a relationship in which both mother and father contribute to the household tasks and support each other. It is also important for the parents to invest time in their own intimacy, as happy parents are more likely to stay together, and divorce has a profoundly negative impact on children, particularly during and immediately after the divorce (Burt, Barnes, McGue, & Iacono, 2008; Ge, Natsuaki, & Conger, 2006).

Physical and Cognitive Changes in Early and Middle Adulthood

Compared with the other stages, the physical and cognitive changes that occur in the stages of early and middle adulthood are less dramatic. As individuals pass into their 30s and 40s, their recovery from muscular strain becomes more prolonged, and their sensory abilities may become somewhat diminished, at least when compared with their prime years, during the teens and early 20s (Panno, 2004). Visual acuity diminishes somewhat, and many people in their late 30s and early 40s begin to notice that their eyes are changing and they need eyeglasses. Adults in their 30s and 40s may also begin to suffer some hearing loss because of damage to the hair cells (*cilia*) in the inner ear (Lacher-Fougëre & Demany, 2005). And it is during middle adulthood that many people first begin to suffer from ailments such as high cholesterol and high blood pressure as well as low bone density (Shelton, 2006). Corresponding to changes in our physical abilities, our cognitive and sensory abilities also seem to show some, but not dramatic, decline during this stage.

Menopause

The stages of both early and middle adulthood bring about a gradual decline in fertility, particularly for women. Eventually, women experience **menopause**, *the cessation of the menstrual cycle*, which usually occurs at around age 50. Menopause occurs because of the gradual decrease in the production of the female sex hormones estrogen and progesterone, which slows the production and release of eggs into the uterus. Women whose menstrual cycles have stopped for 12 consecutive months are considered to have entered menopause (Minkin & Wright, 2004).

Researchers have found that women's responses to menopause are social as well as physical, and that they vary substantially between both individuals and cultures. Within individuals, some women may react more negatively to menopause, worrying that they have lost their femininity and that their final chance to bear children is over, whereas other women may regard menopause more positively, focusing on the new freedom from menstrual discomfort and unwanted pregnancy. In Western cultures such as in Canada, women are likely to see menopause as a challenging and potentially negative event, whereas in India, where older women enjoy more social privileges than do younger ones, menopause is more positively regarded (Avis & Crawford, 2008).

Menopause may have evolutionary benefits. Infants have better chances of survival when their mothers are younger and have more energy to care for them, and the presence of older women who do not have children of their own to care for (but who can help out with raising grandchildren) can be beneficial to the family group. Also consistent with the idea of an evolutionary benefit of menopause is that the decline in fertility occurs primarily for women, who do most of the child care and who need the energy of youth to accomplish it. If older women were able to have children, they might not be as able to effectively care for them. Most men never completely lose their fertility, but they do experience a gradual decrease in testosterone levels, sperm count, and speed of erection and ejaculation.

Social Changes in Early and Middle Adulthood

Perhaps the major marker of adulthood is the ability to create an effective and independent life. Whereas children and adolescents are generally supported by parents, adults must make their own living and must start their own families. Furthermore, the needs of adults are different from those of younger persons.

Even though the timing of the major life events that occur in early and middle adulthood varies substantially among individuals, the events nevertheless tend to follow a general sequence, known as a social clock. The **social clock** refers to *the culturally preferred "right time" for major life events, such as moving out of the childhood house, getting married, and having children*. People who do not appear to be following the social clock (e.g., young adults who still live with their parents, individuals who never marry, and couples who choose not to have children) may be seen as unusual or deviant, and they may be stigmatized by others (DePaulo, 2006; Rook, Catalano, & Dooley, 1989).

Although they are doing it later, on average, than they did even 20 or 30 years ago, most people do eventually marry. Marriage is beneficial to the partners, both in terms of mental health and physical health. People who are married report greater life satisfaction than those who are not married and also suffer fewer health problems (Gallagher & Waite, 2001; Liu & Umberson, 2008).

Divorce is more common now than it was 50 years ago. Fluctuating between 35% and 42%, the proportion of marriages projected to end in divorce has remained relatively stable during the last 20 years in Canada. In 2008, 40.7% of marriages were projected to end in divorce before the 30th wedding anniversary (Statistics Canada, 2011), although about three-quarters of people who divorce

will remarry. Most divorces occur for couples in their 20s, because younger people are frequently not mature enough to make good marriage choices or to make marriages last. Marriages are more successful for older adults and for those with more education (Goodwin, Mosher, & Chandra, 2010).

Parenthood also involves a major and long-lasting commitment, and one that can cause substantial stress on the parents. The time and finances invested in children create stress, which frequently results in decreased marital satisfaction (Twenge, Campbell, & Foster, 2003). This decline is especially true for women, who bear the larger part of the burden of raising the children and taking care of the house, despite the fact they increasingly also work and have careers.

Despite the challenges of early and middle adulthood, the majority of middle-aged adults are not unhappy. These years are often very satisfying, as families have been established, careers have been entered into, and some percentage of life goals has been realized (Eid & Larsen, 2008).

Key Takeaways

- It is in early and middle adulthood that muscle strength, reaction time, cardiac output, and sensory abilities begin to decline.
- One of the key signs of aging in women is the decline in fertility, culminating in menopause, which is marked by the cessation of the menstrual period.
- The different social stages in adulthood, such as marriage, parenthood, and work, are loosely determined by a social clock, a culturally recognized time for each phase.

Exercises and Critical Thinking

1. Compare your behaviour, values, and attitudes regarding marriage and work to the attitudes of your parents and grandparents. In what way are your values similar? In what ways are they different?
2. Draw a timeline of your own planned or preferred social clock. What factors do you think will make it more or less likely that you will be able to follow the timeline?

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Long Descriptions

Figure 14.9 long description: Parenting Styles

	High Demands	Low Demands
High Responsiveness	Authoritative parenting	Permissive parenting
Low Responsiveness	Authoritarian parenting	Rejecting-neglecting parenting

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14.6: Late Adulthood- Aging, Retiring, and Bereavement

Charles Stangor and Jennifer Walinga

Learning Objectives

- Review the physical, cognitive, and social changes that accompany late adulthood.
- Describe the psychological and physical outcomes of bereavement.

We have seen that, over the course of their lives, most individuals are able to develop secure attachments; reason cognitively, socially, and morally; and create families and find appropriate careers. Eventually, however, as people enter into their 60s and beyond, the aging process leads to faster changes in our physical, cognitive, and social capabilities and needs, and life begins to come to its natural conclusion, resulting in *the final life stage, beginning in the 60s*, known as **late adulthood**.

Despite the fact that the body and mind are slowing, most older adults nevertheless maintain an active lifestyle, remain as happy as they were when younger — or are happier — and increasingly value their social connections with family and friends (Angner, Ray, Saag, & Allison, 2009). Kennedy, Mather, and Carstensen (2004) found that people's memories of their lives became more positive with age, and Myers and Diener (1996) found that older adults tended to speak more positively about events in their lives, particularly their relationships with friends and family, than did younger adults.

Cognitive Changes During Aging

The changes associated with aging do not affect everyone in the same way, and they do not necessarily interfere with a healthy life. Former Beatles drummer Ringo Starr celebrated his 70th birthday in 2010 by playing at Radio City Music Hall, and Rolling Stones singer Mick Jagger (who once supposedly said, "I'd rather be dead than singing 'Satisfaction' at 45") continues to perform even as he turned 70 in 2013. The golfer Tom Watson almost won the 2010 British Open golf tournament at the age of 59, playing against competitors in their 20s and 30s. And people such as the financier Warren Buffett; Jim Pattison, a prominent Vancouver philanthropist; Hazel McCallion, mayor of Mississauga in Ontario for over 35 years; and actress Betty White, all in their 80s or 90s, all enjoy highly productive and energetic lives.

Researchers are beginning to better understand the factors that allow some people to age better than others. For one, research has found that the people who are best able to adjust well to changing situations early in life are also able to better adjust later in life (Rubin, 2007; Sroufe, Collins, Egeland, & Carlson, 2009). Perceptions also matter. People who believe that the elderly are sick, vulnerable, and grumpy often act according to such beliefs (Nemmers, 2005), and Levy, Slade, Kunkel, and Kasl (2002) found that the elderly who had more positive perceptions about aging also lived longer.

Research on the influence of cultural values and beliefs on aging attitudes has been dominated by comparisons between Eastern/Asian versus Western cultures. This belief is inspired by the idea that Asian societies are influenced by Confucian values of filial piety and the practice of ancestor worship, which are thought to promote positive views of aging and high esteem for older adults (Davis, 1983; Ho, 1994; Sher, 1984). Western societies, in contrast, were thought to be youth-oriented and to hold more negative views about the aging process and the elderly (Palmore, 1975). Empirical evidence for the proposed East-West differences is scarce. Although some studies have found support for the notion that aging attitudes are more positive in Asian as compared to Western cultures (Levy & Langer, 1994; Tan, Zhang, & Fan, 2004), others report effects in the opposite direction (Giles et al., 2000; Harwood et al., 2001; Sharps, Price-Sharps, & Hanson, 1998; Zhou, 2007), or fail to find any marked cultural differences (Boduroglu, Yoon, Luo, & Park, 2006; Ryan, Jin, Anas, & Luh, 2004).

Whereas it was once believed that almost all older adults suffered from a generalized memory loss, research now indicates that healthy older adults actually experience only some particular types of memory deficits, while other types of memory remain relatively intact or may even improve with age. Older adults do seem to process information more slowly — it may take them longer to evaluate information and to understand language, and it takes them longer, on average, than it does younger people, to recall a word that they know, even though they are perfectly able to recognize the word once they see it (Burke, Shafto, Craik, & Salthouse, 2008). Older adults also have more difficulty inhibiting and controlling their attention (Persad, Abeles, Zacks, & Denburg, 2002), making them, for example, more likely to talk about topics that are not relevant to the topic at hand when conversing (Pushkar et al., 2000).

But slower processing and less accurate executive control do not always mean worse memory, or even worse intelligence. Perhaps the elderly are slower in part because they simply have more knowledge. Indeed, older adults have more **crystallized intelligence** — that is, *general knowledge about the world, as reflected in semantic knowledge, vocabulary, and language*. As a result, adults generally outperform younger people on measures of history, geography, and even on crossword puzzles, where this information is useful (Salthouse, 2004). It is this superior knowledge combined with a slower and more complete processing style, along with a more sophisticated understanding of the workings of the world around them, that gives the elderly the advantage of wisdom over the advantages of **fluid intelligence** — *the ability to think and acquire information quickly and abstractly* — which favour the young (Baltes, Staudinger, & Lindenberger, 1999; Scheibe, Kunzmann, & Baltes, 2009).

The differential changes in crystallized versus fluid intelligence help explain why the elderly do not necessarily show poorer performance on tasks that also require experience (i.e., crystallized intelligence), although they show poorer memory overall. A young chess player may think more quickly, for instance, but a more experienced chess player has more knowledge to draw on. Older adults are also more effective at understanding the nuances of social interactions than younger adults are, in part because they have more experience in relationships (Blanchard-Fields, Mienaltowski, & Seay, 2007).

Dementia and Alzheimer's Disease

Some older adults suffer from biologically based cognitive impairments in which the brain is so adversely affected by aging that it becomes very difficult for the person to continue to function effectively. **Dementia** is defined as *a progressive neurological disease that includes loss of cognitive abilities significant enough to interfere with everyday behaviours*, and **Alzheimer's disease** is *a form of dementia that, over a period of years, leads to a loss of emotions, cognitions, and physical functioning, and that is ultimately fatal*. Dementia and Alzheimer's disease are most likely to be observed in individuals who are 65 and older, and the likelihood of developing Alzheimer's doubles about every five years after age 65. After age 85, the risk reaches nearly 8% per year (Hebert et al., 1995). Dementia and Alzheimer's disease both produce a gradual decline in functioning of the brain cells that produce the neurotransmitter acetylcholine. Without this neurotransmitter, the neurons are unable to communicate, leaving the brain less and less functional, as shown in Figure 14.10.

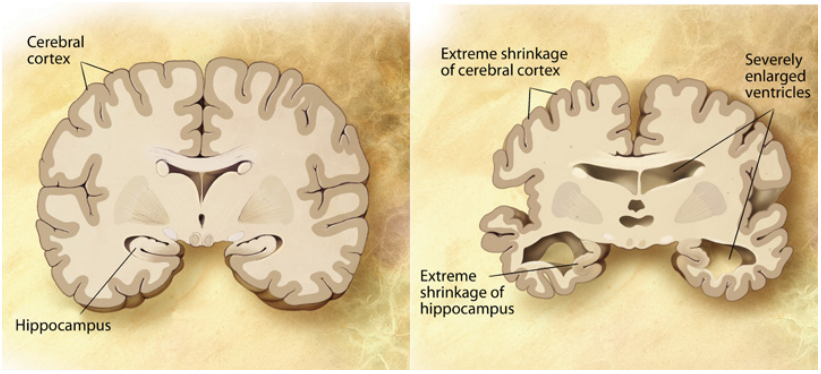


Figure 14.10 Brains. A healthy brain (left) versus a brain with advanced Alzheimer's disease (right).

Dementia and Alzheimer's are in part heritable, but there is increasing evidence that the environment also plays a role. And current research is helping us understand the things that older adults can do to help them slow down or prevent the negative cognitive outcomes of aging, including dementia and Alzheimer's (Pushkar, Bukowski, Schwartzman, Stack, & White, 2007). Older adults who continue to keep their minds active by engaging in cognitive activities, such as reading, playing musical instruments, attending lectures, or doing crossword puzzles, who maintain social interactions with others, and who keep themselves physically fit have a greater chance of maintaining their mental acuity than those who do not (Cherkas et al., 2008; Verghese et al., 2003). In short, although physical illnesses may occur to anyone, the more people keep their brains active and the more they maintain a healthy and active lifestyle, the more healthy their brains will remain (Ertel, Glymour, & Berkman, 2008).

Social Changes During Aging: Retiring Effectively

Because of increased life expectancy in the 21st century, elderly people can expect to spend approximately a quarter of their lives in retirement. Leaving one's career is a major life change and can be a time when people experience anxiety, depression, and other negative changes in the self-concept and in self-identity. On the other hand, retirement may also serve as an opportunity for a

positive transition from work and career roles to stronger family and community member roles, and the latter may have a variety of positive outcomes for the individual. Retirement may be a relief for people who have worked in boring or physically demanding jobs, particularly if they have other outlets for stimulation and expressing self-identity.

Psychologist Mo Wang (2007) observed the well-being of 2,060 people between the ages of 51 and 61 over an eight-year period and made the following recommendations to make the retirement phase a positive one:

1. Continue to work part-time past retirement in order to ease into retirement status slowly.
2. Plan for retirement — this is a good idea financially, but also making plans to incorporate other kinds of work or hobbies into post-employment life makes sense.
3. Retire with someone — if the retiree is still married, it is a good idea to retire at the same time as a spouse, so that people can continue to work part-time and follow a retirement plan together.
4. Have a happy marriage — people with marital problems tend to find retirement more stressful because they do not have a positive home life to return to and can no longer seek refuge in long working hours. Couples that work on their marriages can make their retirements a lot easier.
5. Take care of physical and financial health — a sound financial plan and good physical health can ensure a healthy, peaceful retirement.
6. Retire early from a stressful job — people who stay in stressful jobs for fear that they will lose their pensions or won't be able to find work somewhere else feel trapped. Toxic environments can take a severe emotional toll on an employee. Leaving an unsatisfying job early may make retirement a relief.
7. Retire "on time" — retiring too early or too late can cause people to feel "out of sync" or to feel they have not achieved their goals.

Whereas these seven tips are helpful for a smooth transition to retirement, Wang also notes that people tend to be adaptable, and that no matter how they do it, retirees will eventually adjust to their new lifestyles.

Death, Dying, and Bereavement

Living includes dealing with our own and our loved ones' mortality. In her book *On Death and Dying* (1997), Elisabeth Kübler-Ross describes five phases of grief through which people pass in grappling with the knowledge that they or someone close to them is dying:

1. Denial: "I feel fine." "This can't be happening; not to me."
2. Anger: "Why me? It's not fair!" "How can this happen to me?" "Who is to blame?"
3. Bargaining: "Just let me live to see my children graduate." "I'd do anything for a few more years." "I'd give my life savings if…"
4. Depression: "I'm so sad, why bother with anything?" "I'm going to die. What's the point?" "I miss my loved ones — why go on?"
5. Acceptance: "I know my time has come; it's almost my time."

Despite Kübler-Ross's popularity, there are a growing number of critics of her theory who argue that her five-stage sequence is too constraining because attitudes toward death and dying have been found to vary greatly across cultures and religions, and these variations make the process of dying different according to culture (Bonanno, 2009). As an example, Japanese Americans restrain their grief (Corr, Nabe, & Corr, 2009) so as not to burden other people with their pain. By contrast, Jews observe a seven-day, publicly announced mourning period. In some cultures the elderly are more likely to be living and coping alone, or perhaps only with their spouse, whereas in other cultures, such as the Hispanic culture, the elderly are more likely to be living with their sons and daughters and other relatives, and this social support may create a better quality of life for them (Diaz-Cabello, 2004).

Margaret Stroebe and her colleagues (2008) found that although most people adjusted to the loss of a loved one without seeking professional treatment, many had an increased risk of mortality, particularly within the early weeks and months after the loss. These researchers also found that people going through the grieving process suffered more physical and psychological symptoms and illnesses and used more medical services.

The health of survivors during the end of life is influenced by factors such as circumstances surrounding the loved one's death, individual personalities, and ways of coping. People serving as caretakers to partners or other family members who are ill

frequently experience a great deal of stress themselves, making the dying process even more stressful. Despite the trauma of the loss of a loved one, people do recover and are able to continue with effective lives. Grief intervention programs can go a long way in helping people cope during the bereavement period (Neimeyer, Holland, Currier, & Mehta, 2008).

Key Takeaways

- Most older adults maintain an active lifestyle, remain as happy as they were when younger, or happier, and increasingly value their social connections with family and friends.
- Although older adults have slower cognitive processing overall (fluid intelligence), their experience in the form of crystallized intelligence — or existing knowledge about the world and the ability to use it — is maintained and even strengthened during old age.
- Expectancies about change in aging vary across cultures and may influence how people respond to getting older.
- A portion of the elderly suffer from age-related brain diseases, such as dementia, a progressive neurological disease that includes significant loss of cognitive abilities, and Alzheimer's disease, a fatal form of dementia that is related to changes in the cerebral cortex.
- Two significant social stages in late adulthood are retirement and dealing with grief and bereavement. Studies show that a well-planned retirement can be a pleasant experience.
- A significant number of people going through the grieving process are at increased risk of mortality and physical and mental illness, but grief counselling can be effective in helping these people cope with their loss.

Exercises and Critical Thinking

1. How do the people in your culture view aging? What stereotypes are there about the elderly? Are there other ways that people in your society might learn to think about aging that would be more beneficial?
2. Based on the information you have read in this chapter, what would you tell your parents about how they can best maintain healthy physical and cognitive function into late adulthood?

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14.7: Gender

Christia Spears Brown and Jennifer A. Jewell

This module discusses gender and its related concepts, including sex, gender roles, gender identity, sexual orientation, and sexism. In addition, this module includes a discussion of differences that exist between males and females and how these real gender differences compare to the stereotypes society holds about gender differences. In fact, there are significantly fewer real gender differences than one would expect relative to the large number of stereotypes about gender differences. This module then discusses theories of how gender roles develop and how they contribute to strong expectations for gender differences. Finally, the module concludes with a discussion of some of the consequences of relying on and expecting gender differences, such as gender discrimination, sexual harassment, and ambivalent sexism.

Learning Objectives

- Distinguish gender and sex, as well as gender identity and sexual orientation.
- Discuss gender differences that exist, as well as those that do not actually exist.
- Understand and explain different theories of how gender roles are formed.
- Discuss sexism and its impact on both genders.

Introduction

Before we discuss gender in detail, it is important to understand what gender actually is. The terms sex and gender are frequently used interchangeably, though they have different meanings. In this context, **sex** refers to the biological category of male or female, as defined by physical differences in genetic composition and in reproductive anatomy and function. On the other hand, **gender** refers to the cultural, social, and psychological meanings that are associated with masculinity and femininity (Wood & Eagly, 2002). You can think of "male" and "female" as distinct categories of sex (a person is typically born a male or a female), but "masculine" and "feminine" as continuums associated with gender (everyone has a certain degree of masculine and feminine traits and qualities).

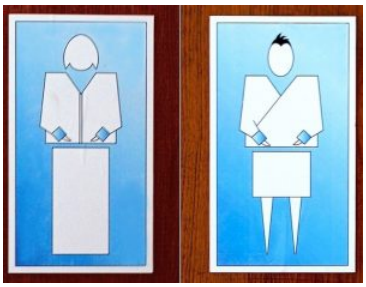


Figure 14.11 Gender refers to the cultural, social, and psychological meanings that are associated with masculinity and femininity.

Beyond sex and gender, there are a number of related terms that are also often misunderstood. **Gender roles** are the behaviors, attitudes, and personality traits that are designated as either masculine or feminine in a given culture. It is common to think of gender roles in terms of **gender stereotypes**, or the beliefs and expectations people hold about the typical characteristics, preferences, and behaviors of men and women. A person's **gender identity** refers to their psychological sense of being male or female. In contrast, a person's **sexual orientation** is the direction of their emotional and erotic attraction toward members of the opposite sex, the same sex, or both sexes. These are important distinctions, and though we will not discuss each of these terms in detail, it is important to recognize that sex, gender, gender identity, and sexual orientation do not always correspond with one another. A person can be biologically male but have a female gender identity while being attracted to women, or any other combination of identities and orientations.

Gender Differences

Differences between males and females can be based on (a) actual gender differences (i.e., men and women are actually different in some abilities), (b) gender roles (i.e., differences in how men and women are supposed to act), or (c) gender stereotypes (i.e.,

differences in how we *think* men and women are). Sometimes gender stereotypes and gender roles reflect actual gender differences, but sometimes they do not.

What are actual gender differences? In terms of language and language skills, girls develop language skills earlier and know more words than boys; this does not, however, translate into long-term differences. Girls are also more likely than boys to offer praise, to agree with the person they're talking to, and to elaborate on the other person's comments; boys, in contrast, are more likely than girls to assert their opinion and offer criticisms (Leaper & Smith, 2004). In terms of temperament, boys are slightly less able to suppress inappropriate responses and slightly more likely to blurt things out than girls (Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006).



Figure 14.12 Boys exhibit higher rates of unprovoked physical aggression than girls and are more likely to play organized rough-and-tumble games.

With respect to aggression, boys exhibit higher rates of unprovoked physical aggression than girls, but no difference in provoked aggression (Hyde, 2005). Some of the biggest differences involve the play styles of children. Boys frequently play organized rough-and-tumble games in large groups, while girls often play less physical activities in much smaller groups (Maccoby, 1998). There are also differences in the rates of depression, with girls much more likely than boys to be depressed after puberty. After puberty, girls are also more likely to be unhappy with their bodies than boys.

However, there is considerable variability between individual males and individual females. Also, even when there are mean level differences, the actual size of most of these differences is quite small. This means, knowing someone's gender does not help much in predicting his or her actual traits. For example, in terms of activity level, boys are considered more active than girls. However, 42% of girls are more active than the average boy (but so are 50% of boys; see Figure 14.13 for a depiction of this phenomenon in a comparison of male and female self-esteem). Furthermore, many gender differences do not reflect innate differences, but instead reflect differences in specific experiences and socialization. For example, one presumed gender difference is that boys show better spatial abilities than girls. However, Tzuriel and Egozi (2010) gave girls the chance to practice their spatial skills (by imagining a line drawing was different shapes) and discovered that, with practice, this gender difference completely disappeared.

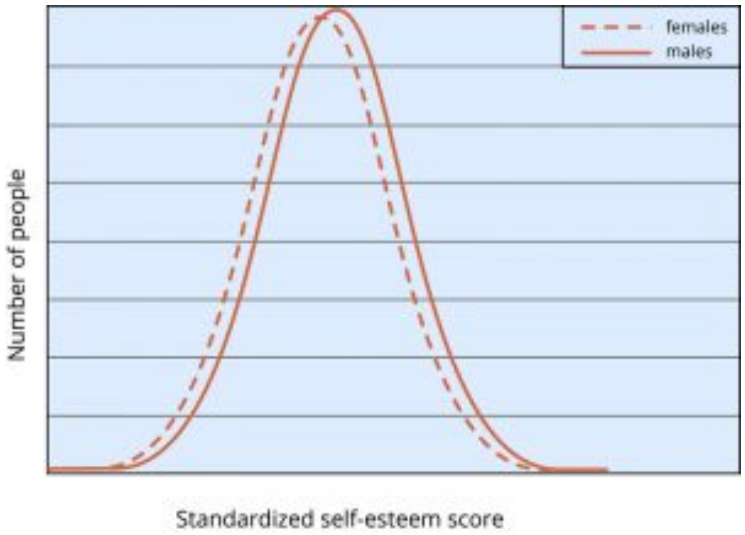


Figure 14.13 While our gender stereotypes paint males and females as drastically different from each other, even when a difference exists, there is considerable overlap in the presence of that trait between genders. This graph shows the average difference in self-esteem between boys and girls. Boys have a higher average self-esteem than girls, but the average scores are much more similar than different. Taken from Hyde (2005).

Many domains we assume differ across genders are really based on gender stereotypes and not actual differences. Based on large meta-analyses, the analyses of thousands of studies across more than one million people, research has shown: Girls are not more fearful, shy, or scared of new things than boys; boys are not more angry than girls and girls are not more emotional than boys; boys do not perform better at math than girls; and girls are not more talkative than boys (Hyde, 2005).

In the following sections, we'll investigate gender roles, the part they play in creating these stereotypes, and how they can affect the development of real gender differences.

Gender Roles

As mentioned earlier, gender roles are well-established social constructions that may change from culture to culture and over time. In American culture, we commonly think of gender roles in terms of **gender stereotypes**, or the beliefs and expectations people hold about the typical characteristics, preferences, and behaviors of men and women.

By the time we are adults, our gender roles are a stable part of our personalities, and we usually hold many gender stereotypes. When do children start to learn about gender? Very early. By their first birthday, children can distinguish faces by gender. By their second birthday, they can label others' gender and even sort objects into gender-typed categories. By the third birthday, children can consistently identify their own gender (see Martin, Ruble, & Szkrybalo, 2002, for a review). At this age, children believe sex is determined by external attributes, not biological attributes. Between 3 and 6 years of age, children learn that gender is constant and can't change simply by changing external attributes, having developed **gender constancy**. During this period, children also develop strong and rigid gender stereotypes. Stereotypes can refer to play (e.g., boys play with trucks, and girls play with dolls), traits (e.g., boys are strong, and girls like to cry), and occupations (e.g., men are doctors and women are nurses). These stereotypes stay rigid until children reach about age 8 or 9. Then they develop cognitive abilities that allow them to be more flexible in their thinking about others.

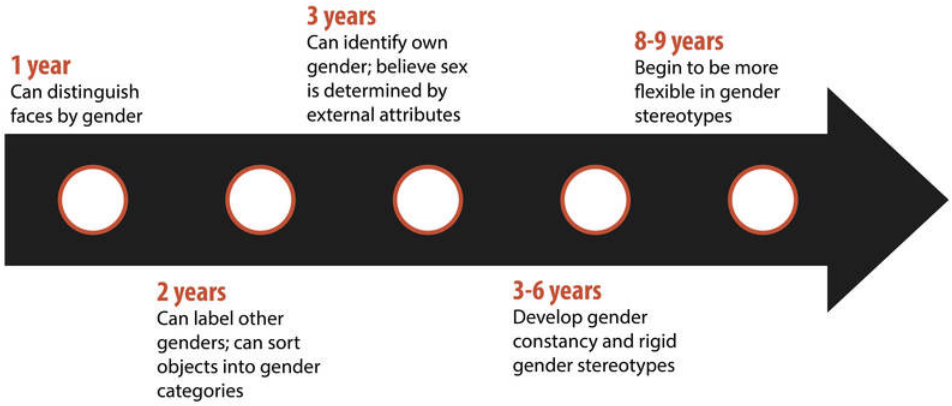


Figure 14.14 Children develop the ability to classify gender very early in life.

How do our gender roles and gender stereotypes develop and become so strong? Many of our gender stereotypes are so strong because we emphasize gender so much in culture (Bigler & Liben, 2007). For example, males and females are treated differently before they are even born. When someone learns of a new pregnancy, the first question asked is "Is it a boy or a girl?" Immediately upon hearing the answer, judgments are made about the child: Boys will be rough and like blue, while girls will be delicate and like pink. **Developmental intergroup theory** postulates that adults' heavy focus on gender leads children to pay attention to gender as a key source of information about themselves and others, to seek out any possible gender differences, and to form rigid stereotypes based on gender that are subsequently difficult to change.



Figure 14.15 People are more likely to remember schema-consistent behaviors and attributes than schema-inconsistent behaviors and attributes. For example, people are more likely to remember men, and forget women, who are firefighters.

There are also psychological theories that partially explain how children form their own gender roles after they learn to differentiate based on gender. The first of these theories is **gender schema theory**. Gender schema theory argues that children are active learners who essentially socialize themselves. In this case, children actively organize others' behavior, activities, and attributes into gender categories, which are known as **schemas**. These schemas then affect what children notice and remember later. People of all ages are more likely to remember schema-consistent behaviors and attributes than schema-inconsistent behaviors and attributes. So, people are more likely to remember men, and forget women, who are firefighters. They also misremember schema-inconsistent information. If research participants are shown pictures of someone standing at the stove, they are more likely to remember the person to be cooking if depicted as a woman, and the person to be repairing the stove if depicted as a man. By only remembering schema-consistent information, gender schemas strengthen more and more over time.

A second theory that attempts to explain the formation of gender roles in children is **social learning theory**. Social learning theory argues that gender roles are learned through reinforcement, punishment, and modeling. Children are rewarded and reinforced for behaving in concordance with gender roles and punished for breaking gender roles. In addition, social learning theory argues that children learn many of their gender roles by modeling the behavior of adults and older children and, in doing so, develop ideas about what behaviors are appropriate for each gender. Social learning theory has less support than gender schema theory—research

shows that parents do reinforce gender-appropriate play, but for the most part treat their male and female children similarly (Lytton & Romney, 1991).

Gender Sexism and Socialization

Treating boys and girls, and men and women, differently is both a *consequence* of gender differences and a *cause*of gender differences. Differential treatment on the basis of gender is also referred to **gender discrimination** and is an inevitable consequence of gender stereotypes. When it is based on unwanted treatment related to sexual behaviors or appearance, it is called **sexual harassment**. By the time boys and girls reach the end of high school, most have experienced some form of sexual harassment, most commonly in the form of unwanted touching or comments, being the target of jokes, having their body parts rated, or being called names related to sexual orientation.

Different treatment by gender begins with parents. A meta-analysis of research from the United States and Canada found that parents most frequently treated sons and daughters differently by encouraging gender-stereotypical activities (Lytton & Romney, 1991). Fathers, more than mothers, are particularly likely to encourage gender-stereotypical play, especially in sons. Parents also talk to their children differently based on stereotypes. For example, parents talk about numbers and counting twice as often with sons than daughters (Chang, Sandhofer, & Brown, 2011) and talk to sons in more detail about science than with daughters. Parents are also much more likely to discuss emotions with their daughters than their sons.

Children do a large degree of socializing themselves. By age 3, children play in gender-segregated play groups and expect a high degree of conformity. Children who are perceived as gender atypical (i.e., do not conform to gender stereotypes) are more likely to be bullied and rejected than their more gender-conforming peers.

Gender stereotypes typically maintain gender inequalities in society. The concept of **ambivalent sexism** recognizes the complex nature of gender attitudes, in which women are often associated with positive and negative qualities (Glick & Fiske, 2001). It has two components. First, **hostile sexism** refers to the negative attitudes of women as inferior and incompetent relative to men. Second, **benevolent sexism** refers to the perception that women need to be protected, supported, and adored by men. There has been considerable empirical support for benevolent sexism, possibly because it is seen as more socially acceptable than hostile sexism. Gender stereotypes are found not just in American culture. Across cultures, males tend to be associated with stronger and more active characteristics than females (Best, 2001).

In recent years, gender and related concepts have become a common focus of social change and social debate. Many societies, including American society, have seen a rapid change in perceptions of gender roles, media portrayals of gender, and legal trends relating to gender. For example, there has been an increase in children's toys attempting to cater to both genders (such as Legos marketed to girls), rather than catering to traditional stereotypes. Nationwide, the drastic surge in acceptance of homosexuality and gender questioning has resulted in a rapid push for legal change to keep up with social change. Laws such as "Don't Ask, Don't Tell" and the Defense of Marriage Act (DOMA), both of which were enacted in the 1990s, have met severe resistance on the grounds of being discriminatory toward sexual minority groups and have been accused of unconstitutionality less than 20 years after their implementation. Change in perceptions of gender is also evident in social issues such as sexual harassment, a term that only entered the mainstream mindset in the 1991 Clarence Thomas/Anita Hill scandal. As society's gender roles and gender restrictions continue to fluctuate, the legal system and the structure of American society will continue to change and adjust.

Important Gender-related Events in the United States

1920 — *19th Amendment* (women's Suffrage Ratified)

1941-1945 — World War II forces millions of women to enter the workforce

1948 — Universal Declaration of Human Rights

1963 — Congress passes *Equal Pay Act*

1964 — Congress passes *Civil Rights Act*, which outlaws sex discrimination

1969 — Stonewall riots in NYC, forcing gay rights into the American spotlight

1972 –Congress passes *Equal Rights Amendment*; *TitleIX* prohibits sex discrimination is schools and sports

1973 — American Psychiatric Association removes homosexuality from the DSM

1981 — First woman appointed to the US Supreme Court

1987 — Average woman earned $0.68 for every $1.00 earned by a man

1992 — World Health Organization no longer considers homosexuality an illness

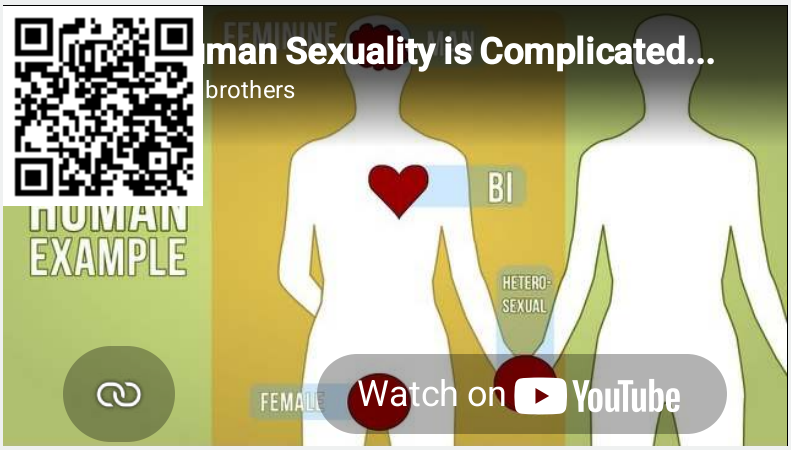
1993 — Supreme Court rules that sexual harassment in the workplace is illegal

2011 — *Don't Ask Don't Tell* is repealed, allowing people who identify as gay serve openly in the US military

2012 — President Barak Obama becomes the first American president to openly support LGBT rights and marriage equality

Outside Resources

Video: Human Sexuality is Complicated



Web: Big Think with Professor of Neuroscience Lise Eliot http://bigthink.com/users/liseeliot

Web: Understanding Prejudice: Sexism http://www.understandingprejudice.org/links/sexism.htm

Discussion Questions

1. What are the differences and associations among gender, sex, gender identity, and sexual orientation?
2. Are the gender differences that exist innate (biological) differences or are they caused by other variables?
3. Discuss the theories relating to the development of gender roles and gender stereotypes. Which theory do you support? Why?
4. Using what you've read in this module: a. Why do you think gender stereotypes are so inflated compared with actual gender differences? b. Why do you think people continue to believe in such strong gender differences despite evidence to the contrary?
5. Brainstorm additional forms of gender discrimination aside from sexual harassment. Have you seen or experienced gender discrimination personally?
6. How is benevolent sexism detrimental to women, despite appearing positive?

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14.8: Summary, Key Terms, and Self-Test

Charles Stangor, Jennifer Walinga, and Jorden A. Cummings

Summary

Development begins at conception when a sperm from the father fertilizes an egg from the mother, creating a new life. The resulting zygote grows into an embryo and then a fetus.

Babies are born prepared with reflexes and cognitive skills that contribute to their survival and growth.

Piaget's stage model of cognitive development proposes that children learn through assimilation and accommodation and that cognitive development follows specific sequential stages: sensorimotor, preoperational, concrete operational, and formal operational.

An important part of development is the attainment of social skills, including the formation of the self-concept and attachment.

Adolescence involves rapid physical changes, including puberty, as well as continued cognitive changes. Moral development continues in adolescence. In Western cultures, adolescence blends into emerging adulthood, the period from age 18 until the mid-20s.

Muscle strength, reaction time, cardiac output, and sensory abilities begin to slowly decline in early and middle adulthood. Fertility, particularly for women, also decreases, and women eventually experience menopause.

Most older adults maintain an active lifestyle — remaining as happy as they were when they were younger, or happier — and increasingly value their social connections with family and friends.

Although older adults have slower cognitive processing overall (fluid intelligence), their experience in the form of crystallized intelligence, or existing knowledge about the world and the ability to use it, is maintained and even strengthened during aging. A portion of the elderly suffer from age-related brain diseases, such as dementia and Alzheimer's disease.

Sex refers to the biological category of male or female, defined by physical differences in genetic composition and reproductive anatomy and function. Gender refers to the cultural, social, and psychological meanings that are associated with masculinity and femininity whereas gender identity refers to a person's psychological sense of being male or female. Gender roles are the behaviours, attitudes, and personality traits that are designated (by our culture) as either masculine or feminine and gender stereotypes are the beliefs and expectations people hold about the "typical" characteristics, preferences, and behaviours of men and women.

There are multiple theories about how our gender roles and gender stereotypes development. Developmental intergroup theory proposes that adults' heavy emphasis on gender leads children to pay attention to gender as a key source of information about themselves and others, to seek out possible gender differences, and to form rigid stereotypes based on gender that are subsequently difficult to change. Gender schema theory proposes that children are active learners who socialize themselves, by organizing others' behaviour, activities, and attributes into gender categories known as schemas. These schemas affect what children notice and remember later. Social learning theory argues that gender roles are learned through reinforcement, punishment, and modeling. Children are rewarded for gender conformity and punished for breaking gender roles.

Key Terms

- Accommodation
- Adolescence
- Alzheimer's Disease
- Ambivalent Attachment Style
- Ambivalent Sexism
- Amniotic Sac
- Assimilation
- Attachment
- Authoritarian Parents
- Authoritative Parents
- Autonomy
- Avoidant Attachment Style
- Benevolent Sexism
- Childhood
- Cohort Effects
- Community Learning
- Competence
- Conception
- Concrete Operational Stage
- Cross-Sectional Research Design
- Crystallized Intelligence
- Dementia
- Development
- Developmental Intergroup Theory
- Disorganized Attachment Style
- Early Adulthood
- Egocentric
- Embryo
- Estrogen
- Fetal Alcohol Syndrome (FAS)
- Fluid Intelligence
- Formal Operational Stage
- Gender
- Gender Constancy
- Gender Discrimination
- Gender Identity
- Gender Roles
- Gender Schema Theory
- Gender Stereotypes
- Habituation
- Habituation Procedure
- Hostile Sexism
- Imaginary Audience
- Infancy
- Late Adulthood
- Longitudinal Research Designs
- Menarche
- Menopause
- Middle Adulthood
- Morality
- Object Permanence
- Ovulation
- Parenting Styles
- Permissive Parents
- Placenta
- Preoperational Stage
- Primary Sex Characteristics
- Progesterone
- Puberty
- Rejecting-Neglecting Parents
- Schemas
- Secondary Sex Characteristics
- Secure Attachment Style
- Secure Base
- Self-Concept
- Sensorimotor Stage
- Sex
- Sexual Harassment
- Sexual Orientation
- Social Clock
- Social Comparison
- Social Identity
- Social Learning Theory
- Sociocultural Theory
- Strange Situation
- Temperament
- Teratogens
- Testosterone
- Theory of Mind
- Three Stages of Moral Thinking
- Umbilical Cord
- Zygote

Self-Test

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CHAPTER OVERVIEW

15: Culture

15.1: Introduction

15.2: Culture

15.3: Culture and Emotion

15.4: Summary, Key Terms, and Self-Test

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15.1: Introduction

Jorden A. Cummings

What comes to mind when you think of culture? It might be certain styles of dress, cuisine, or design. Ideas about differences in mannerisms, behaviours, or social acceptability might come to mind. Or, it might be aspects of your own culture that are meaningful to you. Our culture is a source of meaning for understanding the world. It is shared amongst the members of that culture and passed on to future generations. Our culture tells us messages about who we are, what role we should play in society, and what is acceptable. Many of the things we take for granted as "just how things should be" are due to our culture, such as our views of punishment, love, how we express our emotions, and our morality. Culture is often invisible and it can be hard to define, even for researchers.

In this chapter, we will discuss research methods that are used, primarily by social psychologists, to study culture, cultural psychology, and cross-cultural psychology. We will also review the differences between those three ideas. We'll talk about how we should define culture and what characteristics identify culture, ways in which we view culture, how culture influences us as individuals, and how we learn our culture. Much of the research on psychology about culture has compared individualist to collectivist cultures. We will also review how to define each of those and spend some time discussing some of the research findings about the two.

One of the most studied areas of culture is how cultural ideas and practices shape our emotions. Again, much of the research has compared individualist to collectivist societies. We will review the history of cross-cultural studies on emotion, talk about why culture and emotion matter, and learn about some of the current findings and future directions in this area of research.

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15.2: Culture

Robert Biswas-Diener, Neil Thin, and Lee Sanders

Although the most visible elements of culture are dress, cuisine and architecture, culture is a highly psychological phenomenon. Culture is a pattern of meaning for understanding how the world works. This knowledge is shared among a group of people and passed from one generation to the next. This module defines culture, addresses methodological issues, and introduces the idea that culture is a process. Understanding cultural processes can help people get along better with others and be more socially responsible.

Learning Objectives

- Appreciate culture as an evolutionary adaptation common to all humans.
- Understand cultural processes as variable patterns rather than as fixed scripts.
- Understand the difference between cultural and cross-cultural research methods.
- Appreciate cultural awareness as a source of personal well-being, social responsibility, and social harmony.
- Explain the difference between individualism and collectivism.
- Define “self-construal” and provide a real life example.

Introduction

When you think about different cultures, you likely picture their most visible features, such as differences in the way people dress, or in the architectural styles of their buildings. You might consider different types of food, or how people in some cultures eat with chopsticks while people in others use forks. There are differences in body language, religious practices, and wedding rituals. While these are all obvious examples of cultural differences, many distinctions are harder to see because they are psychological in nature.



Figure 15.1 Culture goes beyond the way people dress and the food they eat. It also stipulates morality, identity, and social roles.

Just as culture can be seen in dress and food, it can also be seen in morality, identity, and gender roles. People from around the world differ in their views of premarital sex, religious tolerance, respect for elders, and even the importance they place on having fun. Similarly, many behaviors that may seem innate are actually products of culture. Approaches to punishment, for example, often depend on cultural norms for their effectiveness. In the United States, people who ride public transportation without buying a ticket face the possibility of being fined. By contrast, in some other societies, people caught dodging the fare are socially shamed by having their photos posted publicly. The reason this campaign of “name and shame” might work in one society but not in another is that members of different cultures differ in how comfortable they are with being singled out for attention. This strategy is less effective for people who are not as sensitive to the threat of public shaming.

The psychological aspects of culture are often overlooked because they are often invisible. The way that gender roles are learned is a cultural process as is the way that people think about their own sense of duty toward their family members. In this module, you will be introduced to one of the most fascinating aspects of social psychology: the study of cultural processes. You will learn about

research methods for studying culture, basic definitions related to this topic, and about the ways that culture affects a person's sense of self.

Social Psychology Research Methods

Social psychologists are interested in the ways that cultural forces influence psychological processes. They study culture as a means of better understanding the ways it affects our emotions, identity, relationships, and decisions. Social psychologists generally ask different types of questions and use different methods than do anthropologists. Anthropologists are more likely to conduct **ethnographic studies**. In this type of research, the scientist spends time observing a culture and conducting interviews. In this way, anthropologists often attempt to understand and appreciate culture from the point of view of the people within it. Social psychologists who adopt this approach are often thought to be studying **cultural psychology**. They are likely to use interviews as a primary research methodology.

For example, in a 2004 study Hazel Markus and her colleagues wanted to explore class culture as it relates to well-being. The researchers adopted a cultural psychology approach and interviewed participants to discover—in the participants own words—what "the good life" is for Americans of different social classes. Dozens of participants answered 30 **open ended questions** about well-being during recorded, face-to-face interviews. After the interview data were collected the researchers then read the transcripts. From these, they agreed on common themes that appeared important to the participants. These included, among others, "health," "family," "enjoyment," and "financial security."

The Markus team discovered that people with a Bachelor's Degree were more likely than high school educated participants to mention "enjoyment" as a central part of the good life. By contrast, those with a high school education were more likely to mention "financial security" and "having basic needs met." There were similarities as well: participants from both groups placed a heavy emphasis on relationships with others. Their understanding of *how* these relationships are tied to well-being differed, however. The college educated—especially men—were more likely to list "advising and respecting" as crucial aspects of relationships while their high school educated counterparts were more likely to list "loving and caring" as important. As you can see, cultural psychological approaches place an emphasis on the participants' own definitions, language, and understanding of their own lives. In addition, the researchers were able to make comparisons between the groups, but these comparisons were based on loose themes created by the researchers.

Cultural psychology is distinct from **cross-cultural psychology**, and this can be confusing. **Cross-cultural studies** are those that use standard forms of measurement, such as Likert scales, to compare people from different cultures and identify their differences. Both cultural and cross-cultural studies have their own advantages and disadvantages (see Table 15.1).

	Ethnographic Study	Cross-Cultural Study
Advantages	Culturally sensitive, studies people in their natural environments	Able to make comparisons between groups
Disadvantages	Difficult to make comparisons between cultures	Vulnerable to ethnocentric bias

Table 15.1 Summary of advantages and disadvantages of ethnographic study and cross-cultural study.

Interestingly, researchers—and the rest of us!—have as much to learn from **cultural similarities** as **cultural differences**, and both require comparisons across cultures. For example, Diener and Oishi (2000) were interested in exploring the relationship between money and happiness. They were specifically interested in cross-cultural differences in levels of life satisfaction between people from different cultures. To examine this question they used international surveys that asked all participants the exact same question, such as "All things considered, how satisfied are you with your life as a whole these days?" and used a **standard scale** for answers; in this case one that asked people to use a 1-10 scale to respond. They also collected data on average income levels in each nation, and adjusted these for local differences in how many goods and services that money can buy.

The Diener research team discovered that, across more than 40 nations there was a tendency for money to be associated with higher life satisfaction. People from richer countries such as Denmark, Switzerland and Canada had relatively high satisfaction while their counterparts from poorer countries such as India and Belarus had lower levels. There were some interesting exceptions, however. People from Japan—a wealthy nation—reported lower satisfaction than did their peers in nations with similar wealth. In addition, people from Brazil—a poorer nation—had unusually high scores compared to their income counterparts.

One problem with cross-cultural studies is that they are vulnerable to **ethnocentric bias**. This means that the researcher who designs the study might be influenced by personal biases that could affect research outcomes—without even being aware of it. For example, a study on happiness across cultures might investigate the ways that personal freedom is associated with feeling a sense of purpose in life. The researcher might assume that when people are free to choose their own work and leisure, they are more likely to pick options they care deeply about. Unfortunately, this researcher might overlook the fact that in much of the world it is considered important to sacrifice some personal freedom in order to fulfill one's duty to the group (Triandis, 1995). Because of the danger of this type of bias, social psychologists must continue to improve their methodology.

What is Culture?

Defining Culture

Like the words "happiness" and "intelligence," the word "culture" can be tricky to define. **Culture** is a word that suggests *social patterns of shared meaning*. In essence, it is a collective understanding of the way the world works, shared by members of a group and passed down from one generation to the next. For example, members of the Yanomamö tribe, in South America, share a cultural understanding of the world that includes the idea that there are four parallel levels to reality that include an abandoned level, and earthly level and heavenly and hell-like levels. Similarly, members of surfing culture understand their athletic pastime as being worthwhile and governed by formal rules of etiquette known only to insiders. There are several features of culture that are central to understanding the uniqueness and diversity of the human mind:

1. *Versatility*: Culture can change and adapt. Someone from the state of Orissa, in India, for example, may have multiple identities. She might see herself as Oriya when at home and speaking her native language. At other times, such as during the national cricket match against Pakistan, she might consider herself Indian. This is known as **situational identity**.
2. *Sharing*: Culture is the product of people sharing with one another. Humans cooperate and share knowledge and skills with other members of their networks. The ways they share, and the content of what they share, helps make up culture. Older adults, for instance, remember a time when long-distance friendships were maintained through letters that arrived in the mail every few months. Contemporary youth culture accomplishes the same goal through the use of instant text messages on smart phones.
3. *Accumulation*: Cultural knowledge is cumulative. That is, information is "stored." This means that a culture's collective learning grows across generations. We understand more about the world today than we did 200 years ago, but that doesn't mean the culture from long ago has been erased by the new. For instance, members of the Haida culture—a First Nations people in British Columbia, Canada—profit from both ancient and modern experiences. They might employ traditional fishing practices and wisdom stories while also using modern technologies and services.
4. *Patterns*: There are systematic and predictable ways of behavior or thinking across members of a culture. Patterns emerge from adapting, sharing, and storing cultural information. Patterns can be both similar and different across cultures. For example, in both Canada and India it is considered polite to bring a small gift to a host's home. In Canada, it is more common to bring a bottle of wine and for the gift to be opened right away. In India, by contrast, it is more common to bring sweets, and often the gift is set aside to be opened later.

Understanding the changing nature of culture is the first step toward appreciating how it helps people. The concept of **cultural intelligence** is the ability to understand why members of other cultures act in the ways they do. Rather than dismissing foreign behaviors as weird, inferior, or immoral, people high in cultural intelligence can appreciate differences even if they do not necessarily share another culture's views or adopt its ways of doing things.

Thinking about Culture

One of the biggest problems with understanding culture is that the word itself is used in different ways by different people. When someone says, "My company has a competitive culture," does it mean the same thing as when another person says, "I'm taking my

children to the museum so they can get some culture"? The truth is, there are many ways to think about culture. Here are three ways to parse this concept:

1. *Progressive cultivation*: This refers to a relatively small subset of activities that are intentional and aimed at "being refined." Examples include learning to play a musical instrument, appreciating visual art, and attending theater performances, as well as other instances of so-called "high art." This was the predominant use of the word culture through the mid-19th century. This notion of culture formed the basis, in part, of a superior mindset on the behalf of people from the upper economic classes. For instance, many tribal groups were seen as lacking cultural sophistication under this definition. In the late 19th century, as global travel began to rise, this understanding of culture was largely replaced with an understanding of it as a way of life.
2. *Ways of Life*: This refers to distinct patterns of beliefs and behaviors widely shared among members of a culture. The "ways of life" understanding of culture shifts the emphasis to patterns of belief and behavior that persist over many generations. Although cultures can be small—such as "school culture"—they usually describe larger populations, such as nations. People occasionally confuse national identity with culture. There are similarities in culture between Japan, China, and Korea, for example, even though politically they are very different. Indeed, each of these nations also contains a great deal of cultural variation within themselves.
3. *Shared Learning*: In the 20th century, anthropologists and social psychologists developed the concept of **enculturation** to refer to the ways people learn about and shared cultural knowledge. Where "ways of life" is treated as a noun "enculturation" is a verb. That is, enculturation is a fluid and dynamic process. That is, it emphasizes that culture is a process that can be learned. As children are raised in a society, they are taught how to behave according to regional cultural norms. As immigrants settle in a new country, they learn a new set of rules for behaving and interacting. In this way, it is possible for a person to have multiple **cultural scripts.**

Culture Concept	Examples	Social Impact	Highlighted Themes
Progressive Cultivation	• College education • Advanced technology • Ballet • Formal etiquette	A distinction between elites and the masses, between "higher civilizations" and "barbarians," between old and young, or between men and women	Deliberate pursuit of mental refinement; efforts to create and improve abilities that seem to offer better prospects of wellbeing, power, or dignity
Way of Life	• National traditions • Religious doctrines • Organizational culture	Geographical or ethnic distinctions between large and spatially segregated populations	Similar beliefs and values within populations, but differences between them; strong cultural identity and stereotyping of out-group members; stability of culture over time
Shared Learning and Enculturation	• Parenting • Teaching • Apprenticeship • Information-sharing and influencing through social networks	Emphasis on the developmental potential of everyone and on the different ways in which individuals develop, depending on different forms of enculturation	An understanding of diversity within populations, individual exposure to multiple cultural influences, negotiation and debating about cultural values and identities.

Table 15.2 Culture concepts and their application

The understanding of culture as a learned pattern of views and behaviors is interesting for several reasons. First, it highlights the ways groups can come into conflict with one another. Members of different cultures simply learn different ways of behaving. Modern youth culture, for instance, interacts with technologies such as smart phones using a different set of rules than people who are in their 40s, 50s, or 60s. Older adults might find texting in the middle of a face-to-face conversation rude while younger people often do not. These differences can sometimes become politicized and a source of tension between groups. One example of this is Muslim women who wear a *hijab*, or head scarf. Non-Muslims do not follow this practice, so occasional misunderstandings arise about the appropriateness of the tradition. Second, understanding that culture is learned is important because it means that people can adopt an appreciation of patterns of behavior that are different than their own. For example, non-Muslims might find it helpful to learn about the hijab. Where did this tradition come from? What does it mean and what are various Muslim opinions about wearing one? Finally, understanding that culture is learned can be helpful in developing self-awareness. For instance, people from the United States might not even be aware of the fact that their attitudes about public nudity are influenced by their cultural learning. While women often go topless on beaches in Europe and women living a traditional tribal existence in places like the South Pacific also go topless, it is illegal for women in some of the United States to do so. These cultural norms for modesty—

reflected in government laws and policies– also enter the discourse on social issues such as the appropriateness of breast-feeding in public. Understanding that your preferences are—in many cases—the products of cultural learning might empower you to revise them if doing so will lead to a better life for you or others.

The Self and Culture



Figure 15.2 In a world that is increasingly connected by travel, technology, and business the ability to understand and appreciate the differences between cultures is more important than ever. Psychologists call this capability “cultural intelligence”.

Traditionally, social psychologists have thought about how patterns of behavior have an overarching effect on populations’ attitudes. Harry Triandis, a cross-cultural psychologist, has studied culture in terms of individualism and collectivism. Triandis became interested in culture because of his unique upbringing. Born in Greece, he was raised under both the German and Italian occupations during World War II. The Italian soldiers broadcast classical music in the town square and built a swimming pool for the townspeople. Interacting with these foreigners—even though they were an occupying army—sparked Triandis’ curiosity about other cultures. He realized that he would have to learn English if he wanted to pursue academic study outside of Greece and so he practiced with the only local who knew the language: a mentally ill 70 year old who was incarcerated for life at the local hospital. He went on to spend decades studying the ways people in different cultures define themselves (Triandis, 2008).

So, what exactly were these two patterns of culture Triandis focused on: **individualism** and **collectivism**? Individualists, such as most people born and raised in Australia or the United States, define themselves as individuals. They seek personal freedom and prefer to voice their own opinions and make their own decisions. By contrast, collectivists—such as most people born and raised in Korea or in Taiwan— are more likely to emphasize their connectedness to others. They are more likely to sacrifice their personal preferences if those preferences come in conflict with the preferences of the larger group (Triandis, 1995).

Both individualism and collectivism can further be divided into *vertical* and *horizontal* dimensions (Triandis, 1995). Essentially, these dimensions describe social status among members of a society. People in vertical societies differ in status, with some people being more highly respected or having more privileges, while in horizontal societies people are relatively equal in status and privileges. These dimensions are, of course, simplifications.

Neither individualism nor collectivism is the “correct way to live.” Rather, they are two separate patterns with slightly different emphases. People from individualistic societies often have more social freedoms, while collectivistic societies often have better social safety nets.

	Individualist	Collectivist
Vertical	People are unique; some distinguish themselves and enjoy higher status. **Example: United States**	People emphasize their connectedness and must do their duty; some enjoy higher status. **Example: Japan**
Horizontal	People are unique; most people have the same status. **Example: Denmark**	People emphasize their connectedness and work toward common goals; most people have the same status. **Example: Israeli kibbutz**

Table 15.3 Individualist and collectivist cultures

There are yet other ways of thinking about culture, as well. The cultural patterns of individualism and collectivism are linked to an important psychological phenomenon: the way that people understand themselves. Known as **self-construal**, this is the way people define the way they "fit" in relation to others. Individualists are more likely to define themselves in terms of an **independent self**. This means that people see themselves as A) being a unique individual with a stable collection of personal traits, and B) that these traits drive behavior. By contrast, people from collectivist cultures are more likely to identify with the **interdependent self**. This means that people see themselves as A) defined differently in each new social context and B) social context, rather than internal traits, are the primary drivers of behavior (Markus & Kitiyama, 1991).

What do the independent and interdependent self look like in daily life? One simple example can be seen in the way that people describe themselves. Imagine you had to complete the sentence starting with "I am…..". And imagine that you had to do this 10 times. People with an independent sense of self are more likely to describe themselves in terms of traits such as "I am honest," "I am intelligent," or "I am talkative." On the other hand, people with a more interdependent sense of self are more likely to describe themselves in terms of their relation to others such as "I am a sister," "I am a good friend," or "I am a leader on my team" (Markus, 1977).

The psychological consequences of having an independent or interdependent self can also appear in more surprising ways. Take, for example, the emotion of anger. In Western cultures, where people are more likely to have an independent self, anger arises when people's personal wants, needs, or values are attacked or frustrated (Markus & Kitiyama, 1994). Angry Westerners sometimes complain that they have been "treated unfairly." Simply put, anger—in the Western sense—is the result of violations of the self. By contrast, people from interdependent self cultures, such as Japan, are likely to experience anger somewhat differently. They are more likely to feel that anger is unpleasant not because of some personal insult but because anger represents a lack of harmony between people. In this instance, anger is particularly unpleasant when it interferes with close relationships.

Culture is Learned

It's important to understand that culture is learned. People aren't born using chopsticks or being good at soccer simply because they have a genetic predisposition for it. They learn to excel at these activities because they are born in countries like Argentina, where playing soccer is an important part of daily life, or in countries like Taiwan, where chopsticks are the primary eating utensils. So, how are such cultural behaviors learned? It turns out that cultural skills and knowledge are learned in much the same way a person might learn to do algebra or knit. They are acquired through a combination of explicit teaching and implicit learning—by observing and copying.

Cultural teaching can take many forms. It begins with parents and caregivers, because they are the primary influence on young children. Caregivers teach kids, both directly and by example, about how to behave and how the world works. They encourage children to be polite, reminding them, for instance, to say "Thankyou." They teach kids how to dress in a way that is appropriate for the culture. They introduce children to religious beliefs and the rituals that go with them. They even teach children how to think and feel! Adult men, for example, often exhibit a certain set of emotional expressions—such as being tough and not crying—that provides a model of masculinity for their children. This is why we see different ways of expressing the same emotions in different parts of the world.



Figure 15.3 Culture teaches us what behaviors and emotions are appropriate or expected in different situations.

In some societies, it is considered appropriate to conceal anger. Instead of expressing their feelings outright, people purse their lips, furrow their brows, and say little. In other cultures, however, it is appropriate to express anger. In these places, people are more likely to bare their teeth, furrow their brows, point or gesture, and yell (Matsumoto, Yoo, & Chung, 2010). Such patterns of behavior are learned. Often, adults are not even aware that they are, in essence, teaching psychology—because the lessons are happening through **observational learning**.

Let's consider a single example of a way you behave that is learned, which might surprise you. All people gesture when they speak. We use our hands in fluid or choppy motions—to point things out, or to pantomime actions in stories. Consider how you might throw your hands up and exclaim, "I have no idea!" or how you might motion to a friend that it's time to go. Even people who are born blind use hand gestures when they speak, so to some degree this is a *universal behavior*, meaning all people naturally do it. However, social researchers have discovered that culture influences how a person gestures. Italians, for example, live in a society full of gestures. In fact, they use about 250 of them (Poggi, 2002)! Some are easy to understand, such as a hand against the belly, indicating hunger. Others, however, are more difficult. For example, pinching the thumb and index finger together and drawing a line backwards at face level means "perfect," while knocking a fist on the side of one's head means "stubborn."

Beyond observational learning, cultures also use **rituals** to teach people what is important. For example, young people who are interested in becoming Buddhist monks often have to endure rituals that help them shed feelings of specialness or superiority—feelings that run counter to Buddhist doctrine. To do this, they might be required to wash their teacher's feet, scrub toilets, or perform other menial tasks. Similarly, many Jewish adolescents go through the process of *bar* and *bat mitzvah*. This is a ceremonial reading from scripture that requires the study of Hebrew and, when completed, signals that the youth is ready for full participation in public worship.

Cultural Relativism

When social psychologists research culture, they try to avoid making value judgments. This is known as **value-free research** and is considered an important approach to scientific objectivity. But, while such objectivity is the goal, it is a difficult one to achieve. With this in mind, anthropologists have tried to adopt a sense of empathy for the cultures they study. This has led to **cultural relativism**, the principle of regarding and valuing the practices of a culture from the point of view of that culture. It is a considerate and practical way to avoid hasty judgments. Take for example, the common practice of same-sex friends in India walking in public while holding hands: this is a common behavior and a sign of connectedness between two people. In England, by contrast, holding hands is largely limited to romantically involved couples, and often suggests a sexual relationship. These are simply two different ways of understanding the meaning of holding hands. Someone who does not take a *relativistic* view might be tempted to see their own understanding of this behavior as superior and, perhaps, the foreign practice as being immoral.

Despite the fact that cultural relativism promotes the appreciation for cultural differences, it can also be problematic. At its most extreme it leaves no room for criticism of other cultures, even if certain cultural practices are horrific or harmful. Many practices have drawn criticism over the years. In Madagascar, for example, the *famahidana* funeral tradition includes bringing bodies out from tombs once every seven years, wrapping them in cloth, and dancing with them. Some people view this practice as disrespectful to the body of a deceased person. Another example can be seen in the historical Indian practice of *sati*—the burning to death of widows on their deceased husband's funeral pyre. This practice was outlawed by the British when they colonized India. Today, a debate rages about the ritual cutting of genitals of children in several Middle Eastern and African cultures. To a lesser

extent, this same debate arises around the circumcision of baby boys in Western hospitals. When considering harmful cultural traditions, it can be patronizing to the point of racism to use cultural relativism as an excuse for avoiding debate. To assume that people from other cultures are neither mature enough nor responsible enough to consider criticism from the outside is demeaning.



Figure 15.4 In some cultures, it's perfectly normal for same-sex friends to hold hands while in others, handholding is restricted to romantically involved individuals only.

Positive cultural relativism is the belief that the world would be a better place if everyone practiced some form of intercultural empathy and respect. This approach offers a potentially important contribution to theories of cultural progress: to better understand human behavior, people should avoid adopting extreme views that block discussions about the basic morality or usefulness of cultural practices.

Conclusion

We live in a unique moment in history. We are experiencing the rise of a global culture in which people are connected and able to exchange ideas and information better than ever before. International travel and business are on the rise. Instantaneous communication and social media are creating networks of contacts who would never otherwise have had a chance to connect. Education is expanding, music and films cross national borders, and state-of-the-art technology affects us all. In this world, an understanding of what culture is and how it happens, can set the foundation for acceptance of differences and respectful disagreements. The science of social psychology—along with the other culture-focused sciences, such as anthropology and sociology—can help produce insights into cultural processes. These insights, in turn, can be used to increase the quality of intercultural dialogue, to preserve cultural traditions, and to promote self-awareness.

Outside Resources

Articles: International Association of Cross-Cultural Psychology (IACCP) [Wolfgang Friedlmeier, ed] Online Readings in Psychology and Culture (ORPC) http://scholarworks.gvsu.edu/orpc/

Database: Human Relations Area Files (HRAF) 'World Cultures' database http://hraf.yale.edu/

Organization: Plous, Scott, et al, Social Psychology Network, Cultural Psychology Links by Subtopic https://www.socialpsychology.org/cultural.htm

Study: Hofstede, Geert et al, 6-D Model of National Culture https://geerthofstede.com/culture-geert-hofstede-gert-jan-hofstede/6d-model-of-national-culture/

Discussion Questions

1. How do you think the culture you live in is similar to or different from the culture your parents were raised in?
2. What are the risks of associating "culture" mainly with differences between large populations such as entire nations?
3. If you were a social psychologist, what steps would you take to guard against ethnocentricity in your research?
4. Name one value that is important to you. How did you learn that value?
5. In your opinion, has the internet increased or reduced global cultural diversity?
6. Imagine a social psychologist who researches the culture of extremely poor people, such as so-called "rag pickers," who sort through trash for food or for items to sell. What ethical challenges can you identify in this type of study?

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15.3: Culture and Emotion

Jeanne Tsai

How do people's cultural ideas and practices shape their emotions (and other types of feelings)? In this module, we will discuss findings from studies comparing North American (United States, Canada) and East Asian (Chinese, Japanese, Korean) contexts. These studies reveal both cultural similarities and differences in various aspects of emotional life. Throughout, we will highlight the scientific and practical importance of these findings and conclude with recommendations for future research.

Learning Objectives

- Review the history of cross-cultural studies of emotion
- Learn about recent empirical findings and theories of culture and emotion
- Understand why cultural differences in emotion matter
- Explore current and future directions in culture and emotion research

Take a moment and imagine you are traveling in a country you've never been to before. Everything—the sights, the smells, the sounds—seems strange. People are speaking a language you don't understand and wearing clothes unlike yours. But they greet you with a smile and you sense that, despite the differences you observe, deep down inside these people have the same feelings as you. But is this true? Do people from opposite ends of the world really feel the same emotions? While most scholars agree that members of different cultures may vary in the foods they eat, the languages they speak, and the holidays they celebrate, there is disagreement about the extent to which culture shapes people's emotions and feelings—including what people feel, what they express, and what they do during an emotional event. Understanding how culture shapes people's emotional lives and what impact emotion has on psychological health and well-being in different cultures will not only advance the study of human behavior but will also benefit multicultural societies. Across a variety of settings—academic, business, medical—people worldwide are coming into more contact with people from foreign cultures. In order to communicate and function effectively in such situations, we must understand the ways cultural ideas and practices shape our emotions.

Historical Background

In the 1950s and 1960s, social scientists tended to fall into either one of two camps. The **universalist** camp claimed that, despite cultural differences in customs and traditions, at a fundamental level all humans feel similarly. These universalists believed that emotions evolved as a response to the environments of our primordial ancestors, so they are the same across all cultures. Indeed, people often describe their emotions as "automatic," "natural," "physiological," and "instinctual," supporting the view that emotions are hard-wired and universal.



Figure 15.4 Universalists point to our prehistoric ancestors as the source of emotions that all humans share.

The **social constructivist** camp, however, claimed that despite a common evolutionary heritage, different groups of humans evolved to adapt to their distinctive environments. And because human environments vary so widely, people's emotions are also

culturally variable. For instance, Lutz (1988) argued that many Western views of emotion assume that emotions are "singular events situated within individuals." However, people from Ifaluk (a small island near Micronesia) view emotions as "exchanges between individuals" (p. 212). Social constructivists contended that because cultural ideas and practices are all-encompassing, people are often unaware of how their feelings are shaped by their culture. Therefore emotions can feel automatic, natural, physiological, and instinctual, and yet still be primarily culturally shaped.

In the 1970s, Paul Ekman conducted one of the first scientific studies to address the universalist–social constructivist debate. He and Wallace Friesen devised a system to measure people's facial muscle activity, called the Facial Action Coding System (FACS; Ekman & Friesen, 1978). Using FACS, Ekman and Friesen analyzed people's facial expressions and identified specific facial muscle configurations associated with specific emotions, such as happiness, anger, sadness, fear, disgust. Ekman and Friesen then took photos of people posing with these different expressions (Figure 15.5). With the help of colleagues at different universities around the world, Ekman and Friesen showed these pictures to members of vastly different cultures, gave them a list of emotion words (translated into the relevant languages), and asked them to match the facial expressions in the photos with their corresponding emotion words on the list (Ekman & Friesen, 1971; Ekman et al., 1987).

Across cultures, participants "recognized" the emotional facial expressions, matching each picture with its "correct" emotion word at levels greater than chance. This led Ekman and his colleagues to conclude that there are universally recognized emotional facial expressions. At the same time, though, they found considerable variability across cultures in recognition rates. For instance, whereas 95% of U.S. participants associated a smile with "happiness," only 69% of Sumatran participants did. Similarly, 86% of U.S. participants associated wrinkling of the nose with "disgust," but only 60% of Japanese did (Ekman et al., 1987). Ekman and colleagues interpreted this variation as demonstrating cultural differences in "display rules," or rules about what emotions are appropriate to show in a given situation (Ekman, 1972). Indeed, since this initial work, Matsumoto and his colleagues have demonstrated widespread cultural differences in display rules (Safdar et al., 2009). One prominent example of such differences is biting one's tongue. In India, this signals embarrassment; however, in the U.S. this expression has no such meaning (Haidt & Keltner, 1999).



Figure 15.5 Facial expressions associated with happiness, sadness, disgust, and anger based on the Facial Action Coding System. [Image: Paul Eckman, used with permission]

These findings suggest both cultural similarities and differences in the recognition of emotional facial expressions (although see Russell, 1994, for criticism of this work). Interestingly, since the mid-2000s, increasing research has demonstrated cultural differences not only in display rules, but also the degree to which people focus on the face (versus other aspects of the social context; Masuda, Ellsworth, Mesquita, Leu, Tanida, & Van de Veerdonk, 2008), and on different features of the face (Yuki, Maddux, & Matsuda, 2007) when perceiving others' emotions. For example, people from the United States tend to focus on the mouth when interpreting others' emotions, whereas people from Japan tend to focus on the eyes.

But how does culture shape other aspects of emotional life—such as how people emotionally respond to different situations, how they want to feel generally, and what makes them happy? Today, most scholars agree that emotions and other related states are multifaceted, and that cultural similarities and differences exist for each facet. Thus, rather than classifying emotions as *either* universal *or* socially-constructed, scholars are now attempting to identify the specific similarities and differences of emotional life across cultures. These endeavors are yielding new insights into the effects of cultural on emotion.

Current and Research Theory

Given the wide range of cultures and facets of emotion in the world, for the remainder of the module we will limit our scope to the two cultural contexts that have received the most empirical attention by social scientists: North America (United States, Canada) and East Asia (China, Japan, and Korea). Social scientists have focused on North American and East Asian contexts because they differ in obvious ways, including their geographical locations, histories, languages, and religions. Moreover, since the 1980s large-scale studies have revealed that North American and East Asian contexts differ in their overall values and attitudes, such as the prioritization of personal vs. group needs (individualism vs. collectivism; Hofstede, 2001). Whereas North American contexts encourage members to prioritize personal over group needs (to be "individualistic"), East Asian contexts encourage members to prioritize group over personal needs (to be "collectivistic").

Cultural Models of Self in North American and East Asian Contexts

In a landmark paper, cultural psychologists Markus and Kitayama (1991) proposed that previously observed differences in individualism and collectivism translated into different models of the self—or one's personal concept of who s/he is as a person. Specifically, the researchers argued that in North American contexts, the dominant model of the self is an independent one, in which being a person means being distinct from others and behaving accordingly across situations. In East Asian contexts, however, the dominant model of the self is an interdependent one, in which being a person means being fundamentally connected to others and being responsive to situational demands. For example, in a classic study (Cousins, 1989), American and Japanese students were administered the Twenty Statements Test, in which they were asked to complete the sentence stem, "I am _____," twenty times. U.S. participants were more likely than Japanese participants to complete the stem with psychological attributes (e.g., friendly, cheerful); Japanese participants, on the other hand, were more likely to complete the stem with references to social roles and responsibilities (e.g., a daughter, a student) (Cousins, 1989). These different models of the self result in different principles for interacting with others. An independent model of self teaches people to express themselves and try to influence others (i.e., change their environments to be consistent with their own beliefs and desires). In contrast, an interdependent model of self teaches people to suppress their own beliefs and desires and adjust to others' (i.e., fit in with their environment) (Heine, Lehman, Markus, & Kitayama, 1999; Morling, Kitayama, & Miyamoto, 2002; Weisz, Rothbaum, & Blackburn, 1984). Markus and Kitayama (1991) argue that these different models of self have significant implications for how people in Western and East Asian contexts feel.

Cultural Similarities and Differences in Emotion: Comparisons of North American and East Asian Contexts

A considerable body of empirical research suggests that these different models of self shape various aspects of emotional dynamics. Next we will discuss several ways culture shapes emotion, starting with emotional response.

People's Physiological Responses to Emotional Events Are Similar Across Cultures, but Culture Influences People's Facial Expressive Behavior



Figure 15.6 Although study participants from different cultural backgrounds reported similar emotions and levels of intensity when recalling important episodes in their lives, there were significant differences in facial expressions in response to those emotions.

How does culture influence people's responses to emotional events? Studies of emotional response tend to focus on three components: physiology (e.g., how fast one's heart beats), subjective experience (e.g., feeling intensely happy or sad), and facial expressive behavior (e.g., smiling or frowning). Although only a few studies have simultaneously measured these different aspects of emotional response, those that do tend to observe more similarities than differences in physiological responses between cultures. That is, regardless of culture, people tend to respond similarly in terms of physiological (or bodily) expression. For instance, in one study, European American and Hmong (pronounced "muhng") American participants were asked to relive various emotional episodes in their lives (e.g., when they lost something or someone they loved; when something good happened) (Tsai, Chentsova-Dutton, Freire-Bebeau, & Przymus, 2002). At the level of physiological arousal (e.g., heart rate), there were no differences in how the participants responded. However, their facial expressive behavior told a different story. When reliving events that elicited happiness, pride, and love, European Americans smiled more frequently and more intensely than did their Hmong counterparts—though all participants reported feeling happy, proud, and in love at similar levels of intensity. And similar patterns have emerged in studies comparing European Americans with Chinese Americans during different emotion-eliciting tasks (Tsai et al., 2002; Tsai, Levenson, & McCoy, 2006; Tsai, Levenson, & Carstensen, 2000). Thus, while the physiological aspects of emotional responses appear to be similar across cultures, their accompanying facial expressions are more culturally distinctive.

Again, these differences in facial expressions during positive emotional events are consistent with findings from cross-cultural studies of *display rules*, and stem from the models of self-description discussed above: In North American contexts that promote an **independent self**, individuals tend to express their emotions to influence others. Conversely, in East Asian contexts that promote an interdependent self, individuals tend to control and suppress their emotions to adjust to others.

People Suppress Their Emotions Across Cultures, but Culture Influences the Consequences of Suppression for Psychological Well-Being

If the cultural ideal in North American contexts is to express oneself, then suppressing emotions (not showing how one feels) should have negative consequences. This is the assumption underlying hydraulic models of emotion: the idea that emotional suppression and repression impair psychological functioning (Freud, 1910). Indeed, significant empirical research shows that suppressing emotions can have negative consequences for psychological well-being in North American contexts (Gross, 1998). However, Soto and colleagues (2011) find that the relationship between suppression and psychological well-being varies by culture. True, with European Americans, emotional suppression is associated with higher levels of depression and lower levels of life satisfaction. (Remember, in these individualistic societies, the expression of emotion is a fundamental aspect of positive interactions with others.) On the other hand, since for Hong Kong Chinese, emotional suppression is needed to adjust to others (in this interdependent community, suppressing emotions is how to appropriately interact with others), it is simply a part of normal life and therefore not associated with depression or life satisfaction.

These findings are consistent with research suggesting that factors related to clinical depression vary between European Americans and Asian Americans. European Americans diagnosed with depression show dampened or muted emotional responses (Bylsma, Morris, & Rottenberg, 2008). For instance, when shown sad or amusing film clips, depressed European Americans respond less intensely than their nondepressed counterparts.However, other studies have shown that depressed East Asian Americans (i.e., people of East Asian descent who live in the United States) demonstrate *similar or increased* emotional responses compared with their nondepressed counterparts (Chentsova-Dutton et al., 2007; Chentsova-Dutton, Tsai, & Gotlib, 2010). In other words, depressed European Americans show reduced emotional expressions, but depressed East Asian Americans do *not*—and, in fact, may express *more* emotion. Thus, muted responses (which resemble suppression) are associated with depression in European American contexts, but not in East Asian contexts.



Figure 15.7 Someone from a collectivist culture is more likely to think about how their own accomplishments might impact others. An otherwise positive achievement for one person could cause another to feel something negative, with mixed emotions as the result.

What about people's subjective emotional experiences? Do people across cultures *feel* the same emotions in similar situations, despite how they show them? Recent studies indicate that culture affects whether people are likely to feel bad during good events. In North American contexts, people rarely feel bad after good experiences. However, a number of research teams have observed that, compared with people in North American contexts, people in East Asian contexts are more likely to feel bad *and* good ("mixed" emotions) during positive events (e.g., feeling worried after winning an important competition; Miyamoto, Uchida, & Ellsworth, 2010). This may be because, compared with North Americans, East Asians engage in more dialectical thinking (i.e., they are more tolerant of contradiction and change). Therefore, they accept that positive and negative feelings can occur simultaneously. In addition, whereas North Americans value maximizing positive states and minimizing negative ones, East Asians value a greater balance between the two (Sims, Tsai, Wang, Fung, & Zhang, 2013). To better understand this, think about how you would feel after getting the top score on a test that's graded on a curve. In North American contexts, such success is considered an individual achievement and worth celebrating. But what about the other students who will now receive a lower grade because you "raised the curve" with your good grade? In East Asian contexts, not only would students be more thoughtful of the overall group's success, but they would also be more comfortable acknowledging both the positive (their own success on the test) and the negative (their classmates' lower grades).

Again, these differences can be linked to cultural differences in models of the self. An interdependent model encourages people to think about how their accomplishments might affect others (e.g., make others feel bad or jealous). Thus, awareness of negative emotions during positive events may discourage people from expressing their excitement and standing out (as in East Asian contexts). Such emotional suppression helps individuals feel in sync with those around them. An independent model, however, encourages people to express themselves and stand out, so when something good happens, they have no reason to feel bad.

So far, we have reviewed research that demonstrates cultural similarities in physiological responses and in the ability to suppress emotions. We have also discussed the cultural differences in facial expressive behavior and the likelihood of experiencing negative feelings during positive events. Next, we will explore how culture shapes people's ideal or desired states.

People Want to Feel Good Across Cultures, but Culture Influences the Specific Good States People Want to Feel (Their "Ideal Affect")

Everyone welcomes positive feelings, but cultures vary in the specific types of **positive affective states** (see Figure 15.8) their people favor. An affective state is essentially the type of emotional arousal one feels coupled with its intensity—which can vary from pleasant to unpleasant (e.g., happy to sad), with high to low arousal (e.g., energetic to passive). Although people of all cultures experience this range of affective states, they can vary in their preferences for each. For example, people in North American contexts lean toward feeling excited, enthusiastic, energetic, and other "high arousal positive" states. People in East Asian contexts, however, generally prefer feeling calm, peaceful, and other "low arousal positive" states (Tsai, Knutson, & Fung,

2006). These cultural differences have been observed in young children between the ages of 3 and 5, college students, and adults between the ages of 60 and 80 (Tsai, Louie, Chen, & Uchida, 2007; Tsai, Sims, Thomas, & Fung, 2013), and are reflected in widely-distributed cultural products. For example, wherever you look in American contexts—women's magazines, children's storybooks, company websites, and even Facebook profiles (Figure 3)—you will find more open, excited smiles and fewer closed, calm smiles compared to Chinese contexts (Chim, Moon, Ang, Tsai, 2013; Tsai, 2007; Tsai, Louie, et al., 2007).

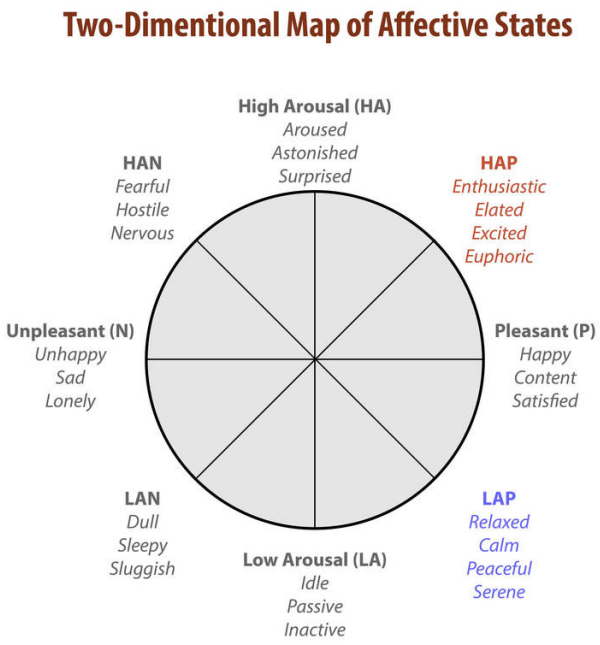


Figure 15.8 Adapted from Feldman, Barrett, and Russell (1999); Larsen and Diener ((1992); Russell (1991); Thayer (1989); Watson and Tellegen (1985)

Again, these differences in ideal affect (i.e., the emotional states that people believe are best) correspond to the independent and interdependent models described earlier: Independent selves want to influence others, which requires action (*doing something*), and action involves high arousal states. Conversely, interdependent selves want to adjust to others, which requires *suspending* action and attending to others—both of which involve low arousal states. Thus, the more that individuals and cultures want to influence others (as in North American contexts), the more they value excitement, enthusiasm, and other high arousal positive states. And, the more that individuals and cultures want to adjust to others (as in East Asian contexts), the more they value calm, peacefulness, and other low arousal positive states (Tsai, Miao, Seppala, Fung, & Yeung, 2007).



Figure 15.9 Sample Hong Kong Chinese (left) and European American (right) Facebook pages.

Because one's ideal affect functions as a guide for behavior and a way of evaluating one's emotional states, cultural differences in ideal affect can result in different emotional lives. For example, several studies have shown that people engage in activities (e.g., recreational pastimes, musical styles) consistent with their cultural ideal affect. That is, people from North American contexts (who value high arousal affective states) tend to prefer thrilling activities like skydiving, whereas people from East Asian contexts (who

value low arousal affective states) prefer tranquil activities like lounging on the beach (Tsai, 2007). In addition, people base their conceptions of well-being and happiness on their ideal affect. Therefore, European Americans are more likely to define well-being in terms of excitement, whereas Hong Kong Chinese are more likely to define well-being in terms of calmness. Indeed, among European Americans, the less people experience *high* arousal positive states, the more depressed they are. But, among Hong Kong Chinese—you guessed it!—the less people experience *low* arousal positive states, the more depressed they are (Tsai, Knutson, & Fung, 2006).

People Base Their Happiness on Similar Factors Across Cultures, but Culture Influences the Weight Placed on Each Factor



Figure 15.10 Research has shown that self-esteem is more highly correlated with life satisfaction in individualistic cultures than in collectivist cultures.

What factors make people happy or satisfied with their lives? We have seen that discrepancies between how people actually feel (actual affect) and how they want to feel (ideal affect)—as well as people's suppression of their ideal affect—are associated with depression. But happiness is based on other factors as well. For instance, Kwan, Bond, & Singelis (1997) found that while European Americans and Hong Kong Chinese subjects both based life satisfaction on how they felt about themselves (self-esteem) and their relationships (relationship harmony), their weighting of each factor was different. That is, European Americans based their life satisfaction primarily on self-esteem, whereas Hong Kong Chinese based their life satisfaction equally on self-esteem *and* relationship harmony. Consistent with these findings, Oishi and colleagues (1999) found in a study of 39 nations that self-esteem was more strongly correlated with life satisfaction in more individualistic nations compared to more collectivistic ones. Researchers also found that in individualistic cultures people rated life satisfaction based on their emotions more so than on social definitions (or norms). In other words, rather than using social norms as a guideline for what constitutes an ideal life, people in individualistic cultures tend to evaluate their satisfaction according to how they feel emotionally. In collectivistic cultures, however, people's life satisfaction tends to be based on a balance between their emotions and norms (Suh, Diener, Oishi, & Triandis, 1998). Similarly, other researchers have recently found that people in North American contexts are more likely to feel negative when they have poor mental and physical health, while people in Japanese contexts don't have this association (Curhan et al., 2013).

Again, these findings are consistent with cultural differences in models of the self. In North American, independent contexts, feelings about the self matter more, whereas in East Asian, interdependent contexts, feelings about others matter as much as or even more than feelings about the self.

Why Do Cultural Similarities And Differences In Emotion Matter?

Understanding cultural similarities and differences in emotion is obviously critical to understanding emotions in general, and the flexibility of emotional processes more specifically. Given the central role that emotions play in our interaction, understanding cultural similarities and differences is especially critical to preventing potentially harmful miscommunications. Although misunderstandings are unintentional, they can result in negative consequences—as we've seen historically for ethnic minorities in many cultures. For instance, across a variety of North American settings, Asian Americans are often characterized as too "quiet" and "reserved," and these low arousal states are often misinterpreted as expressions of disengagement or boredom—rather than expressions of the ideal of calmness. Consequently, Asian Americans may be perceived as "cold," "stoic," and "unfriendly,"

fostering stereotypes of Asian Americans as “perpetual foreigners” (Cheryan & Monin, 2005). Indeed, this may be one reason Asian Americans are often overlooked for top leadership positions (Hyun, 2005).

In addition to averting cultural miscommunications, recognizing cultural similarities and differences in emotion may provide insights into other paths to psychological health and well-being. For instance, findings from a recent series of studies suggest that calm states are easier to elicit than excited states, suggesting that one way of increasing happiness in cultures that value excitement may be to increase the value placed on calm states (Chim, Tsai, Hogan, & Fung, 2013).

Current Directions In Culture And Emotion Research

What About Other Cultures?

In this brief review, we’ve focused primarily on comparisons between North American and East Asian contexts because most of the research in cultural psychology has focused on these comparisons. However, there are obviously a multitude of other cultural contexts in which emotional differences likely exist. For example, although Western contexts are similar in many ways, specific Western contexts (e.g., American vs. German) also differ from each other in substantive ways related to emotion (Koopmann-Holm & Matsumoto, 2011). Thus, future research examining other cultural contexts is needed. Such studies may also reveal additional, uninvestigated dimensions or models that have broad implications for emotion. In addition, because more and more people are being raised within multiple cultural contexts (e.g., for many Chinese Americans, a Chinese immigrant culture at home and mainstream American culture at school), more research is needed to examine how people negotiate and integrate these different cultures in their emotional lives (for examples, see De Leersnyder, Mesquita, & Kim, 2011; Perunovic, Heller, & Rafaeli, 2007).

How Are Cultural Differences in Beliefs About Emotion Transmitted?



Figure 15.11 Children’s story books offer one interesting and effective way to study how early influences can impact a person’s ideal affect.

According to Kroeber and Kluckhohn (1952), cultural ideas are reflected in and reinforced by practices, institutions, and products. As an example of this phenomenon—and illustrating the point regarding cultural differences in ideal affect—bestselling children’s storybooks in the United States often contain more exciting and less calm content (smiles and activities) than do bestselling children’s storybooks in Taiwan (Tsai, Louie, et al., 2007). To investigate this further, the researchers randomly assigned European American, Asian American, and Taiwanese Chinese preschoolers to be read either stories with exciting content or stories with calm content. Across all of these cultures, the kids who were read stories with exciting content were afterward more likely to value excited states, whereas those who were read stories with calm content were more likely to value calm states. As a test, after hearing the stories, the kids were shown a list of toys and asked to select their favorites. Those who heard the exciting stories wanted to play with more arousing toys (like a drum that beats loud and fast), whereas those who heard the calm stories wanted to play with less arousing toys (like a drum that beats quiet and slow). These findings suggest that regardless of ethnic background, direct exposure to storybook content alters children’s ideal affect. More studies are needed to assess whether a similar process occurs when children and adults are chronically exposed to various types of cultural products. As well, future studies should examine other ways cultural ideas regarding emotion are transmitted (e.g., via interactions with parents and teachers).

Could These Cultural Differences Be Due to Temperament?

An alternative explanation for cultural differences in emotion is that they are due to temperamental factors—that is, biological predispositions to respond in certain ways. (Might European Americans just be more emotional than East Asians because of genetics?) Indeed, most models of emotion acknowledge that both culture *and* temperament play roles in emotional life, yet few if any models indicate how. Nevertheless, most researchers believe that despite genetic differences in founder populations (i.e., the migrants from a population who leave to create their own societies), culture has a greater impact on emotions. For instance, one theoretical framework, Affect Valuation Theory, proposes that cultural factors shape how people want to feel ("ideal affect") more than how they actually feel ("actual affect"); conversely, temperamental factors influence how people actually feel more than how they want to feel (Tsai, 2007) (see Figure 15.12).

To test this hypothesis, European American, Asian American, and Hong Kong Chinese participants completed measures of temperament (i.e., stable dispositions, such as neuroticism or extraversion), actual affect (i.e., how people actually feel in given situations), ideal affect (i.e., how people would like to feel in given situations), and influential cultural values (i.e., personal beliefs transmitted through culture). When researchers analyzed the participants' responses, they found that differences in ideal affect between cultures were associated more with cultural factors than with temperamental factors (Tsai, Knutson, & Fung, 2006). However, when researchers examined actual affect, they found this to be reversed: actual affect was more strongly associated with temperamental factors than cultural factors. Not all of the studies described above have ruled out a temperamental explanation, though, and more studies are needed to rule out the possibility that the observed group differences are due to genetic factors instead of, or in addition to, cultural factors. Moreover, future studies should examine whether the links between temperament and emotions might vary across cultures, and how cultural and temperamental factors work together to shape emotion.

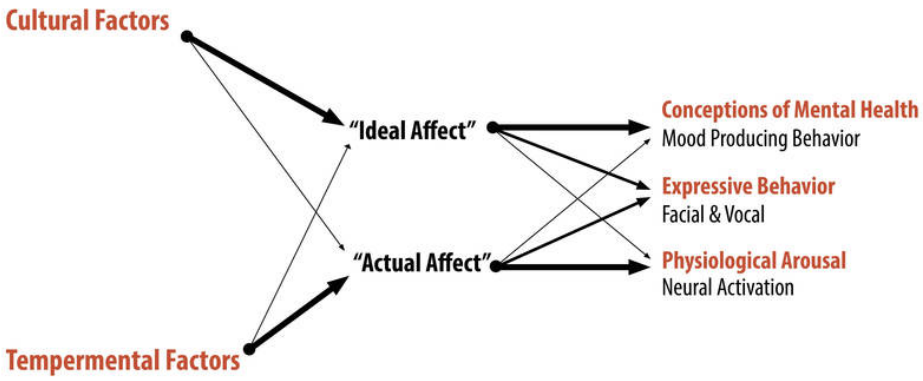


Figure 15.12 Affect valuation theory. Thicker lines indicate stronger predicted relationships.

Summary

Based on studies comparing North American and East Asian contexts, there is clear evidence for cultural similarities and differences in emotions, and most of the differences can be traced to different cultural models of the self.

Consider your own concept of self for a moment. What kinds of pastimes do you prefer—activities that make you excited, or ones that make you calm? What kinds of feelings do you strive for? What is your ideal affect? Because emotions seem and feel so instinctual to us, it's hard to imagine that the way we experience them and the ones we desire are anything other than biologically programmed into us. However, as current research has shown (and as future research will continue to explore), there are myriad ways in which culture, both consciously and unconsciously, shapes people's emotional lives.

Outside Resources

Audio Interview: The Really Big Questions "What Are Emotions?" Interview with Paul Ekman, Martha Nussbaum, Dominique Moisi, and William Reddy http://www.trbq.org/index.php?option=com_content&view=category&layout=blog&id=16&Itemid=43

Book: Ed Diener and Robert Biswas-Diener: *Happiness: Unlocking the Mysteries of Psychological Wealth*

Book: Eric Weiner: *The Geography of Bliss*

Book: Eva Hoffmann: *Lost in Translation: Life in a New Language*

Book: Hazel Markus: *Clash: 8 Cultural Conflicts That Make Us Who We Are*

Video: Social Psychology Alive http://psychology.stanford.edu/~tsailab/PDF/socpsychalive.wmv

Video: The Really Big Questions "Culture and Emotion," Dr. Jeanne Tsai



Video: Tsai's description of cultural differences in emotion



Web: Acculturation and Culture Collaborative at Leuven http://ppw.kuleuven.be/home/english/research/cscp/acc-research

Web: Culture and Cognition at the University of Michigan http://culturecognition.isr.umich.edu/

Web: Experts In Emotion Series, Dr. June Gruber, Department of Psychology, Yale University http://www.yalepeplab.com/teaching/psych131_summer2013/expertseries.php

Web: Georgetown Culture and Emotion Lab http://georgetownculturelab.wordpress.com/

Web: Paul Ekman's website http://www.paulekman.com

Web: Penn State Culture, Health, and Emotion Lab http://www.personal.psu.edu/users/m/r/mrm280/sotosite/

Web: Stanford Culture and Emotion Lab http://www-psych.stanford.edu/~tsailab/index.htm

Web: Wesleyan Culture and Emotion Lab http://culture-and-emotion.research.wesleyan.edu/

Discussion Questions

1. What cultural ideas and practices related to emotion were you exposed to when you were a child? What cultural ideas and practices related to emotion are you currently exposed to as an adult? How do you think they shape your emotional experiences and expressions?
2. How can researchers avoid inserting their own beliefs about emotion in their research?
3. Most of the studies described above are based on self-report measures. What are some of the advantages and disadvantages of using self-report measures to understand the cultural shaping of emotion? How might the use of other behavioral methods (e.g., neuroimaging) address some of these limitations?
4. Do the empirical findings described above change your beliefs about emotion? How?
5. Imagine you are a manager of a large American company that is beginning to do work in China and Japan. How will you apply your current knowledge about culture and emotion to prevent misunderstandings between you and your Chinese and Japanese employees?

Image Attributions

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15.4: Summary, Key Terms, and Self-Test

Jorden A. Cummings

Summary

Culture is a pattern of meaning for understanding how the world works, which is shared among a group of people and passed from one generation to the next. Many behaviours that seem innate are actually products of culture. The psychological aspects of culture are often overlooked because they are often invisible. That is, we may think something is “just how it’s done,” when it’s how we see the world because of our culture.

Psychologists who attempt to understand and appreciate culture from the point of view of the people within it are studying cultural psychology. This is distinct from cross-cultural psychology, which use standard forms of measurement to compare people from different cultures and identify their differences. One problem with cross-cultural studies is that they are vulnerable to ethnocentric bias, which means the researcher designing the study might be influenced by the personal biases and these could influence the research, without the researcher even being aware.

Four features of culture that are central to understanding what it is are versatility (i.e., culture can change and adapt), sharing (i.e., culture is the product of people sharing with one another), accumulation (i.e., cultural is cumulative), and patterns (i.e., there are predictable ways of behaving and thinking across members of a culture).

Two aspects of culture that have received a lot of research attention are the traits of individualism and collectivism. Individualists define themselves as individuals, seek personal freedom, value voicing their own opinions, and aim for autonomy. Individuals born in Western cultures tend to be individualistic. Collectivists are more likely to emphasize their connectedness to others, and often come from cultures such as Korea or in Taiwan.

Cultures play an important role in our emotions. Early universalist researchers claimed that, despite cultural differences in customs and traditions, at a fundamental level all humans feel similarly. In contrast, social constructivists argue that humans adapted to their distinctive environments and this included variability in emotions. Much research on culture and emotion has compared Western (i.e., individualist) and Eastern (i.e., collectivist) cultural experiences of emotion to identify the similarities and differences.

Key Terms

- Collectivism
- Cross-Cultural Psychology
- Cross-Cultural Studies
- Cultural Differences
- Cultural Intelligence
- Cultural Psychology
- Cultural Relativism
- Cultural Scripts
- Cultural Similarities
- Culture
- Enculturation
- Ethnocentric Bias
- Ethnographic Studies
- Independent Self
- Individualism
- Interdependent Self
- Observational Learning
- Open Ended Questions
- Positive Affective States
- Rituals
- Self-Construal
- Situational Identity
- Standard Scale
- Value-Free Research

Self-Test

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CHAPTER OVERVIEW

16: Personality

16.1: Introduction

16.2: Personality Traits

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16.1: Introduction

Jorden A. Cummings

What are you like? What are your friends like? Chances are, the way you describe yourself and others often reflects what you think their **personality** is like. **Personality traits** reflect people's characteristic patterns of thoughts, feelings, and behaviour. They imply that we have consistency and stability in who we are. There are many trait theories of personality and we discuss some of them in this chapter.

Other personality researchers, however, argue that our behaviour is only influenced in part by our consistent traits. Instead, situations also influence how a person behaves. For example, you probably behave differently whether you are in class, at your job, or with your friends. In fact, some people who know you in some of those settings might be surprised at who you "are" in some of the others. In this chapter, we're going to discuss these situational theories of personality as well.

Personality assessment is the process a psychologist undertakes to determine what someone's personality is. There are multiple different ways to do that. In this chapter we discuss objective personality tests, projective and implicit tests, and behavioural/performance measures.

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16.2: Personality Traits

Edward Diener, Richard E. Lucas, and Jorden A. Cummings

Personality traits reflect people's characteristic patterns of thoughts, feelings, and behaviours. Personality traits imply consistency and stability—someone who scores high on a specific trait like Extraversion is expected to be sociable in different situations and over time. Thus, trait psychology rests on the idea that people differ from one another in terms of where they stand on a set of basic trait dimensions that persist over time and across situations. The most widely used system of traits is called the Five-Factor Model. This system includes five broad traits that can be remembered with the acronym OCEAN: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Each of the major traits from the Big Five can be divided into facets to give a more fine-grained analysis of someone's personality. In addition, some trait theorists argue that there are other traits that cannot be completely captured by the Five-Factor Model. Critics of the trait concept argue that people do not act consistently from one situation to the next and that people are very influenced by situational forces. Thus, one major debate in the field concerns the relative power of people's traits versus the situations in which they find themselves as predictors of their behaviour.

Learning Objectives

- List and describe the "Big Five" ("OCEAN") personality traits that comprise the Five-Factor Model of personality.
- Describe how the facet approach extends broad personality traits.
- Explain a critique of the personality-trait concept.
- Describe in what ways personality traits may be manifested in everyday behaviour.
- Describe each of the Big Five personality traits, and the low and high end of the dimension.
- Give examples of each of the Big Five personality traits, including both a low and high example.
- Describe the person-situation debate and how situational factors might complicate attempts to define and measure personality traits.

Introduction



Figure 16.1 "Are you an introvert"? In popular culture it's common to talk about people being introverts or extroverts as if these were precise descriptions that meant the same thing for everyone. But research shows that these traits and others are quite variable within individuals.

When we observe people around us, one of the first things that strikes us is how different people are from one another. Some people are very talkative while others are very quiet. Some are active whereas others are couch potatoes. Some worry a lot, others almost never seem anxious. Each time we use one of these words, words like "talkative," "quiet," "active," or "anxious," to describe those around us, we are talking about a person's **personality**—the characteristic ways that people differ from one another. Personality psychologists try to describe and understand these differences.

Although there are many ways to think about the personalities that people have, Gordon Allport and other "personologists" claimed that we can best understand the differences between individuals by understanding their personality traits. **Personality traits** reflect basic dimensions on which people differ (Matthews, Deary, & Whiteman, 2003). According to trait psychologists, there are a limited number of these dimensions (dimensions like Extraversion, Conscientiousness, or Agreeableness), and each individual falls somewhere on each dimension, meaning that they could be low, medium, or high on any specific trait.

An important feature of personality traits is that they reflect **continuous distributions** rather than distinct personality types. This means that when personality psychologists talk about Introverts and Extraverts, they are not really talking about two distinct types of people who are completely and qualitatively different from one another. Instead, they are talking about people who score relatively low or relatively high along a continuous distribution. In fact, when personality psychologists measure traits like **Extraversion**, they typically find that most people score somewhere in the middle, with smaller numbers showing more extreme levels. Figure 16.2 shows the distribution of Extraversion scores from a survey of thousands of people. As you can see, most people report being moderately, but not extremely, extraverted, with fewer people reporting very high or very low scores.

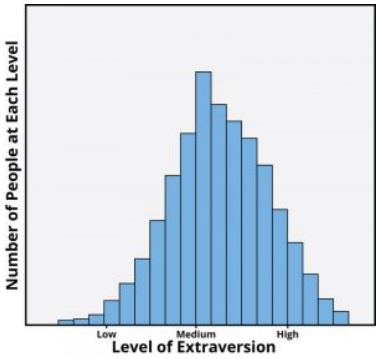


Figure 16.2 Distribution of Extraversion Scores in a Sample Higher bars mean that more people have scores of that level. This figure shows that most people score towards the middle of the extraversion scale, with fewer people who are highly extraverted or highly introverted.

There are three criteria that are characterize personality traits: (1) consistency, (2) stability, and (3) individual differences.

1. To have a personality trait, individuals must be somewhat consistent across situations in their behaviours related to the trait. For example, if they are talkative at home, they tend also to be talkative at work.
2. Individuals with a trait are also somewhat stable over time in behaviours related to the trait. If they are talkative, for example, at age 30, they will also tend to be talkative at age 40.
3. People differ from one another on behaviours related to the trait. Using speech is not a personality trait and neither is walking on two feet—virtually all individuals do these activities, and there are almost no individual differences. But people differ on how frequently they talk and how active they are, and thus personality traits such as Talkativeness and Activity Level do exist.

A challenge of the trait approach was to discover the major traits on which all people differ. Scientists for many decades generated hundreds of new traits, so that it was soon difficult to keep track and make sense of them. For instance, one psychologist might focus on individual differences in "friendliness," whereas another might focus on the highly related concept of "sociability." Scientists began seeking ways to reduce the number of traits in some systematic way and to discover the basic traits that describe most of the differences between people.

The way that Gordon Allport and his colleague Henry Odbert approached this was to search the dictionary for all descriptors of personality (Allport & Odbert, 1936). Their approach was guided by the **lexical hypothesis**, which states that all important personality characteristics should be reflected in the language that we use to describe other people. Therefore, if we want to understand the fundamental ways in which people differ from one another, we can turn to the words that people use to describe one another. So if we want to know what words people use to describe one another, where should we look? Allport and Odbert looked in the most obvious place—the dictionary. Specifically, they took all the personality descriptors that they could find in the dictionary (they started with almost 18,000 words but quickly reduced that list to a more manageable number) and then used statistical techniques to determine which words "went together." In other words, if everyone who said that they were "friendly" also said that they were "sociable," then this might mean that personality psychologists would only need a single trait to capture individual differences in these characteristics. Statistical techniques were used to determine whether a small number of dimensions might underlie all of the thousands of words we use to describe people.

The Five-Factor Model of Personality

Research that used the lexical approach showed that many of the personality descriptors found in the dictionary do indeed overlap. In other words, many of the words that we use to describe people are synonyms. Thus, if we want to know what a person is like, we do not necessarily need to ask how sociable they are, how friendly they are, and how gregarious they are. Instead, because sociable people tend to be friendly and gregarious, we can summarize this personality dimension with a single term. Someone who is sociable, friendly, and gregarious would typically be described as an "Extravert." Once we know she is an extravert, we can assume that she is sociable, friendly, and gregarious.

Statistical methods (specifically, a technique called **factor analysis**) helped to determine whether a small number of dimensions underlie the diversity of words that people like Allport and Odbert identified. The most widely accepted system to emerge from this approach was "The Big Five" or "**Five-Factor Model**" (Goldberg, 1990; McCrae & John, 1992; McCrae & Costa, 1987). The Big Five comprises five major traits shown in the Figure 16.3 below. A way to remember these five is with the acronym OCEAN (O is for **Openness**; C is for **Conscientiousness**; E is for **Extraversion**; A is for **Agreeableness**; N is for **Neuroticism**). Figure 16.4 provides descriptions of people who would score high and low on each of these traits.

Figure 16.3 Descriptions of the Big Five Personality Traits

Figure 16.4 Example behaviours for those scoring low and high for the big 5 traits

Scores on the Big Five traits are mostly independent. That means that a person's standing on one trait tells very little about their standing on the other traits of the Big Five. For example, a person can be extremely high in Extraversion and be either high or low on Neuroticism. Similarly, a person can be low in Agreeableness and be either high or low in Conscientiousness. Thus, in the Five-Factor Model, you need five scores to describe most of an individual's personality.

In the Appendix to this module, we present a short scale to assess the Five-Factor Model of personality (Donnellan, Oswald, Baird, & Lucas, 2006). You can take this test to see where you stand in terms of your Big Five scores. John Johnson has also created a helpful website that has personality scales that can be used and taken by the general public: http://www.personal.psu.edu/j5j/IPIP/ipipneo120.htm. After seeing your scores, you can judge for yourself whether you think such tests are valid.

Traits are important and interesting because they describe stable patterns of behaviour that persist for long periods of time (Caspi, Roberts, & Shiner, 2005). Importantly, these stable patterns can have broad-ranging consequences for many areas of our life (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). For instance, think about the factors that determine success in college. If you were asked to guess what factors predict good grades in college, you might guess something like intelligence. This guess would be correct, but we know much more about who is likely to do well. Specifically, personality researchers have also found the personality traits like Conscientiousness play an important role in college and beyond, probably because highly conscientious individuals study hard, get their work done on time, and are less distracted by nonessential activities that take time away from school work. In addition, highly conscientious people are often healthier than people low in conscientiousness because they are more likely to maintain healthy diets, to exercise, and to follow basic safety procedures like wearing seat belts or bicycle helmets. Over the long term, this consistent pattern of behaviours can add up to meaningful differences in health and longevity. Thus, personality traits are not just a useful way to describe people you know; they actually help psychologists predict how good a worker someone will be, how long he or she will live, and the types of jobs and activities the person will enjoy. Thus, there is growing interest in personality psychology among psychologists who work in applied settings, such as health psychology or organizational psychology.

Facets of Traits (Subtraits)

Trait	Facets of Trait
Openness	• Fantasy prone • Open to feelings • Open to diverse behaviors • Open to new and different ideas • Open to various values and beliefs
Conscientiousness	• Competent • Orderly • Dutiful • Achievement oriented • Self-disciplined • Deliberate
Extraversion	• Gregarious (sociable) • Warm • Assertive • Active • Excitement-seeking • Positive emotionality
Agreeableness	• Trusting • Straightforward • Altruistic • Compliant • Modest • Tender-minded
Neuroticism	• Anxious • Angry • Depressed • Self-consciousness • Impulsive • Vulnerable

Figure 16.5 Facets of Traits

So how does it feel to be told that your entire personality can be summarized with scores on just five personality traits? Do you think these five scores capture the complexity of your own and others' characteristic patterns of thoughts, feelings, and behaviours? Most people would probably say no, pointing to some exception in their behaviour that goes against the general pattern that others might see. For instance, you may know people who are warm and friendly and find it easy to talk with strangers at a party yet are terrified if they have to perform in front of others or speak to large groups of people. The fact that there are different ways of being extraverted or conscientious shows that there is value in considering lower-level units of personality that are more specific than the Big Five traits. These more specific, lower-level units of personality are often called **facets**.

To give you a sense of what these narrow units are like, Figure 16.5 shows facets for each of the Big Five traits. It is important to note that although personality researchers generally agree about the value of the Big Five traits as a way to summarize one's personality, there is no widely accepted list of facets that should be studied. The list seen here, based on work by researchers Paul Costa and Jeff McCrae, thus reflects just one possible list among many. It should, however, give you an idea of some of the facets making up each of the Five-Factor Model.

Facets can be useful because they provide more specific descriptions of what a person is like. For instance, if we take our friend who loves parties but hates public speaking, we might say that this person scores high on the "gregariousness" and "warmth" facets of extraversion, while scoring lower on facets such as "assertiveness" or "excitement-seeking." This precise profile of facet scores not only provides a better description, it might also allow us to better predict how this friend will do in a variety of different jobs (for example, jobs that require public speaking versus jobs that involve one-on-one interactions with customers; Paunonen & Ashton, 2001). Because different facets within a broad, global trait like extraversion tend to go together (those who are gregarious are often but not always assertive), the broad trait often provides a useful summary of what a person is like. But when we really want to know a person, facet scores add to our knowledge in important ways.

Other Traits Beyond the Five-Factor Model

Despite the popularity of the Five-Factor Model, it is certainly not the only model that exists. Some suggest that there are more than five major traits, or perhaps even fewer. For example, in one of the first comprehensive models to be proposed, Hans Eysenck suggested that Extraversion and Neuroticism are most important. Eysenck believed that by combining people's standing on these two major traits, we could account for many of the differences in personality that we see in people (Eysenck, 1981). So for instance, a neurotic introvert would be shy and nervous, while a stable introvert might avoid social situations and prefer solitary activities, but he may do so with a calm, steady attitude and little anxiety or emotion. Interestingly, Eysenck attempted to link these two major dimensions to underlying differences in people's biology. For instance, he suggested that

introverts experienced too much sensory stimulation and arousal, which made them want to seek out quiet settings and less stimulating environments. More recently, Jeffrey Gray suggested that these two broad traits are related to fundamental reward and avoidance systems in the brain—extraverts might be motivated to seek reward and thus exhibit assertive, reward-seeking behaviour, whereas people high in neuroticism might be motivated to avoid punishment and thus may experience anxiety as a result of their heightened awareness of the threats in the world around them (Gray, 1981. This model has since been updated; see Gray & McNaughton, 2000). These early theories have led to a burgeoning interest in identifying the physiological underpinnings of the individual differences that we observe.

Another revision of the Big Five is the **HEXACO model** of traits (Ashton & Lee, 2007). This model is similar to the Big Five, but it posits slightly different versions of some of the traits, and its proponents argue that one important class of individual differences was omitted from the Five-Factor Model. The HEXACO adds Honesty-Humility as a sixth dimension of personality. People high in this trait are sincere, fair, and modest, whereas those low in the trait are manipulative, narcissistic, and self-centered. Thus, trait theorists are agreed that personality traits are important in understanding behaviour, but there are still debates on the exact number and composition of the traits that are most important.

There are other important traits that are not included in comprehensive models like the Big Five. Although the five factors capture much that is important about personality, researchers have suggested other traits that capture interesting aspects of our behaviour. In Figure 16.6 below we present just a few, out of hundreds, of the other traits that have been studied by personologists.

Figure 16.6 Other Traits Beyond Those Included in the Big Five

Not all of the above traits are currently popular with scientists, yet each of them has experienced popularity in the past. Although the Five-Factor Model has been the target of more rigorous research than some of the traits above, these additional personality characteristics give a good idea of the wide range of behaviours and attitudes that traits can cover.

Figure 16.7 The way people behave is only in part a product of their natural personality. Situations also influence how a person behaves. Are you for instance a "different person" as a student in a classroom compared to when you're a member of a close-knit social group?

The ideas described in this module should probably seem familiar, if not obvious to you. When asked to think about what our friends, enemies, family members, and colleagues are like, some of the first things that come to mind are their personality characteristics. We might think about how warm and helpful our first teacher was, how irresponsible and careless our brother is, or how demanding and insulting our first boss was. Each of these descriptors reflects a personality trait, and most of us generally think that the descriptions that we use for individuals accurately reflect their "characteristic pattern of thoughts, feelings, and behaviours," or in other words, their personality.

But what if this idea were wrong? What if our belief in personality traits were an illusion and people are not consistent from one situation to the next? This was a possibility that shook the foundation of personality psychology in the late 1960s when Walter Mischel published a book called *Personality and Assessment* (1968). In this book, Mischel suggested that if one looks closely at people's behaviour across many different situations, the consistency is really not that impressive. In other words, children who cheat on tests at school may steadfastly follow all rules when playing games and may never tell a lie to their parents. In other words, he suggested, there may not be any general trait of honesty that links these seemingly related behaviours. Furthermore, Mischel suggested that observers may believe that broad personality traits like honesty exist, when in fact, this belief is an illusion. The debate that followed the publication of Mischel's book was called the **person-situation debate** because it pitted the power of personality against the power of situational factors as determinants of the behaviour that people exhibit.

Because of the findings that Mischel emphasized, many psychologists focused on an alternative to the trait perspective. Instead of studying broad, context-free descriptions, like the trait terms we've described so far, Mischel thought that psychologists should focus on people's distinctive reactions to specific situations. For instance, although there may not be a broad and general trait of honesty, some children may be especially likely to cheat on a test when the risk of being caught is low and the rewards for cheating are high. Others might be motivated by the sense of risk involved in cheating and may do so even when the rewards are not very high. Thus, the behaviour itself results from the child's unique evaluation of the risks and rewards present at that moment, along with her evaluation of her abilities and values. Because of this, the same child might act very differently in different situations. Thus, Mischel thought that specific behaviours were driven by the interaction between very specific, psychologically meaningful features of the situation in which people found themselves, the person's unique way of perceiving that situation, and his or her abilities for dealing with it. Mischel and others argued that it was these social-cognitive processes that underlie people's reactions to specific situations that provide some consistency when situational features are the same. If so, then studying these broad traits might be more fruitful than cataloging and measuring narrow, context-free traits like Extraversion or Neuroticism.

In the years after the publication of Mischel's (1968) book, debates raged about whether personality truly exists, and if so, how it should be studied. And, as is often the case, it turns out that a more moderate middle ground than what the situationists proposed could be reached. It is certainly true, as Mischel pointed out, that a person's behaviour in one specific situation is not a good guide to how that person will behave in a very different specific situation. Someone who is extremely talkative at one specific party may sometimes be reticent to speak up during class and may even act like a wallflower at a different party. But this does not mean that personality does not exist, nor does it mean that people's behaviour is completely determined by situational factors. Indeed, research conducted after the person-situation debate shows that on average, the effect of the "situation" is about as large as that of personality traits. However, it is also true that if psychologists assess a broad range of behaviours across many different situations, there are general tendencies that emerge. Personality traits give an indication about how people will act on average, but frequently they are not so good at predicting how a person will act in a specific situation at a certain moment in time. Thus, to best capture broad traits, one must assess *aggregate* behaviours, averaged over time and across many different types of situations. Most modern personality researchers agree that there is a place for broad personality traits and for the narrower units such as those studied by Walter Mischel.

Appendix: The Mini-IPIP Scale

(Donnellan, Oswald, Baird, & Lucas, 2006)

Instructions: Below are phrases describing people's behaviours. Please use the rating scale below to describe how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. Please read each statement carefully, and put a number from 1 to 5 next to it to describe how accurately the statement describes you.

1 = Very inaccurate

2 = Moderately inaccurate

3 = Neither inaccurate nor accurate

4 = Moderately accurate

5 = Very accurate

1. _____ Am the life of the party (E)
2. _____ Sympathize with others' feelings (A)
3. _____ Get chores done right away (C)
4. _____ Have frequent mood swings (N)
5. _____ Have a vivid imagination (O)
6. _____Don't talk a lot (E)
7. _____ Am not interested in other people's problems (A)
8. _____ Often forget to put things back in their proper place (C)
9. _____ Am relaxed most of the time (N)
10. _____ Am not interested in abstract ideas (O)
11. _____ Talk to a lot of different people at parties (E)
12. _____ Feel others' emotions (A)
13. _____ Like order (C)
14. _____ Get upset easily (N)
15. _____ Have difficulty understanding abstract ideas (O)
16. _____ Keep in the background (E)
17. _____ Am not really interested in others (A)
18. _____ Make a mess of things (C)
19. _____ Seldom feel blue (N)
20. _____ Do not have a good imagination (O)

Scoring: The first thing you must do is to reverse the items that are worded in the opposite direction. In order to do this, subtract the number you put for that item from 6. So if you put a 4, for instance, it will become a 2. Cross out the score you put when you took the scale, and put the new number in representing your score subtracted from the number 6.

Items to be reversed in this way: 6, 7, 8, 9, 10, 15, 16, 17, 18, 19, 20

Next, you need to add up the scores for each of the five OCEAN scales (including the reversed numbers where relevant). Each OCEAN score will be the sum of four items. Place the sum next to each scale below.

_____ Openness: Add items 5, 10, 15, 20

_____ Conscientiousness: Add items 3, 8, 13, 18

_____ Extraversion: Add items 1, 6, 11, 16

_____ Agreeableness: Add items 2, 7, 12, 17

_____ Neuroticism: Add items 4, 9,14, 19

Compare your scores to the norms below to see where you stand on each scale. If you are low on a trait, it means you are the opposite of the trait label. For example, low on Extraversion is Introversion, low on Openness is Conventional, and low on Agreeableness is Assertive.

19–20 Extremely High, 17–18 Very High, 14–16 High,

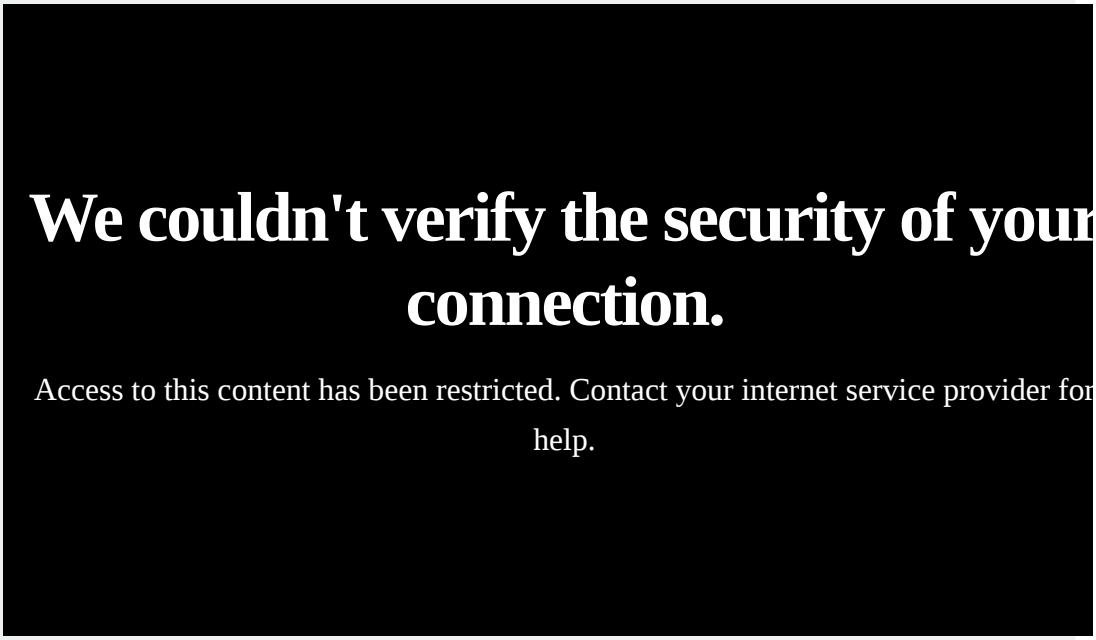
11–13 Neither high nor low; in the middle, 8–10 Low, 6–7 Very low, 4–5 Extremely low

Outside Resources

Video 1: Gabriela Cintron's – *5 Factors of Personality (OCEAN Song)*. This is a student-made video which cleverly describes, through song, common behavioural characteristics of the Big 5 personality traits. It was one of the winning entries in the 2016-17 Noba + Psi Chi Student Video Award.



Video 2: Michael Harris' – *Personality Traits: The Big 5 and More*. This is a student-made video that looks at characteristics of the OCEAN traits through a series of funny vignettes. It also presents on the Person vs Situation Debate. It was one of the winning entries in the 2016-17 Noba + Psi Chi Student Video Award.



Video 3: David M. Cole's – *Grouchy with a Chance of Stomping*. This is a student-made video that makes a very important point about the relationship between personality traits and behaviour using a handy weather analogy. It was one of the winning entries in the 2016-17 Noba + Psi Chi Student Video Award.





Web: International Personalit

Web: John Johnson personali

Web: Personality trait systems compared http://www.personalityresearch.org/bigfive/goldberg.html

Web: Sam Gosling website http://homepage.psy.utexas.edu/homepage/faculty/gosling/samgosling.htm

Discussion Questions

1. Consider different combinations of the Big Five, such as O (Low), C (High), E (Low), A (High), and N (Low). What would this person be like? Do you know anyone who is like this? Can you select politicians, movie stars, and other famous people and rate them on the Big Five?
2. How do you think learning and inherited personality traits get combined in adult personality?
3. Can you think of instances where people do not act consistently—where their personality traits are not good predictors of their behaviour?
4. Has your personality changed over time, and in what ways?
5. Can you think of a personality trait not mentioned in this module that describes how people differ from one another?
6. When do extremes in personality traits become harmful, and when are they unusual but productive of good outcomes?

Image Attributions

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Figure 16.7: UO Education, https://goo.gl/ylgV9T, CC BY-NC 2.0, https://goo.gl/VnKlK8

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16.3: Personality Assessment

David Watson

This module provides a basic overview to the assessment of personality. It discusses objective personality tests (based on both self-report and informant ratings), projective and implicit tests, and behavioral/performance measures. It describes the basic features of each method, as well as reviewing the strengths, weaknesses, and overall validity of each approach.

Learning Objectives

- Appreciate the diversity of methods that are used to measure personality characteristics.
- Understand the logic, strengths and weaknesses of each approach.
- Gain a better sense of the overall validity and range of applications of personality tests.

Introduction

Personality is the field within psychology that studies the thoughts, feelings, behaviors, goals, and interests of normal individuals. It therefore covers a very wide range of important psychological characteristics. Moreover, different theoretical models have generated very different strategies for measuring these characteristics. For example, humanistically oriented models argue that people have clear, well-defined goals and are actively striving to achieve them (McGregor, McAdams, & Little, 2006). It, therefore, makes sense to ask them directly about themselves and their goals. In contrast, psychodynamically oriented theories propose that people lack insight into their feelings and motives, such that their behavior is influenced by processes that operate outside of their awareness (e.g., McClelland, Koestner, & Weinberger, 1989; Meyer & Kurtz, 2006). Given that people are unaware of these processes, it does not make sense to ask directly about them. One, therefore, needs to adopt an entirely different approach to identify these nonconscious factors. Not surprisingly, researchers have adopted a wide range of approaches to measure important personality characteristics. The most widely used strategies will be summarized in the following sections.



Figure 16.8 Do people possess the necessary awareness to see themselves as they are and provide accurate insights into their own personalities?

Objective Tests

Definition

Objective tests (Loevinger, 1957; Meyer & Kurtz, 2006) represent the most familiar and widely used approach to assessing personality. Objective tests involve administering a standard set of items, each of which is answered using a limited set of response options (e.g., true or false; strongly disagree, slightly disagree, slightly agree, strongly agree). Responses to these items then are scored in a standardized, predetermined way. For example, self-ratings on items assessing talkativeness, assertiveness, sociability, adventurousness, and energy can be summed up to create an overall score on the personality trait of extraversion.

It must be emphasized that the term “objective” refers to the method that is used to *score* a person’s responses, rather than to the responses themselves. As noted by Meyer and Kurtz (2006, p. 233), “What is *objective* about such a procedure is that the

psychologist administering the test does not need to rely on judgment to classify or interpret the test-taker's response; the intended response is clearly indicated and scored according to a pre-existing key." In fact, as we will see, a person's test responses may be highly subjective and can be influenced by a number of different rating biases.

Basic Types of Objective Tests

Self-report measures

Objective personality tests can be further subdivided into two basic types. The first type—which easily is the most widely used in modern personality research—asks people to describe themselves. This approach offers two key advantages. First, self-raters have access to an unparalleled wealth of information: After all, who knows more about you than you yourself? In particular, self-raters have direct access to their own thoughts, feelings, and motives, which may not be readily available to others (Oh, Wang, & Mount, 2011; Watson, Hubbard, & Weise, 2000). Second, asking people to describe themselves is the simplest, easiest, and most cost-effective approach to assessing personality. Countless studies, for instance, have involved administering self-report measures to college students, who are provided some relatively simple incentive (e.g., extra course credit) to participate.

The items included in self-report measures may consist of single words (e.g., *assertive*), short phrases (e.g., *am full of energy*), or complete sentences (e.g., *I like to spend time with others*). Table 16.1 presents a sample self-report measure assessing the general traits comprising the influential five-factor model (FFM) of personality: neuroticism, extraversion, openness, agreeableness, and conscientiousness (John & Srivastava, 1999; McCrae, Costa, & Martin, 2005). The sentences shown in Table 1 are modified versions of items included in the International Personality Item Pool (IPIP) (Goldberg et al., 2006), which is a rich source of personality-related content in the public domain (for more information about IPIP, go to: http://ipip.ori.org/).

Please read each statement carefully and then mark the appropriate response below. Use the following scale to record your responses:

1	2	3	4	5
strongly disagree	slightly disagree	neutral or cannot decide	slightly agree	strongly agree

_____ 1. I get upset easily.
_____ 2. I enjoy being part of a group.
_____ 3. I like to solve complex problems.
_____ 4. I believe that others have good intentions.
_____ 5. I am always prepared.
_____ 6. I have a low opinion of myself.
_____ 7. I have a natural talent for influencing people.
_____ 8. I enjoy the beauty of nature.
_____ 9. I try to anticipate the needs of others.
_____ 10. I can be trusted to keep my promises.
_____ 11. I get irritated easily.
_____ 12. I have a lot of fun.
_____ 13. I like to visit new places.
_____ 14. I love to help others.
_____ 15. I set high standards for myself and others.

Sum up the following items to see how you score on five general personality traits. The numbers below indicate which questions correspond to each trait. A high score indicates a stronger level of that trait:

1	6	11	Neuroticism
2	7	12	Extraversion
3	8	13	Openness/Intellect
4	9	14	Agreeableness
5	10	15	Conscientiousness

Table 16.1 Sample Self-Report Personality Measure

Self-report personality tests show impressive **validity** in relation to a wide range of important outcomes. For example, self-ratings of conscientiousness are significant predictors of both overall academic performance (e.g., cumulative grade point average; Poropat, 2009) and job performance (Oh, Wang, and Mount, 2011). Roberts, Kuncel, Shiner, Caspi, and Goldberg (2007) reported that self-rated personality predicted occupational attainment, divorce, and mortality. Similarly, Friedman, Kern, and Reynolds (2010) showed that personality ratings collected early in life were related to happiness/well-being, physical health, and mortality risk assessed several decades later. Finally, self-reported personality has important and pervasive links to psychopathology. Most notably, self-ratings of neuroticism are associated with a wide array of clinical syndromes, including anxiety disorders, depressive disorders, substance use disorders, somatoform disorders, eating disorders, personality and conduct disorders, and schizophrenia/schizotypy (Kotov, Gamez, Schmidt, & Watson, 2010; Mineka, Watson, & Clark, 1998).

At the same time, however, it is clear that this method is limited in a number of ways. First, raters may be motivated to present themselves in an overly favorable, socially desirable way (Paunonen & LeBel, 2012). This is a particular concern in "**high-stakes testing**," that is, situations in which test scores are used to make important decisions about individuals (e.g., when applying for a job). Second, personality ratings reflect a **self-enhancement bias** (Vazire & Carlson, 2011); in other words, people are motivated to ignore (or at least downplay) some of their less desirable characteristics and to focus instead on their more positive attributes. Third, self-ratings are subject to the **reference group effect** (Heine, Buchtel, & Norenzayan, 2008); that is, we base our self-perceptions, in part, on how we compare to others in our sociocultural reference group. For instance, if you tend to work harder

than most of your friends, you will see yourself as someone who is relatively conscientious, even if you are not particularly conscientious in any absolute sense.

Informant ratings

Another approach is to ask someone who knows a person well to describe his or her personality characteristics. In the case of children or adolescents, the informant is most likely to be a parent or teacher. In studies of older participants, informants may be friends, roommates, dating partners, spouses, children, or bosses (Oh et al., 2011; Vazire & Carlson, 2011; Watson et al., 2000).

Generally speaking, informant ratings are similar in format to self-ratings. As was the case with self-report, items may consist of single words, short phrases, or complete sentences. Indeed, many popular instruments include parallel self- and informant-rating versions, and it often is relatively easy to convert a self-report measure so that it can be used to obtain informant ratings. Table 16.2 illustrates how the self-report instrument shown in Table 16.1 can be converted to obtain spouse-ratings (in this case, having a husband describe the personality characteristics of his wife).

Please read each statement carefully and then mark the appropriate response below. For each item, select the answer that best represents the personality characteristics of *your wife*. Use the following scale to record your responses:

1	2	3	4	5
strongly disagree	slightly disagree	neutral or cannot decide	slightly agree	strongly agree

_____ 1. She gets upset easily.
_____ 2. She enjoys being part of a group.
_____ 3. She likes to solve complex problems.
_____ 4. She believes that others have good intentions.
_____ 5. She is always prepared.
_____ 6. She has a low opinion of herself.
_____ 7. She has a natural talent for influencing people.
_____ 8. She enjoys the beauty of nature.
_____ 9. She tries to anticipate the needs of others.
_____ 10. She can be trusted to keep her promises.
_____ 11. She gets irritated easily.
_____ 12. She has a lot of fun.
_____ 13. She likes to visit new places.
_____ 14. She loves to help others.
_____ 15. She sets high standards for herself and others.

Table 16.2 Sample Spouse-Report Personality Measure

Informant ratings are particularly valuable when self-ratings are impossible to collect (e.g., when studying young children or cognitively impaired adults) or when their validity is suspect (e.g., as noted earlier, people may not be entirely honest in high-stakes testing situations). They also may be combined with self-ratings of the same characteristics to produce more **reliable** and valid measures of these attributes (McCrae, 1994).

Informant ratings offer several advantages in comparison to other approaches to assessing personality. A well-acquainted informant presumably has had the opportunity to observe large samples of behavior in the person he or she is rating. Moreover, these judgments presumably are not subject to the types of defensiveness that potentially can distort self-ratings (Vazire & Carlson, 2011). Indeed, informants typically have strong incentives for being accurate in their judgments. As Funder and Dobroth (1987, p. 409), put it, “Evaluations of the people in our social environment are central to our decisions about who to befriend and avoid, trust and distrust, hire and fire, and so on.”

Informant personality ratings have demonstrated a level of validity in relation to important life outcomes that is comparable to that discussed earlier for self-ratings. Indeed, they outperform self-ratings in certain circumstances, particularly when the assessed traits

are highly evaluative in nature (e.g., intelligence, charm, creativity; see Vazire & Carlson, 2011). For example, Oh et al. (2011) found that informant ratings were more strongly related to job performance than were self-ratings. Similarly, Oltmanns and Turkheimer (2009) summarized evidence indicating that informant ratings of Air Force cadets predicted early, involuntary discharge from the military better than self-ratings.

Nevertheless, informant ratings also are subject to certain problems and limitations. One general issue is the level of relevant information that is available to the rater (Funder, 2012). For instance, even under the best of circumstances, informants lack full access to the thoughts, feelings, and motives of the person they are rating. This problem is magnified when the informant does not know the person particularly well and/or only sees him or her in a limited range of situations (Funder, 2012; Beer & Watson, 2010).



Figure 16.9 Informant personality ratings are generally a reliable and valid assessment instrument, however in certain cases the informant may have some significant biases that make the rating less reliable. Newly married individuals for example are likely to rate their partners in an unrealistically positive way.

Informant ratings also are subject to some of the same response biases noted earlier for self-ratings. For instance, they are not immune to the reference group effect. Indeed, it is well-established that parent ratings often are subject to a **sibling contrast effect**, such that parents exaggerate the true magnitude of differences between their children (Pinto, Rijsdijk, Frazier-Wood, Asherson, & Kuntsi, 2012). Furthermore, in many studies, individuals are allowed to nominate (or even recruit) the informants who will rate them. Because of this, it most often is the case that informants (who, as noted earlier, may be friends, relatives, or romantic partners) like the people they are rating. This, in turn, means that informants may produce overly favorable personality ratings. Indeed, their ratings actually can be more favorable than the corresponding self-ratings (Watson & Humrichouse, 2006). This tendency for informants to produce unrealistically positive ratings has been termed the **letter of recommendation effect** (Leising, Erbs, & Fritz, 2010) and the **honeymoon effect** when applied to newlyweds (Watson & Humrichouse, 2006).

Other Ways of Classifying Objective Tests

Comprehensiveness

In addition to the source of the scores, there are at least two other important dimensions on which personality tests differ. The first such dimension concerns the extent to which an instrument seeks to assess personality in a reasonably comprehensive manner. At one extreme, many widely used measures are designed to assess a single core attribute. Examples of these types of measures include the Toronto Alexithymia Scale (Bagby, Parker, & Taylor, 1994), the Rosenberg Self-Esteem Scale (Rosenberg, 1965), and the Multidimensional Experiential Avoidance Questionnaire (Gamez, Chmielewski, Kotov, Ruggero, & Watson, 2011). At the other extreme, a number of omnibus inventories contain a large number of specific scales and purport to measure personality in a reasonably comprehensive manner. These instruments include the California Psychological Inventory (Gough, 1987), the Revised HEXACO Personality Inventory (HEXACO-PI-R) (Lee & Ashton, 2006), the Multidimensional Personality Questionnaire (Patrick, Curtin, & Tellegen, 2002), the NEO Personality Inventory-3 (NEO-PI-3) (McCrae et al., 2005), the Personality Research Form (Jackson, 1984), and the Sixteen Personality Factor Questionnaire (Cattell, Eber, & Tatsuoka, 1980).

Breadth of the target characteristics

Second, personality characteristics can be classified at different levels of breadth or generality. For example, many models emphasize broad, "big" traits such as neuroticism and extraversion. These general dimensions can be divided up into several distinct yet empirically correlated component traits. For example, the broad dimension of extraversion contains such specific component traits as dominance (extraverts are assertive, persuasive, and exhibitionistic), sociability (extraverts seek out and enjoy the company of others), positive emotionality (extraverts are active, energetic, cheerful, and enthusiastic), and adventurousness (extraverts enjoy intense, exciting experiences).

Some popular personality instruments are designed to assess only the broad, general traits. For example, similar to the sample instrument displayed in Table 16.1, the **Big Five** Inventory (John & Srivastava, 1999) contains brief scales assessing the broad traits of neuroticism, extraversion, openness, agreeableness, and conscientiousness. In contrast, many instruments—including several of the omnibus inventories mentioned earlier—were designed primarily to assess a large number of more specific characteristics. Finally, some inventories—including the HEXACO-PI-R and the NEO-PI-3—were explicitly designed to provide coverage of both general and specific trait characteristics. For instance, the NEO-PI-3 contains six specific facet scales (e.g., Gregariousness, Assertiveness, Positive Emotions, Excitement Seeking) that then can be combined to assess the broad trait of extraversion.

Projective and Implicit Tests

Projective Tests

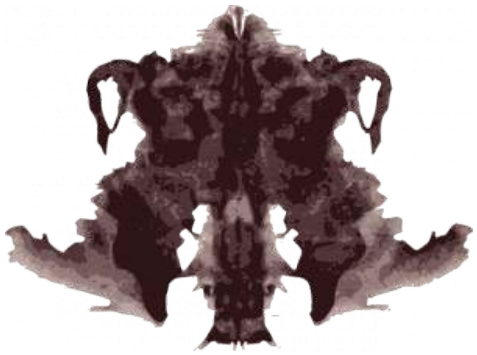


Figure 16.10 Projective tests, such as the famous Rorschach inkblot test require a person to give spontaneous answers that "project" their unique personality onto an ambiguous stimulus.

As noted earlier, some approaches to personality assessment are based on the belief that important thoughts, feelings, and motives operate outside of conscious awareness. Projective tests represent influential early examples of this approach. Projective tests originally were based on the **projective hypothesis** (Frank, 1939; Lilienfeld, Wood, & Garb, 2000): If a person is asked to describe or interpret ambiguous stimuli—that is, things that can be understood in a number of different ways—their responses will be influenced by nonconscious needs, feelings, and experiences (note, however, that the theoretical rationale underlying these measures has evolved over time) (see, for example, Spangler, 1992). Two prominent examples of projective tests are the Rorschach Inkblot Test (Rorschach, 1921) and the Thematic Apperception Test (TAT) (Morgan & Murray, 1935). The former asks respondents to interpret symmetrical blots of ink, whereas the latter asks them to generate stories about a series of pictures.

For instance, one TAT picture depicts an elderly woman with her back turned to a young man; the latter looks downward with a somewhat perplexed expression. Another picture displays a man clutched from behind by three mysterious hands. What stories could you generate in response to these pictures?

In comparison to objective tests, projective tests tend to be somewhat cumbersome and labor intensive to administer. The biggest challenge, however, has been to develop a reliable and valid scheme to score the extensive set of responses generated by each respondent. The most widely used Rorschach scoring scheme is the Comprehensive System developed by Exner (2003). The most influential TAT scoring system was developed by McClelland, Atkinson and colleagues between 1947 and 1953 (McClelland et al., 1989; see also Winter, 1998), which can be used to assess motives such as the need for achievement.

The validity of the Rorschach has been a matter of considerable controversy (Lilienfeld et al., 2000; Mihura, Meyer, Dumitrascu, & Bombel, 2012; Society for Personality Assessment, 2005). Most reviews acknowledge that Rorschach scores do show some ability to predict important outcomes. Its critics, however, argue that it fails to provide important incremental information beyond other, more easily acquired information, such as that obtained from standard self-report measures (Lilienfeld et al., 2000).

Validity evidence is more impressive for the TAT. In particular, reviews have concluded that TAT-based measures of the need for achievement (a) show significant validity to predict important criteria and (b) provide important information beyond that obtained from objective measures of this motive (McClelland et al., 1989; Spangler, 1992). Furthermore, given the relatively weak associations between objective and projective measures of motives, McClelland et al. (1989) argue that they tap somewhat different processes, with the latter assessing **implicit motives** (Schultheiss, 2008).

Implicit Tests

In recent years, researchers have begun to use implicit measures of personality (Back, Schmuckle, & Egloff, 2009; Vazire & Carlson, 2011). These tests are based on the assumption that people form automatic or implicit associations between certain concepts based on their previous experience and behavior. If two concepts (e.g., *me*and *assertive*) are strongly associated with each other, then they should be sorted together more quickly and easily than two concepts (e.g., *me* and *shy*) that are less strongly associated. Although validity evidence for these measures still is relatively sparse, the results to date are encouraging: Back et al. (2009), for example, showed that implicit measures of the FFM personality traits predicted behavior even after controlling for scores on objective measures of these same characteristics.

Behavioral and Performance Measures



Figure 16.11 Observing real world behavior is one way to assess personality. Tendencies such as messiness and neatness are clues to personality.

A final approach is to infer important personality characteristics from direct samples of behavior. For example, Funder and Colvin (1988) brought opposite-sex pairs of participants into the laboratory and had them engage in a five-minute “getting acquainted” conversation; raters watched videotapes of these interactions and then scored the participants on various personality characteristics. Mehl, Gosling, and Pennebaker (2006) used the electronically activated recorder (EAR) to obtain samples of ambient sounds in participants’ natural environments over a period of two days; EAR-based scores then were related to self- and observer-rated measures of personality. For instance, more frequent talking over this two-day period was significantly related to both self- and observer-ratings of extraversion. As a final example, Gosling, Ko, Mannarelli, and Morris (2002) sent observers into college students’ bedrooms and then had them rate the students’ personality characteristics on the Big Five traits. The averaged observer ratings correlated significantly with participants’ self-ratings on all five traits. Follow-up analyses indicated that conscientious students had neater rooms, whereas those who were high in openness to experience had a wider variety of books and magazines.

Behavioral measures offer several advantages over other approaches to assessing personality. First, because behavior is sampled directly, this approach is not subject to the types of response biases (e.g., self-enhancement bias, reference group effect) that can distort scores on objective tests. Second, as is illustrated by the Mehl et al. (2006) and Gosling et al. (2002) studies, this approach allows people to be studied in their daily lives and in their natural environments, thereby avoiding the artificiality of other methods

(Mehl et al., 2006). Finally, this is the only approach that actually assesses what people *do*, as opposed to what they think or feel (see Baumeister, Vohs, & Funder, 2007).

At the same time, however, this approach also has some disadvantages. This assessment strategy clearly is much more cumbersome and labor intensive than using objective tests, particularly self-report. Moreover, similar to projective tests, behavioral measures generate a rich set of data that then need to be scored in a reliable and valid way. Finally, even the most ambitious study only obtains relatively small samples of behavior that may provide a somewhat distorted view of a person's true characteristics. For example, your behavior during a "getting acquainted" conversation on a single given day inevitably will reflect a number of transient influences (e.g., level of stress, quality of sleep the previous night) that are idiosyncratic to that day.

Conclusion

No single method of assessing personality is perfect or infallible; each of the major methods has both strengths and limitations. By using a diversity of approaches, researchers can overcome the limitations of any single method and develop a more complete and integrative view of personality.

Discussion Questions

1. Under what conditions would you expect self-ratings to be most similar to informant ratings? When would you expect these two sets of ratings to be most different from each other?
2. The findings of Gosling, et al. (2002) demonstrate that we can obtain important clues about students' personalities from their dorm rooms. What other aspects of people's lives might give us important information about their personalities?
3. Suppose that you were planning to conduct a study examining the personality trait of honesty. What method or methods might you use to measure it?

Image Attributions

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16.4: Summary, Key Terms, and Self-Test

Jorden A. Cummings

Summary

Personality is the ways that people differ from one another. Many personality researchers believe was can understand the differences between people by examining their personality traits, which reflect basic dimensions on which people differ. Personality traits exist on continuums, not distinct categories.

Personality traits are characterized by consistency, stability, and individual differences. Traits are consistent across situations and stable over time. They also differ amongst people.

One of the most well-known models of personality is the Big Five or Five Factor Model. It was developed using a statistical technique called factor analysis and consists of the traits of openness, conscientiousness, extraversion, agreeableness, and neuroticism. Each trait has several facets, or more specific, lower-level units of personality.

Other personality researchers argue that personality traits are not the best way to view who we are, because we might act differently in various situations. This controversy between trait theories and situational theories of personality is referred to as the person-situation debate. Research has indicated, however, that aspects of both theories best describe personality.

Personality assessment is how we figure out what someone's personality is. We can use multiple types of measures to do this including objective tests (including self-report measures and informant ratings), projective tests, implicit tests, and behavioural and performance measures.

Key Terms

- Agreeableness
- Conscientiousness
- Continuous Distributions
- Extraversion
- Facets
- Factor Analysis
- HEXACO Model
- High-Stakes Testing
- Honeymoon Effect
- Implicit Motives
- Letter of Recommendation Effect
- Lexical Hypothesis
- Neuroticism
- Openness
- Person-Situation Debate
- Personality
- Personality Traits
- Projective Hypothesis
- Reference Group Effect
- Reliability
- Self-Enhancement Bias
- Sibling Contrast Effect
- The Big Five (Five-Factor Model)
- Validity

Self-Test

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CHAPTER OVERVIEW

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17.1: Introduction

Charles Stangor and Jennifer Walinga

When Minor Body Imperfections Lead to Suicide

"I think we probably noticed in his early teens that he became very conscious about aspects of his appearance…he began to brood over it quite a lot," said Maria, as she called in to the talk radio program to describe her son Robert.

Maria described how Robert had begun to worry about his weight. A friend had commented that he had a "fat" stomach, and Robert began to cut down on eating. Then he began to worry that he wasn't growing enough and devised an elaborate series of stretching techniques to help him get taller.

Robert scrutinized his face and body in the mirror for hours, finding a variety of imagined defects. He believed that his nose was crooked, and he was particularly concerned about a lump that he saw on it: "A small lump," said his mother. "I should say it wasn't very significant, but it was significant to him."

Robert insisted that all his misery stemmed from this lump on his nose, that everybody noticed it. In his sophomore year of high school, he had cosmetic surgery to remove it.

Around this time, Robert had his first panic attack and began to worry that everybody could notice him sweating and blushing in public. He asked his parents for a $10,000 loan, which he said was for overseas study. He used the money for a procedure designed to reduce sweating and blushing. Then, dissatisfied with the results, he had the procedure reversed.

Robert was diagnosed with *body dysmorphic disorder*. His mother told the radio host, "At the time we were really happy because we thought that finally we actually knew what we were trying to fight and to be quite honest, I must admit I thought well it sounds pretty trivial.…things seemed to go quite well and he got a new girlfriend and he was getting excellent marks in his clinical work in hospital and he promised us that he wasn't going to have any more surgery."

However, a lighthearted comment from a friend about a noticeable vein in his forehead prompted a relapse. Robert had surgery to tie off the vein. When that didn't solve all his problems as he had hoped, he attempted to have the procedure reversed but learned that it would require complicated microsurgery. He then used injections on himself to try opening the vein again, but he could never completely reverse the first surgery.

Robert committed suicide shortly afterward, in 2001 (Mitchell, 2002).

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17.2: Psychological Disorder- What Makes a Behaviour Abnormal?

Charles Stangor, Jennifer Walinga, and Jorden A. Cummings

Learning Objectives

- Define "psychological disorder" and summarize the general causes of disorder.
- Explain why it is so difficult to define disorder, and how the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*) is used to make diagnoses.
- Describe the stigma of psychological disorders and their impact on those who suffer from them.

The focus of this chapter and the next is, to many people, the heart of psychology. This emphasis on **abnormal psychology** — *the application of psychological science to understanding and treating mental disorders* — is appropriate, as more psychologists are involved in the diagnosis and treatment of psychological disorder than in any other endeavour, and these are probably the most important tasks psychologists face. In 2012, approximately 2.8 million people, or 10.1% of Canadians aged 15 and older, reported symptoms consistent with at least one of six mental or substance use disorders in the past 12 months (Pearson, Janz, & Ali, 2013). At least a half billion people are affected worldwide. The six disorders measured by the Canadian Mental Health Survey were major depressive episode, bipolar disorder, generalized anxiety disorder, and abuse of or dependence on alcohol, cannabis, or other drugs. The impact of mental illness is particularly strong on people who are poorer, of lower socioeconomic class, and from disadvantaged ethnic groups.

People with psychological disorders are also stigmatized by the people around them, resulting in shame and embarrassment, as well as prejudice and discrimination against them. Thus the understanding and treatment of psychological disorder has broad implications for the everyday life of many people. Table 17.1, "Prevalence Rates for Psychological Disorders in Canada, 2012," shows the **prevalence**, *the frequency of occurrence of a given condition in a population at a given time*, of some of the major psychological disorders in Canada.

	Lifetime	12-month
	percent	
Mental or substance disorders	**33.1**	**10.1**
Substance use disorder	21.6	4.4
Alcohol abuse or dependence	18.1	3.2
Cannabis abuse or dependence	6.8	1.3
Other drug abuse or dependence (excluding Cannabis)	4	0.7
Mood disorder	12.6	5.4
Major Depressive Episode	11.3	4.7
Bipolar Disorder	2.6	1.5
Generalized Anxiety Disorder	8.7	2.6

Table 17.1. Prevalence Rates for Psychological Disorders in Canada, 2012, adapted by J. Walinga from Statistics Canada 2013. [Long Description]

In this chapter our focus is on the disorders themselves. We will review the major psychological disorders and consider their causes and their impact on the people who suffer from them. Then in Chapter 18, "Treating Psychological Disorders," we will turn to consider the treatment of these disorders through psychotherapy and drug therapy.

Defining Disorder

A psychological disorder is *an ongoing dysfunctional pattern of thought, emotion, and behaviour that causes significant distress, and that is considered deviant in that person's culture or society* (Butcher, Mineka, & Hooley, 2007). Psychological disorders have much in common with other medical disorders. They are out of the patient's control, they may in some cases be treated by drugs, and their treatment is often covered by medical insurance. Like medical problems, psychological disorders have both biological (nature) as well as environmental (nurture) influences. These causal influences are reflected in the bio-psycho-social model of illness (Engel, 1977).

The **bio-psycho-social model of illness** is *a way of understanding disorder that assumes that disorder is caused by biological, psychological, and social factors* (Figure 17.1, "The Bio-Psycho-Social Model"). The *biological component* of the bio-psycho-

social model refers to the influences on disorder that come from the functioning of the individual's body. Particularly important are genetic characteristics that make some people more vulnerable to a disorder than others and the influence of neurotransmitters. The *psychological component* of the bio-psycho-social model refers to the influences that come from the individual, such as patterns of negative thinking and stress responses. The **social component** of the bio-psycho-social model refers to *the influences on disorder due to social and cultural factors such as socioeconomic status, homelessness, abuse, and discrimination.*

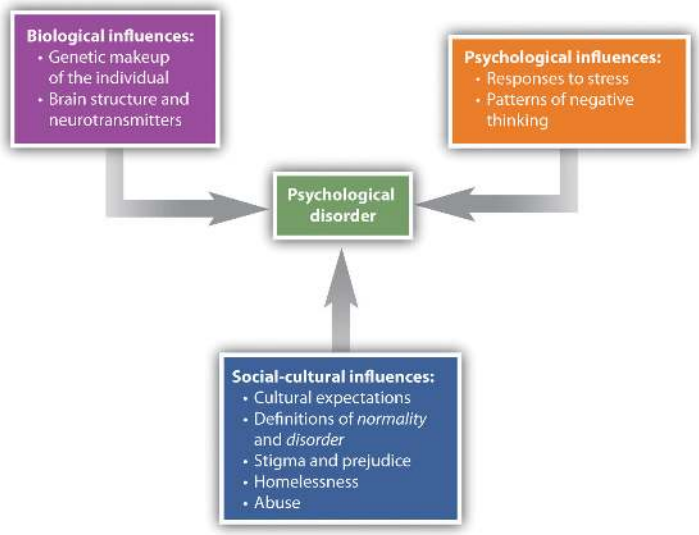


Figure 17.1 The Bio-Psycho-Social Model. The bio-psycho-social model of disorder proposes that disorders are caused by biological, psychological, and social-cultural factors.

To consider one example, the psychological disorder of schizophrenia has a biological cause because it is known that there are patterns of genes that make a person vulnerable to the disorder (Gejman, Sanders, & Duan, 2010). But whether or not the person with a biological vulnerability experiences the disorder depends in large part on psychological factors such as how the individual responds to the stress he or she experiences, as well as social factors such as whether or not the person is exposed to stressful environments in adolescence and whether or not the person has support from people who care about him or her (Sawa & Snyder, 2002; Walker, Kestler, Bollini, & Hochman, 2004). Similarly, mood and anxiety disorders are caused in part by genetic factors such as hormones and neurotransmitters, in part by the individual's particular thought patterns, and in part by the ways that other people in the social environment treat the person with the disorder. We will use the bio-psycho-social model as a framework for considering the causes and treatments of disorder.

Although they share many characteristics with them, psychological disorders are nevertheless different from medical conditions in important ways. For one, diagnosis of psychological disorders can be more difficult. Although a medical doctor can see cancer in the lungs using an MRI scan or see blocked arteries in the heart using cardiac catheterization, there is no corresponding test for psychological disorder. Current research is beginning to provide more evidence about the role of brain structures in psychological disorder, but for now the brains of people with severe mental disturbances often look identical to those of people without such disturbances.

Because there are no clear biological diagnoses, psychological disorders are instead diagnosed on the basis of clinical observations of the behaviours that the individual engages in. These observations find that emotional states and behaviours operate on a continuum, ranging from more normal and accepted to more deviant, abnormal, and unaccepted. The behaviours that are associated with disorder are in many cases the same behaviours that we engage in during our normal everyday life. Washing one's hands is a normal healthy activity, but it can be overdone by those with an *obsessive-compulsive disorder (OCD)*. It is not unusual to worry about and try to improve one's body image. The dancer in Figure 17.2, "How Thin Is Too Thin?" needs to be thin for her career, but when does her dieting turn into a psychological disorder? Psychologists believe this happens when the behaviour becomes distressing and dysfunctional to the person. Robert's struggle with his personal appearance, as discussed at the beginning of this chapter, was clearly unusual, unhealthy, and distressing to him.



Figure 17.2 How Thin Is Too Thin?

Whether a given behaviour is considered a psychological disorder is determined not only by whether a behaviour is unusual (e.g., whether it is mild anxiety versus extreme anxiety) but also by whether a behaviour is **maladaptive** — *that is, the extent to which it causes distress (e.g., pain and suffering) and dysfunction (impairment in one or more important areas of functioning) to the individual* (American Psychiatric Association, 2013). An intense fear of spiders, for example, would not be considered a psychological disorder unless it has a significant negative impact on the sufferer's life, for instance by causing him or her to be unable to step outside the house. The focus on distress and dysfunction means that behaviours that are simply unusual (such as some political, religious, or sexual practices) are not classified as disorders.

Put your psychology hat on for a moment and consider the behaviours of the people listed in Table 17.2, "Diagnosing Disorder." For each, indicate whether you think the behaviour is or is not a psychological disorder. If you're not sure, what other information would you need to know to be more certain of your diagnosis?

Table 17.2 Diagnosing Disorder.

Yes	No	Need more information	Description
			Jackie frequently talks to herself while she is working out her math homework. Her roommate sometimes hears her and wonders if she is okay.
			Charlie believes that the noises made by cars and planes going by outside his house have secret meanings. He is convinced that he was involved in the start of a nuclear war and that the only way for him to survive is to find the answer to a difficult riddle.
			Harriet gets very depressed during the winter months when the light is low. She sometimes stays in her pajamas for the whole weekend, eating chocolate and watching TV.
			Frank seems to be afraid of a lot of things. He worries about driving on the highway and about severe weather that may come through his neighbourhood. But mostly he fears mice, checking under his bed frequently to see if any are present.
			A worshiper speaking in “tongues” at an Evangelical church views himself as “filled” with the Holy Spirit and is considered blessed with the gift to speak the “language of angels.”

A trained clinical psychologist would have checked off “need more information” for each of the examples in Table 17.2, “Diagnosing Disorder,” because although the behaviours may seem unusual, there is no clear evidence that they are distressing or dysfunctional for the person. Talking to ourselves out loud is unusual and can be a symptom of schizophrenia, but just because we do it once in a while does not mean that there is anything wrong with us. It is natural to be depressed, particularly in the long winter nights, but how severe should this depression be, and how long should it last? If the negative feelings last for an extended time and begin to lead the person to miss work or classes, then they may become symptoms of a mood disorder. It is normal to worry about things, but when does worry turn into a debilitating anxiety disorder? And what about thoughts that seem to be irrational, such as being able to speak the language of angels? Are they indicators of a severe psychological disorder, or part of a normal religious experience? Again, the answer lies in the extent to which they are (or are not) interfering with the individual’s functioning in society.

Another difficulty in diagnosing psychological disorders is that they frequently occur together. For instance, people diagnosed with anxiety disorders also often have mood disorders (Hunt, Slade, & Andrews, 2004), and people diagnosed with one personality

disorder frequently suffer from other personality disorders as well. **Comorbidity** *occurs when people who suffer from one disorder also suffer at the same time from other disorders*. Because many psychological disorders are comorbid, most severe mental disorders are concentrated in a small group of people (about 6% of the population) who have more than three of them (Kessler, Chiu, Demler, & Walters, 2005).

Psychology in Everyday Life: Combating the Stigma of Abnormal Behaviour

Every culture and society has its own views on what constitutes abnormal behaviour and what causes it (Brothwell, 1981). The Old Testament Book of Samuel tells us that as a consequence of his sins, God sent King Saul an evil spirit to torment him (1 Samuel 16:14). Ancient Hindu tradition attributed psychological disorder to sorcery and witchcraft. During the Middle Ages it was believed that mental illness occurred when the body was infected by evil spirits, particularly the devil. Remedies included whipping, bloodletting, purges, and trepanation (cutting a hole in the skull, Figure 17.3) to release the demons.

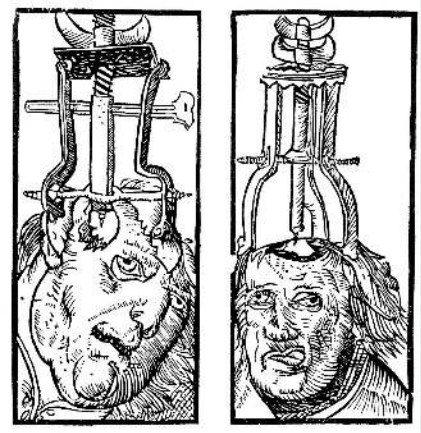


Figure 17.3 Trepanation. Trepanation (drilling holes in the skull) has been used since prehistoric times in attempts to cure epilepsy, schizophrenia, and other psychological disorders.

Until the 18th century, the most common treatment for the mentally ill was to incarcerate them in asylums or “madhouses.” During the 18th century, however, some reformers began to oppose this brutal treatment of the mentally ill, arguing that mental illness was a medical problem that had nothing to do with evil spirits or demons. In France, one of the key reformers was Philippe Pinel (1745-1826), who believed that mental illness was caused by a combination of physical and psychological stressors, exacerbated by inhumane conditions. Pinel advocated the introduction of exercise, fresh air, and daylight for the inmates, as well as treating them gently and talking with them.

Reformers such as Phillipe Pinel (1745-1826), Dorothea Dix (1802-1887), Richard M. Bucke (1837-1902), Charles K. Clarke (1857-1924), Clifford W. Beers (1876-1943), and Clarence M. Hincks (1885-1964) were instrumental in creating mental hospitals that treated patients humanely and attempted to cure them if possible (Figure 13.5). These reformers saw mental illness as an underlying psychological disorder, which was diagnosed according to its symptoms and which could be cured through treatment.

Dr Richard Bucke was appointed superintendent of the Asylum for the Insane in Hamilton in 1876 and a year later of the asylum in London, Ontario. He believed mental illness was a failure of the human biological adaptive process. In his attempts to reform the crude treatment of mentally ill patients he abandoned the practice of pacifying the inmates with alcohol or restraining them, and inaugurated regular cultural and sports events for patients.

Dr Charles Clarke was an assistant superintendent at the Hamilton asylum in the early 1880s, and later superintendent of the asylum at Kingston, Ontario. By 1887 he had changed the asylum from a jail to a hospital and was instructing nurses and attendants in the care of the mentally ill. By 1893 he was advocating that the term “asylum” be dropped and that special hospitals be constructed for the mentally ill.

Dr Clarence Hincks, born in St Mary’s, Ontario, was interested in mental health partly due to his own experiences with severe depression. In 1918, with Beers’s help, he organized the Canadian National Committee for Mental Hygiene, which later became the Canadian Mental Health Association.

Dix was a Massachusetts schoolteacher who wrote, lectured, and informed the public and legislators about the deplorable conditions in mental institutions like those shown in Figure 13.4. She was successful in influencing a number of state legislatures either to establish or improve their mental institutions, and because of her efforts a mental hospital was built in St. John's, Newfoundland, in 1885. She also lobbied the Nova Scotia legislature and oversaw the building of a hospital for mental patients in that province.

Phillipe Pinel was a French physician who became intensely interested in mental health in the 1770s. He took a psychological approach as opposed to the prominent biological approach that was the custom and introduced new forms of treatments that involved close contact with and careful observation of patients. Pinel visited each patient up to several times a day, engaging them in lengthy conversations, and took careful notes in an effort to assemble a detailed case history and a natural history of the patient's illness. At the time, his therapy was quite contrary to the usual practices of bleeding, purging, or blistering.

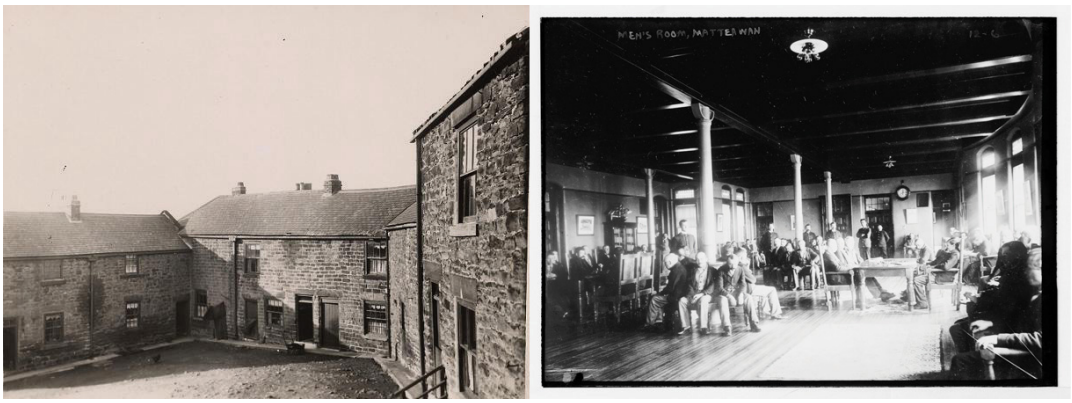


Figure 17.4 Asylums for People with Mental Disorders. Until the early 1900s people with mental disorders were often imprisoned in asylums such as these.

Figure 17.5 Portraits of Philippe Pine, Benjamin Rush, and Dorothea Dix. Reformers such as Philippe Pinel, Benjamin Rush, and Dorothea Dix fought the often brutal treatment of the mentally ill and were instrumental in changing perceptions and treatment of them.

Despite the progress made since the 1800s in public attitudes about those who suffer from psychological disorders, people, including police, coworkers, and even friends and family members, still stigmatize people with psychological disorders. A **stigma** refers to *a disgrace or defect that indicates that person belongs to a culturally devalued social group*. In some cases the stigma of mental illness is accompanied by the use of disrespectful and dehumanizing labels, including names such as crazy, nuts, mental, schizo, and retard.

The stigma of mental disorder affects people while they are ill, while they are healing, and even after they have healed (Schefer, 2003). On a community level, stigma can affect the kinds of services social service agencies give to people with mental illness, and the treatment provided to them and their families by schools, workplaces, places of worship, and health-care providers. Stigma about mental illness also leads to employment discrimination, despite the fact that with appropriate support, even people with

severe psychological disorders are able to hold a job (Boardman, Grove, Perkins, & Shepherd, 2003; Leff & Warner, 2006; Ozawa & Yaeda, 2007; Pulido, Diaz, & Ramirez, 2004).

The mass media has a significant influence on society's attitude toward mental illness (Francis, Pirkis, Dunt, & Blood, 2001). While media portrayal of mental illness is often sympathetic, negative stereotypes still remain in newspapers, magazines, film, and television. (See the following video for an example.)

Video: *Burger King: The King's Gone Crazy* [https://youtu.be/xYA7AnVwejo]. Television advertisements may perpetuate negative stereotypes about the mentally ill. For example, in 2010 Burger King ran an ad called "The King's Gone Crazy," in which the company's mascot runs around an office complex carrying out acts of violence and wreaking havoc.



The most significant problem of the stigmatization of those with psychological disorder is that it slows their recovery. People with mental problems internalize societal attitudes about mental illness, often becoming so embarrassed or ashamed that they conceal their difficulties and fail to seek treatment. Stigma leads to lowered self-esteem, increased isolation, and hopelessness, and it may negatively influence the individual's family and professional life (Hayward & Bright, 1997).

Despite all of these challenges, however, many people overcome psychological disorders and go on to lead productive lives. It is up to all of us who are informed about the causes of psychological disorder and the impact of these conditions on people to understand, first, that mental illness is not a "fault" any more than is cancer. People do not choose to have a mental illness. Second, we must all work to help overcome the stigma associated with disorder. Organizations such as the Canadian Mental Health Association (CMHA) help by working to reduce the negative impact of stigma through education, community action, and individual support.

Diagnosing Disorder: The *DSM*

Psychologists have developed criteria that help them determine whether behaviour should be considered a psychological disorder and which of the many disorders particular behaviours indicate. These criteria are laid out in a 1,000-page manual known as the **Diagnostic and Statistical Manual of Mental Disorders (DSM)**, *a document that provides a common language and standard criteria for the classification of mental disorders* (American Psychiatric Association, 2013). The *DSM* is used by therapists, researchers, drug companies, health insurance companies, and policymakers in Canada and the United States to determine what services are appropriately provided for treating patients with given symptoms.

The first edition of the *DSM* was published in 1952 on the basis of census data and psychiatric hospital statistics. Since then, the *DSM* has been revised five times. The last major revision was the fourth edition (*DSM-IV*), published in 1994, and an update of that document was produced in 2000 (*DSM-IV-TR*). The fifth edition (*DSM-5*) is the most recent edition and was published in 2013. The Medical Council of Canada transitioned to the *DSM-5* recently (MCC, 2013). The *DSM-IV-TR* was designed in conjunction with the World Health Organization's 10th version of the *International Classification of Diseases* (*ICD-10*), which is used as a guide for mental disorders in Europe and other parts of the world.

The *DSM* does not attempt to specify the exact symptoms that are required for a diagnosis. Rather, the *DSM* uses categories, and patients whose symptoms are similar to the description of the category are said to have that disorder. The *DSM* frequently uses qualifiers to indicate different levels of severity within a category. For instance, the disorder of mental retardation can be classified as mild, moderate, or severe.

Each revision of the *DSM* takes into consideration new knowledge as well as changes in cultural norms about disorder. Homosexuality, for example, was listed as a mental disorder in the *DSM* until 1973, when it was removed in response to advocacy by politically active gay rights groups and changing social norms. The current version of the *DSM* lists about 400 disorders.

Although the *DSM* has been criticized regarding the nature of its categorization system (and it is frequently revised to attempt to address these criticisms), for the fact that it tends to classify more behaviours as disorders with every revision (even "academic problems" are now listed as a potential psychological disorder), and for the fact that it is primarily focused on Western illness, it is nevertheless a comprehensive, practical, and necessary tool that provides a common language to describe disorder. Most insurance companies will not pay for therapy unless the patient has a *DSM* diagnosis. The *DSM* approach allows a systematic assessment of the patient, taking into account the mental disorder in question, the patient's medical condition, psychological and cultural factors, and the way the patient functions in everyday life.

Key Takeaways

- More psychologists are involved in the diagnosis and treatment of psychological disorder than in any other endeavour, and those tasks are probably the most important psychologists face.
- The impact on people with a psychological disorder comes both from the disease itself and from the stigma associated with disorder.
- A psychological disorder is an ongoing dysfunctional pattern of thought, emotion, and behaviour that causes significant distress and that is considered deviant in that person's culture or society.
- According to the bio-psycho-social model, psychological disorders have biological, psychological, and social causes.
- It is difficult to diagnose psychological disorders, although the *DSM* provides guidelines that are based on a category system. The *DSM* is frequently revised, taking into consideration new knowledge as well as changes in cultural norms about disorder.

Exercises and Critical Thinking

1. Do you or your friends hold stereotypes about the mentally ill? Can you think of or find clips from any films or other popular media that portray mental illness positively or negatively? Is it more or less acceptable to stereotype the mentally ill than to stereotype other social groups?
2. Consider the diagnosis of ADHD, autism, and Asperger's disorder from the biological, personal, and social-cultural perspectives. Do you think that these disorders are overdiagnosed? How might clinicians determine if ADHD is dysfunctional or distressing to the individual?

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Long Descriptions

Table 17.1 long description: Prevalence rates for psychological disorders in Canada, 2012.

Disorder		Lifetime	12-month
Substance use disorder	Alcohol abuse or dependence	18.1%	3.2%
	Cannabis abuse or dependence	6.8%	1.3%
	Other drug abuse or dependence (excluding Cannabis)	4%	0.7%
Total substance use disorders		**21.6%**	**4.4%**
Mood Disorder	Major Depressive Episode	11.3%	4.7%
	Bipolar disorder	2.6%	1.5%
	Generalized anxiety disorder	8.7%	2.6%
Total mood disorders		**12.6%**	**5.4%**
Total Mental/Substance disorders		**33.1%**	**10.1%**

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17.3: Anxiety and Dissociative Disorders- Fearing the World Around Us

Charles Stangor and Jennifer Walinga

Learning Objectives

- Outline and describe the different types of anxiety disorders.
- Outline and describe the different types of dissociative disorders.
- Explain the biological and environmental causes of anxiety and dissociative disorders.

Anxiety, *the nervousness or agitation that we sometimes experience, often about something that is going to happen*, is a natural part of life. We all feel anxious at times, maybe when we think about our upcoming visit to the dentist or the presentation we have to give to our class next week. Anxiety is an important and useful human emotion; it is associated with the activation of the sympathetic nervous system and the physiological and behavioural responses that help protect us from danger. But too much anxiety can be debilitating, and every year millions of people suffer from **anxiety disorders**, which are *psychological disturbances marked by irrational fears, often of everyday objects and situations* (Kessler, Chiu, Demler, & Walters, 2005).

Generalized Anxiety Disorder

Consider the following, in which Chase describes her feelings of a persistent and exaggerated sense of anxiety, even when there is little or nothing in her life to provoke it:

> For a few months now I've had a really bad feeling inside of me. The best way to describe it is like a really bad feeling of negative inevitability, like something really bad is impending, but I don't know what. It's like I'm on trial for murder or I'm just waiting to be sent down for something. I have it all of the time but it gets worse in waves that come from nowhere with no apparent triggers. I used to get it before going out for nights out with friends, and it kinda stopped me from doing it as I'd rather not go out and stress about the feeling, but now I have it all the time so it doesn't really make a difference anymore (Chase, 2010).

Chase is probably suffering from a **generalized anxiety disorder (GAD)**, *a psychological disorder diagnosed in situations in which a person has been excessively worrying about money, health, work, family life, or relationships* for at least six months, even though he or she knows that the concerns are exaggerated, and when the anxiety causes significant distress and dysfunction.

In addition to their feelings of anxiety, people who suffer from GAD may also experience a variety of physical symptoms, including irritability, sleep troubles, difficulty concentrating, muscle aches, trembling, perspiration, and hot flashes. The sufferer cannot deal with what is causing the anxiety, nor avoid it, because there is no clear cause for anxiety. In fact, the sufferer frequently knows, at least cognitively, that there is really nothing to worry about.

About 3% of the general population suffer from GAD, and about two-thirds are women (Kessler, Chiu, Demler, & Walters, 2005; Robins & Regier, 1991). Generalized anxiety disorder is most likely to develop between the ages of seven and 40 years, but its influence may in some cases lessen with age (Rubio & Lopez-Ibor, 2007).

Panic Disorder

> When I was about 30 I had my first panic attack. I was driving home, my three little girls were in their car seats in the back, and all of a sudden I couldn't breathe, I broke out into a sweat, and my heart began racing and literally beating against my ribs! I thought I was going to die. I pulled off the road and put my head on the wheel. I remember songs playing on the CD for about 15 minutes and my kids' voices singing along. I was sure I'd never see them again. And then, it passed. I slowly got back on the road and drove home. I had no idea what it was (Ceejay, 2006).

Ceejay is experiencing **panic disorder**, *a psychological disorder characterized by sudden attacks of anxiety and terror that have led to significant behavioural changes in the person's life*. Symptoms of a panic attack include shortness of breath, heart palpitations, trembling, dizziness, choking sensations, nausea, and an intense feeling of dread or impending doom. Panic attacks can often be mistaken for heart attacks or other serious physical illnesses, and they may lead the person experiencing them to go to a hospital emergency room. Panic attacks may last as little as one or as much as 20 minutes, but they often peak and subside within about 10 minutes.

Sufferers are often anxious because they fear that they will have another attack. They focus their attention on the thoughts and images of their fears, becoming excessively sensitive to cues that signal the possibility of threat (MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002). They may also become unsure of the source of their arousal, misattributing it to situations that are not actually the cause. As a result, they may begin to avoid places where attacks have occurred in the past, such as driving, using an elevator, or being in public places. In Canada, 12-month and lifetime prevalence rates for panic attacks are 1.6% and 3.7%, respectively (Health Canada, 2006).

Phobias

A **phobia** (from the Greek word *phobos*, which means fear) is *a specific fear of a certain object, situation, or activity*. The fear experience can range from a sense of unease to a full-blown panic attack. Most people learn to live with their phobias, but for others the fear can be so debilitating that they go to extremes to avoid the fearful situation. A sufferer of arachnophobia (fear of spiders), for example, may refuse to enter a room until it has been checked thoroughly for spiders, or may refuse to vacation in the countryside because spiders may be there. Phobias are characterized by their specificity and their irrationality. A person with acrophobia (a fear of height) could fearlessly sail around the world on a sailboat with no concerns yet refuse to go out onto the balcony on the fifth floor of a building.

A common phobia is **social phobia**, *extreme shyness around people or discomfort in social situations*. Social phobia may be specific to a certain event, such as speaking in public or using a public restroom, or it can be a more generalized anxiety toward almost all people outside of close family and friends. People with social phobia will often experience physical symptoms in public, such as sweating profusely, blushing, stuttering, nausea, and dizziness. They are convinced that everybody around them notices these symptoms as they are occurring. Women are somewhat more likely than men to suffer from social phobia.

The most incapacitating phobia is **agoraphobia**, defined as *anxiety about being in places or situations from which escape might be difficult or embarrassing, or in which help may not be available* (American Psychiatric Association, 2000). Typical places that provoke the panic attacks are parking lots; crowded streets or shops; and bridges, tunnels, or expressways. People (mostly women) who suffer from agoraphobia may have great difficulty leaving their homes and interacting with other people.

Phobias are one of the most common anxiety disorders, are among the most common psychiatric illnesses, and are about twice as prevalent in women as in men (Fredrikson, Annas, Fischer, & Wik, 1996; Kessler, Meron-Ruscio, Shear, & Wittchen, 2009). In most cases phobias first appear in childhood and adolescence, and usually persist into adulthood. Table 17.3, “The Most Common Phobias,” presents a list of the common phobias that are diagnosed by psychologists.

Table 17.3 The Most Common Phobias.

Name	Description
Acrophobia	Fear of heights
Agoraphobia	Fear of situations in which escape is difficult
Arachnophobia	Fear of spiders
Astraphobia	Fear of thunder and lightning
Claustrophobia	Fear of closed-in spaces
Cynophobia	Fear of dogs
Mysophobia	Fear of germs or dirt
Ophidiophobia	Fear of snakes
Pteromerhanophobia	Fear of flying
Social phobia	Fear of social situations
Trypanophobia	Fear of injections
Zoophobia	Fear of small animals

Obsessive-Compulsive Disorders

Although he is best known his perfect shots on the field, the British soccer star David Beckham (Figure 17.6, “David Beckham”) also suffers from obsessive-compulsive disorder (OCD). As he describes it, “I have got this obsessive-compulsive disorder where I have to have everything in a straight line or everything has to be in pairs. I’ll put my Pepsi cans in the fridge and if there’s one too many then I’ll put it in another cupboard somewhere. I’ve got that problem. I’ll go into a hotel room. Before I can relax, I have to move all the leaflets and all the books and put them in a drawer. Everything has to be perfect” (Dolan, 2006).

David Beckham’s experience with obsessive behaviour is not unusual. We all get a little obsessive at times. We may continuously replay a favourite song in our heads, worry about getting the right outfit for an upcoming party, or find ourselves analyzing a series of numbers that seem to have a certain pattern. And our everyday compulsions can be useful. Going back inside the house once more to be sure that we really did turn off the sink faucet or checking the mirror a couple of times to be sure that our hair is combed are not necessarily bad ideas.



Figure 17.6 David Beckham.

Obsessive-compulsive disorder (OCD) is *a psychological disorder that is diagnosed when an individual continuously experiences distressing or frightening thoughts, and engages in* **obsessions** *(repetitive thoughts) or* **compulsions** *(repetitive behaviours) in an attempt to calm these thoughts*. OCD is diagnosed when the obsessive thoughts are so disturbing and the compulsive behaviours are so time consuming that they cause distress and significant dysfunction in a person’s everyday life. Washing your hands once or even twice to make sure that they are clean is normal; washing them 20 times is not. Keeping your fridge neat is a good idea; spending hours a day on it is not. The sufferers know that these rituals are senseless, but they cannot bring themselves to stop them, in part because the relief that they feel after they perform them acts as a reinforcer, making the behaviour more likely to occur again.

Sufferers of OCD may avoid certain places that trigger the obsessive thoughts, or use alcohol or drugs to try to calm themselves down. OCD has a low prevalence rate (about 1% of the population in a given year) in relation to other anxiety disorders, and usually develops in adolescence or early adulthood (Horwath & Weissman, 2000; Samuels & Nestadt, 1997). The course of OCD varies from person to person. Symptoms can come and go, decrease, or worsen over time.

Post-traumatic Stress Disorder (PTSD)

People who have survived a terrible ordeal, such as combat, torture, sexual assault, imprisonment, abuse, natural disasters, or the death of someone close to them may develop *post-traumatic stress disorder (PTSD)*. The anxiety may begin months or even years after the event. People with **PTSD** experience *high levels of anxiety* along with *reexperiencing* the trauma (flashbacks), and a strong desire to *avoid any reminders of the event*. They may lose interest in things they used to enjoy; startle easily; have difficulty feeling affection; and may experience terror, rage, depression, or insomnia. The symptoms may be felt especially when approaching the area where the event took place or when the anniversary of that event is near.

PTSD has affected approximately 8% of the population (Kessler, Berglund, Jin, Demler, & Walters, 2005). PTSD is a frequent outcome of childhood or adult*sexual abuse*, a disorder that has its own*Diagnostic and Statistical Manual of Mental Disorders**DSM* diagnosis. Women are more likely to develop PTSD than men (Davidson, 2000).

Romeo Dallaire, seen in Figure 17.7 "Roméo Dallaire," who served as Canadian Lieutenant General and Force Commander of UNAMIR, the ill-fated United Nations peacekeeping force for Rwanda in 1993 and 1994, attempted to stop the genocide that was being waged by Hutu extremists against Tutsis and Hutu moderates. Dallaire has worked to bring understanding of post-traumatic stress disorder to the general public. He was a visiting lecturer at several Canadian and American universities and a Fellow of the Carr Center for Human Rights Policy, Kennedy School of Government at Harvard University. He has also pursued research on conflict resolution and the use of child soldiers and written several articles and chapters in publications on conflict resolution, humanitarian assistance, and human rights. Recently he wrote a book about the use of child soldiers, *They Fight Like Soldiers, They Die Like Children*.



Figure 17.7 Roméo Dallaire.

Risk factors for PTSD include the degree of the trauma's severity, the lack of family and community support, and additional life stressors (Brewin, Andrews, & Valentine, 2000). Many people with PTSD also suffer from another mental disorder, particularly depression, other anxiety disorders, and substance abuse (Brady, Back, & Coffey, 2004).

Dissociative Disorders: Losing the Self to Avoid Anxiety

In 1985, Michelle Philpots of England suffered a head injury in a motorcycle accident. Five years later, she reinjured her head in a serious car accident. These injuries did enough cumulative damage to Philpots's brain that she eventually started having seizures and was diagnosed with epilepsy. By 1994, she was suffering from anterograde amnesia and had completely lost the ability to create new memories, as all of her memories are wiped clean after she goes to sleep. Upon waking, she believes that it is still 1994. Even though Philpots was in a relationship with her husband long before she suffered amnesia, they did not actually get married until 1997. As a result, Philpots's husband has to show her their wedding pictures every morning in order to remind her that they're married. A popular movie, *50 First Dates*, is loosely based on Philpots's story.

People who experience anxiety are haunted by their memories and experiences, and although they desperately wish to get past them, they normally cannot. In some cases, however, such as with Michelle Philpots, people who become overwhelmed by stress experience an altered state of consciousness in which they become detached from the reality of what is happening to them. A **dissociative disorder** is *a condition that involves disruptions or breakdowns of memory, awareness, and identity*. The dissociation is used as a defence against the trauma.

Dissociative Amnesia and Fugue

Dissociative amnesia is *a psychological disorder that involves extensive, but selective, memory loss, but in which there is no physiological explanation for the forgetting* (van der Hart & Nijenhuis, 2009). The amnesia is normally brought on by a trauma — a situation that causes such painful anxiety that the individual "forgets" in order to escape. These kinds of trauma include disasters, accidents, physical abuse, rape, and other forms of severe stress (Cloninger & Dokucu, 2008). Although the personality of people who experience dissociative amnesia remains fundamentally unchanged — and they recall how to carry out daily tasks such as reading, writing, and problem solving — they tend to forget things about their personal lives — for instance, their name, age, and occupation — and may fail to recognize family and friends (van der Hart & Nijenhuis, 2009).

A related disorder, **dissociative fugue**, is *a psychological disorder in which an individual loses complete memory of his or her identity and may even assume a new one, often far from home*. The individual with dissociative fugue experiences all the symptoms of dissociative amnesia but also leaves the situation entirely. The fugue state may last for just a matter of hours or may continue for months. Recovery from the fugue state tends to be rapid, but when people recover they commonly have no memory of the stressful event that triggered the fugue or of events that occurred during their fugue state (Cardeña & Gleaves, 2007).

Dissociative Identity Disorder

You may remember the story of Sybil (a pseudonym for Shirley Ardell Mason, who was born in 1923), a person who, over a period of 40 years, claimed to possess 16 distinct personalities (Figure 17.8, "Sybil"). Mason was in therapy for many years trying to integrate these personalities into one complete self. A TV movie about Mason's life, starring Sally Field as Sybil, appeared in 1976.



Figure 17.8 Sybil (Shirley Ardell Mason).

Sybil suffered from the most severe of the dissociative disorders, *dissociative identity disorder*. **Dissociative identity disorder** is *a psychological disorder in which two or more distinct and individual personalities exist in the same person, and there is an extreme memory disruption regarding personal information about the other personalities* (van der Hart & Nijenhuis, 2009). Dissociative identity disorder was once known as *multiple personality disorder*, and this label is still sometimes used. This disorder is sometimes mistakenly referred to as schizophrenia.

In some cases of dissociative identity disorder, there can be more than 10 different personalities in one individual. Switches from one personality to another tend to occur suddenly, often triggered by a stressful situation (Gillig, 2009). The **host personality** is the *personality in control of the body most of the time*, and the *alter personalities* tend to differ from each other in terms of age, race, gender, language, manners, and even sexual orientation (Kluft, 1996). A shy, introverted individual may develop a boisterous, extroverted alter personality. Each personality has unique memories and social relationships (Dawson, 1990). Women are more frequently diagnosed with dissociative identity disorder than are men, and when they are diagnosed also tend to have more "personalities" (American Psychiatric Association, 2000).

The dissociative disorders are relatively rare conditions and are most frequently observed in adolescents and young adults. In part because they are so unusual and difficult to diagnose, clinicians and researchers disagree about the legitimacy of the disorders, and particularly about dissociative identity disorder. Some clinicians argue that the descriptions in the *DSM* accurately reflect the symptoms of these patients, whereas others believe that patients are faking, role-playing, or using the disorder as a way to justify behaviour (Barry-Walsh, 2005; Kihlstrom, 2004; Lilienfeld & Lynn, 2003; Lipsanen et al., 2004). Even the diagnosis of Shirley

Ardell Mason (Sybil) is disputed. Some experts claim that Mason was highly hypnotizable and that her therapist unintentionally suggested the existence of her multiple personalities (Miller & Kantrowitz, 1999).

Explaining Anxiety and Dissociation Disorders

Both nature and nurture contribute to the development of anxiety disorders. In terms of our evolutionary experiences, humans have evolved to fear dangerous situations. Those of us who had a healthy fear of the dark, of storms, of high places, of closed spaces, and of spiders and snakes were more likely to survive and have descendants. Our evolutionary experience can account for some modern fears as well. A fear of elevators may be a modern version of our fear of closed spaces, while a fear of flying may be related to a fear of heights.

Also supporting the role of biology, anxiety disorders, including PTSD, are heritable (Hettema, Neale, & Kendler, 2001), and molecular genetics studies have found a variety of genes that are important in the expression of such disorders (Smoller et al., 2008; Thoeringer et al., 2009). Neuroimaging studies have found that anxiety disorders are linked to areas of the brain that are associated with emotion, blood pressure and heart rate, decision making, and action monitoring (Brown & McNiff, 2009; Damsa, Kosel, & Moussally, 2009). People who experience PTSD also have a somewhat smaller hippocampus in comparison with those who do not, and this difference leads them to have a very strong sensitivity to traumatic events (Gilbertson et al., 2002).

Whether the genetic predisposition to anxiety becomes expressed as a disorder depends on environmental factors. People who were abused in childhood are more likely to be anxious than those who had normal childhoods, even with the same genetic disposition to anxiety sensitivity (Stein, Schork, & Gelernter, 2008). And the most severe anxiety and dissociative disorders, such as PTSD, are usually triggered by the experience of a major stressful event. One problem is that modern life creates a lot of anxiety. Although our life expectancy and quality of life have improved over the past 50 years, the same period has also created a sharp increase in anxiety levels (Twenge, 2006). These changes suggest that most anxiety disorders stem from perceived, rather than actual, threats to our well-being.

Anxieties are also learned through classical and operant conditioning. Just as rats that are shocked in their cages develop a chronic anxiety toward their laboratory environment (which has become a conditioned stimulus for fear), rape victims may feel anxiety when passing by the scene of the crime, and victims of PTSD may react to memories or reminders of the stressful event. Classical conditioning may also be accompanied by *stimulus generalization*. A single dog bite can lead to generalized fear of all dogs; a panic attack that follows an embarrassing moment in one place may be generalized to a fear of all public places. People's responses to their anxieties are often reinforced. Behaviours become compulsive because they provide relief from the torment of anxious thoughts. Similarly, leaving or avoiding fear-inducing stimuli leads to feelings of calmness or relief, which reinforces phobic behaviour.

In contrast to the anxiety disorders, the causes of the dissociative orders are less clear, which is part of the reason that there is disagreement about their existence. Unlike most psychological orders, there is little evidence of a genetic predisposition; they seem to be almost entirely environmentally determined. Severe emotional trauma during childhood, such as physical or sexual abuse, coupled with a strong stressor, is typically cited as the underlying cause (Alpher, 1992; Cardeña & Gleaves, 2007). Kihlstrom, Glisky, and Angiulo (1994) suggest that people with personalities that lead them to fantasize and become intensely absorbed in their own personal experiences are more susceptible to developing dissociative disorders under stress. Dissociative disorders can in many cases be successfully treated, usually by psychotherapy (Lilienfeld & Lynn, 2003).

Key Takeaways

- Anxiety is a natural part of life, but too much anxiety can be debilitating. Every year millions of people suffer from anxiety disorders.
- People who suffer from generalized anxiety disorder experience anxiety, as well as a variety of physical symptoms.
- Panic disorder involves the experience of panic attacks, including shortness of breath, heart palpitations, trembling, and dizziness.
- Phobias are specific fears of a certain object, situation, or activity. Phobias are characterized by their specificity and their irrationality.
- A common phobia is social phobia — extreme shyness around people or discomfort in social situations.

- Obsessive-compulsive disorder is diagnosed when a person's repetitive thoughts are so disturbing and his or her compulsive behaviours so time consuming that they cause distress and significant disruption in a person's everyday life.
- People who have survived a terrible ordeal, such as combat, torture, rape, imprisonment, abuse, natural disasters, or the death of someone close to them, may develop PTSD.
- Dissociative disorders, including dissociative amnesia and dissociative fugue, are conditions that involve disruptions or breakdowns of memory, awareness, and identity. The dissociation is used as a defence against the trauma.
- Dissociative identity disorder, in which two or more distinct and individual personalities exist in the same person, is relatively rare and difficult to diagnose.
- Both nature and nurture contribute to the development of anxiety disorders.

Exercises and Critical Thinking

1. Under what situations do you experience anxiety? Are these experiences rational or irrational? Does the anxiety keep you from doing some things that you would like to be able to do?
2. Do you or people you know suffer from phobias? If so, what are the phobias and how do you think the phobias began? Do they seem more genetic or more environmental in origin?

Image Attributions

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Figure 17.7: Roméo Dallaire by gdcgraphics (http://commons.wikimedia.org/wiki/Fi...aire07TIFF.jpg) used under CC BY 2.0 (http://creativecommons.org/licenses/by/2.0/deed.en).

Figure 17.8: http://en.wikipedia.org/wiki/File:Sh...dell_Mason.jpg.

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17.4: Mood Disorders- Emotions as Illness

Charles Stangor and Jennifer Walinga

Learning Objectives

- Summarize and differentiate the various forms of mood disorders, in particular dysthymia, major depressive disorder, and bipolar disorder.
- Explain the genetic and environmental factors that increase the likelihood that a person will develop a mood disorder.

The everyday variations in our feelings of happiness and sadness reflect our **mood**, which can be defined as *the positive or negative feelings that are in the background of our everyday experiences*. In most cases we are in a relatively good mood, and this positive mood has some positive consequences — it encourages us to do what needs to be done and to make the most of the situations we are in (Isen, 2003). When we are in a good mood our thought processes open up, and we are more likely to approach others. We are more friendly and helpful to others when we are in a good mood than we are when we are in a bad mood, and we may think more creatively (De Dreu, Baas, & Nijstad, 2008). On the other hand, when we are in a bad mood we are more likely to prefer to be alone rather than interact with others, we focus on the negative things around us, and our creativity suffers.

It is not unusual to feel down or low at times, particularly after a painful event such as the death of someone close to us, a disappointment at work, or an argument with a partner. We often get depressed when we are tired, and many people report being particularly sad during the winter when the days are shorter. **Mood (or affective) disorders** are *psychological disorders in which the person's mood negatively influences his or her physical, perceptual, social, and cognitive processes*. People who suffer from mood disorders tend to experience more intense — and particularly more intense negative — moods. About 5% of the Canadian population suffers from a mood disorder in a given year (Health Canada, 2002).

The most common symptom of mood disorders is negative mood, also known as sadness or *depression (*Figure 17.9, "Depression"). Consider the feelings of this person, who was struggling with depression and was diagnosed with *major depressive disorder*:

> *I didn't want to face anyone; I didn't want to talk to anyone. I didn't really want to do anything for myself…I couldn't sit down for a minute really to do anything that took deep concentration…It was like I had big huge weights on my legs and I was trying to swim and just kept sinking. And I'd get a little bit of air, just enough to survive and then I'd go back down again. It was just constantly, constantly just fighting, fighting, fighting, fighting, fighting. (National Institute of Mental Health, 2010)*



Figure 17.9 Depression.

Mood disorders can occur at any age, and the median age of onset is 32 years (Kessler, Berglund, Demler, Jin, & Walters, 2005). Recurrence of depressive episodes is fairly common and is greatest for those who first experience depression before the age of 15 years. About twice as many women as men suffer from depression (Culbertson, 1997). This gender difference is consistent across many countries and cannot be explained entirely by the fact that women are more likely to seek treatment for their depression. Rates of depression have been increasing, although the reasons for this increase are not known (Kessler et al., 2003).

As you can see in the list below, the experience of depression has a variety of negative effects on our behaviours. In addition to the loss of interest, productivity, and social contact that accompanies depression, the person's sense of hopelessness and sadness may become so severe that he or she considers or even succeeds in committing suicide. In 2009 there were 3,890 suicides in Canada, a rate of 11.5 per 100,000 (Navaneelan, 2012). Almost all the people who commit suicide have a diagnosable psychiatric disorder at the time of their death (Statistics Canada, 2012; Sudak, 2005).

Behaviours Associated with Depression

- Changes in appetite; weight loss or gain
- Difficulty concentrating, remembering details, and making decisions
- Fatigue and decreased energy
- Feelings of hopelessness, helplessness, and pessimism
- Increased use of alcohol or drugs
- Irritability, restlessness
- Loss of interest in activities or hobbies once pleasurable, including sex
- Loss of interest in personal appearance
- Persistent aches or pains, headaches, cramps, or digestive problems that do not improve with treatment
- Sleep disorders, either trouble sleeping or excessive sleeping
- Thoughts of suicide or attempts at suicide

Dysthymia and Major Depressive Disorder

The level of depression observed in people with mood disorders varies widely. People who experience depression for many years, to the point that it becomes to seem normal and part of their everyday life, and who feel that they are rarely or never happy, will likely be diagnosed with a mood disorder. If the depression is mild but long-lasting, they will be diagnosed with **dysthymia**, *a condition characterized by mild, but chronic, depressive symptoms that last for at least two years*.

If the depression continues and becomes even more severe, the diagnosis may become that of *major depressive disorder*. **Major depressive disorder (clinical depression)** is *a mental disorder characterized by an all-encompassing low mood accompanied by low self-esteem and loss of interest or pleasure in normally enjoyable activities*. Those who suffer from major depressive disorder feel an intense sadness, despair, and loss of interest in pursuits that once gave them pleasure. These negative feelings profoundly limit the individual's day-to-day functioning and ability to maintain and develop interests in life (Fairchild & Scogin, 2008).

About 4.8% of Canadian adults suffer from a major depressive disorder in any given year. Major depressive disorder occurs about twice as often in women as it does in men (Kessler, Chiu, Demler, & Walters, 2005; Kessler et al., 2003). In some cases clinically depressed people lose contact with reality and may receive a diagnosis of *major depressive episode with psychotic features*. In these cases the depression includes delusions and hallucinations.

Bipolar Disorder

Juliana is a 21-year-old single woman. Over the past several years she had been treated by a psychologist for depression, but for the past few months she had been feeling a lot better. Juliana had landed a good job in a law office and found a steady boyfriend. She told her friends and parents that she had been feeling particularly good — her energy level was high and she was confident in herself and her life.

One day Juliana was feeling so good that she impulsively quit her new job and left town with her boyfriend on a road trip. But the trip didn't turn out well because Juliana became impulsive, impatient, and easily angered. Her euphoria continued, and in one of the

towns that they visited she left her boyfriend and went to a party with some strangers that she had met. She danced into the early morning and ended up having sex with several of the men.

Eventually Juliana returned home to ask for money, but when her parents found out about her recent behaviour and confronted her, she acted aggressively and abusively to them, so they referred her to a social worker. Juliana was hospitalized, where she was diagnosed with bipolar disorder.

While dysthymia and major depressive disorder are characterized by overwhelming negative moods, **bipolar disorder** is *a psychological disorder characterized by swings in mood from overly "high" to sad and hopeless, and back again, with periods of near-normal mood in between*. Bipolar disorder is diagnosed in cases such as Juliana's, where experiences with depression are followed by a more normal period and then a period of mania or euphoria in which the person feels particularly awake, alive, excited, and involved in everyday activities but is also impulsive, agitated, and distracted. Without treatment, it is likely that Juliana would cycle back into depression and then eventually into mania again, with the likelihood that she would harm herself or others in the process.

Based on his intense bursts of artistic productivity (in one two-month period in 1889 he produced 60 paintings), personal writings, and behaviour (including cutting off his own ear), it is commonly thought that Vincent van Gogh suffered from bipolar disorder. He committed suicide at age 37 (Thomas & Bracken, 2001). His painting, *Starry Night*, is shown in Figure 17.10.

Figure 17.10 Starry Night by Vincent van Gogh.

Bipolar disorder is an often chronic and lifelong condition that may begin in childhood. Although the normal pattern involves swings from high to low, in some cases the person may experience both highs and lows at the same time. Determining whether a person has bipolar disorder is difficult due to the frequent presence of comorbidity with both depression and anxiety disorders. Bipolar disorder is more likely to be diagnosed when it is initially observed at an early age, when the frequency of depressive episodes is high, and when there is a sudden onset of the symptoms (Bowden, 2001).

Explaining Mood Disorders

Mood disorders are known to be at least in part genetic, because they are heritable (Berrettini, 2006; Merikangas et al., 2002). Neurotransmitters also play an important role in mood disorders. Serotonin, dopamine, and norepinephrine are all known to influence mood (Sher & Mann, 2003), and drugs that influence the actions of these chemicals are often used to treat mood disorders.

The brains of those with mood disorders may in some cases show structural differences from those without them. Videbech and Ravnkilde (2004) found that the hippocampus was smaller in depressed subjects than in normal subjects, and this may be the result of reduced *neurogenesis* (the process of generating new neurons) in depressed people (Warner-Schmidt & Duman, 2006). Antidepressant drugs may alleviate depression in part by increasing neurogenesis (Duman & Monteggia, 2006).

Research Focus: Using Molecular Genetics to Unravel the Causes of Depression

Avshalom Caspi and his colleagues (Caspi et al., 2003) used a longitudinal study to test whether genetic predispositions might lead some people, but not others, to suffer from depression as a result of environmental stress. Their research focused on a particular gene, the 5-HTT gene, which is known to be important in the production and use of the neurotransmitter *serotonin*. The researchers focused on this gene because serotonin is known to be important in depression, and because selective serotonin reuptake inhibitors (SSRIs) have been shown to be effective in treating depression.

People who experience stressful life events, for instance involving threat, loss, humiliation, or defeat, are likely to experience depression. But biological-situational models suggest that a person's sensitivity to stressful events depends on his or her genetic makeup. The researchers therefore expected that people with one type of genetic pattern would show depression following stress to a greater extent than people with a different type of genetic pattern.

The research included a sample of 1,037 adults from Dunedin, New Zealand. Genetic analysis on the basis of DNA samples allowed the researchers to divide the sample into two groups on the basis of the characteristics of their 5-HTT gene. One group had a short version (or *allele*) of the gene, whereas the other group did not have the short allele of the gene.

The participants also completed a measure where they indicated the number and severity of stressful life events that they had experienced over the past five years. The events included employment, financial, housing, health, and relationship stressors. The dependent measure in the study was the level of depression reported by the participant, as assessed using a structured interview test (Robins, Cottler, Bucholtz, & Compton, 1995).

As you can see in Figure 17.11 as the number of stressful experiences the participants reported increased from 0 to 4, depression also significantly increased for the participants with the short version of the gene (top panel). But for the participants who did not have a short allele, increasing stress did not increase depression (bottom panel). Furthermore, for the participants who experienced four stressors over the past five years, 33% of the participants who carried the short version of the gene became depressed, whereas only 17% of participants who did not have the short version did.

Figure 17.11 Research. [Long Description]

This important study provides an excellent example of how genes and environment work together: an individual's response to environmental stress was influenced by his or her genetic makeup.

But psychological and social determinants are also important in creating mood disorders and depression. In terms of psychological characteristics, mood states are influenced in large part by our cognitions. Negative thoughts about ourselves and our relationships to others create negative moods, and a goal of cognitive therapy for mood disorders is to attempt to change people's cognitions to be more positive. Negative moods also create negative behaviours toward others, such as acting sad, slouching, and avoiding others, which may lead those others to respond negatively to the person, for instance by isolating that person, which then creates even more depression (Figure 17.12, "Cycle of Depression"). You can see how it might become difficult for people to break out of this "cycle of depression."

Figure 17.12 Cycle of Depression. Negative thoughts cause negative emotions which may cause negative behaviours which may lead to negative responses from others which may cause more negative thoughts.

Weissman et al. (1996) found that rates of depression varied greatly among countries, with the highest rates in European and North American countries and the lowest rates in Asian countries. These differences seem to be due to discrepancies between individual feelings and cultural expectations about what one should feel. People from European and North American cultures report that it is important to experience emotions such as happiness and excitement, whereas the Chinese report that it is more important to be stable and calm. Because North Americans may feel that they are not happy or excited but that they are supposed to be, this may increase their depression (Tsai, Knutson, & Fung, 2006).

Key Takeaways

- Mood is the positive or negative feelings that are in the background of our everyday experiences.
- We all may get depressed in our daily lives, but people who suffer from mood disorders tend to experience more intense — and particularly more intense negative — moods.
- The most common symptom of mood disorders is negative mood.
- If a person experiences mild but long-lasting depression, he or she will be diagnosed with dysthymia. If the depression continues and becomes even more severe, the diagnosis may become that of major depressive disorder.
- Bipolar disorder is characterized by swings in mood from overly "high" to sad and hopeless, and back again, with periods of near-normal mood in between.
- Mood disorders are caused by the interplay among biological, psychological, and social variables.

Exercises and Critical Thinking

1. Give a specific example of the negative cognitions, behaviours, and responses of others that might contribute to a cycle of depression like that shown in Figure 17.12, "Cycle of Depression."

2. Given the discussion about the causes of negative moods and depression, what might people do to try to feel better on days that they are experiencing negative moods?

Image Attributions

Figure 17.9: "sad looking woman" by Bradley Gordon is licensed under CC BY 2.0 license (http://creativecommons.org/licenses/by/2.0/deed.en_CA)

Figure 17.11: Adapted from Caspi, A., et al., 2003.

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Long Description

Figure 17.11 long description: Genetics and Causes of Depression

Number of stressful life events experienced	Major Depression Episode (%)	
	Group with short version of allele	Group without short version of allele
0	10%	10%
1	11%	16%
2	14%	18%
3	28%	11%
4 or more	33%	18%

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17.5: Schizophrenia- The Edge of Reality and Consciousness

Charles Stangor, Jennifer Walinga, and Jorden A. Cummings

Learning Objectives

- Categorize and describe the three major symptoms of schizophrenia.
- Differentiate the five types of schizophrenia and their characteristics.
- Identify the biological and social factors that increase the likelihood that a person will develop schizophrenia.

The term *schizophrenia*, which in Greek means split mind, was first used to describe a psychological disorder by Eugen Bleuler (1857-1939), a Swiss psychiatrist who was studying patients who had very severe thought disorders. **Schizophrenia** is *a serious psychological disorder marked by delusions, hallucinations, loss of contact with reality, inappropriate affect, disorganized speech, social withdrawal, and deterioration of adaptive behaviour* (Figure 17.13, “Schizophrenia”).



Figure 17.13 Schizophrenia. People with schizophrenia may exhibit disorganized behaviour, as this person does.

Schizophrenia is the most chronic and debilitating of all psychological disorders. It affects men and women equally, occurs in similar rates across ethnicities and across cultures, and affects at any one time approximately 350,000 people in Canada (Public Health Agency of Canada, 2012). Onset of schizophrenia is usually between the ages of 16 and 30 and rarely after the age of 45 or in children (Mueser & McGurk, 2004; Nicolson, Lenane, Hamburger, Fernandez, Bedwell, & Rapoport, 2000).

Symptoms of Schizophrenia

Schizophrenia is accompanied by a variety of symptoms, but not all patients have all of them (Lindenmayer & Khan, 2006). As you can see in Table 17.4, “Positive, Negative, and Cognitive Symptoms of Schizophrenia,” the symptoms are divided into *positive symptoms*, *negative symptoms*, and *cognitive symptoms* (American Psychiatric Association, 2008; National Institute of Mental Health, 2010). Positive symptoms refer to the presence of abnormal behaviours or experiences (such as hallucinations) that are not observed in normal people, whereas negative symptoms (such as lack of affect and an inability to socialize with others) refer to the loss or deterioration of thoughts and behaviours that are typical of normal functioning. Finally, cognitive symptoms are the changes in cognitive processes that accompany schizophrenia (Skrabalo, 2000). Because the patient has lost contact with reality, we say that he or she is experiencing **psychosis**, which is *a psychological condition characterized by a loss of contact with reality*.

Table 17.4 Positive, Negative, and Cognitive Symptoms of Schizophrenia.

Positive symptoms	Negative symptoms	Cognitive symptoms
Hallucinations	Social withdrawal	Poor executive control
Delusions (of grandeur or persecution)	Flat affect and lack of pleasure in everyday life	Trouble focusing
Derailment	Apathy and loss of motivation	Working memory problems
Grossly disorganized behaviour	Distorted sense of time	Poor problem-solving abilities
Inappropriate affect	Lack of goal-oriented activity	
Movement disorders	Limited speech	
	Poor hygiene and grooming	

People with schizophrenia almost always suffer from **hallucinations** — *imaginary sensations that occur in the absence of a real stimulus or which are gross distortions of a real stimulus*. Auditory hallucinations are the most common and are reported by approximately three-quarters of patients (Nicolson, Mayberg, Pennell, & Nemeroff, 2006). Schizophrenic patients frequently report hearing imaginary voices that curse them, comment on their behaviour, order them to do things, or warn them of danger (National Institute of Mental Health, 2009). Visual hallucinations are less common and frequently involve seeing God or the devil (De Sousa, 2007).

Schizophrenic people also commonly experience **delusions**, which are *false beliefs not commonly shared by others within one's culture, and maintained even though they are obviously out of touch with reality*. People with *delusions of grandeur* believe that they are important, famous, or powerful. They often become convinced that they are someone else, such as the president or God, or that they have some special talent or ability. Some claim to have been assigned to a special covert mission (Buchanan & Carpenter, 2005). People with *delusions of persecution* believe that a person or group seeks to harm them. They may think that people are able to read their minds and control their thoughts (Maher, 2001). If a person suffers from delusions of persecution, there is a good chance that he or she will become violent, and this violence is typically directed at family members (Buchanan & Carpenter, 2005).

People suffering from schizophrenia also often suffer from the positive symptom of **derailment** — *the shifting from one subject to another, without following any one line of thought to conclusion* — and may exhibit *grossly disorganized behaviour* including inappropriate sexual behaviour, peculiar appearance and dress, unusual agitation (e.g., shouting and swearing), strange body movements, and awkward facial expressions. It is also common for schizophrenia sufferers to experience *inappropriate affect*. For example, a patient may laugh uncontrollably when hearing sad news. Movement disorders typically appear as agitated movements, such as repeating a certain motion again and again, but can in some cases include *catatonia*, a state in which a person does not move and is unresponsive to others (Janno, Holi, Tuisku, & Wahlbeck, 2004; Rosebush & Mazurek, 2010).

Negative symptoms of schizophrenia include social withdrawal, poor hygiene and grooming, poor problem-solving abilities, and a distorted sense of time (Skrabalo, 2000). Patients often suffer from flat affect, which means that they express almost no emotional response (e.g., they speak in a monotone and have a blank facial expression) even though they may report feeling emotions (Kring, 1999). Another negative symptom is the tendency toward incoherent language, such as repeating the speech of others ("echo speech"). Some schizophrenics experience motor disturbances, ranging from complete catatonia and apparent obliviousness to their environment to random and frenzied motor activity during which they become hyperactive and incoherent (Kirkpatrick & Tek, 2005).

Not all schizophrenic patients exhibit negative symptoms, but those who do also tend to have the poorest outcomes (Fenton & McGlashan, 1994). Negative symptoms are predictors of deteriorated functioning in everyday life and often make it impossible for sufferers to work or to care for themselves.

Cognitive symptoms of schizophrenia are typically difficult for outsiders to recognize but make it extremely difficult for the sufferer to lead a normal life. These symptoms include *difficulty comprehending information and using it to make decisions* (the **lack of executive control**), difficulty maintaining focus and attention, and problems with working memory (the ability to use information immediately after it is learned).

Explaining Schizophrenia

There is no single cause of schizophrenia. Rather, a variety of biological and environmental risk factors interact in a complex way to increase the likelihood that someone might develop schizophrenia (Walker, Kestler, Bollini, & Hochman, 2004).

Studies in molecular genetics have not yet identified the particular genes responsible for schizophrenia, but it is evident from research using family, twin, and adoption studies that genetics are important (Walker & Tessner, 2008). As you can see in Figure 17.14 ,"Genetic Disposition to Develop Schizophrenia," the likelihood of developing schizophrenia increases dramatically if a close relative also has the disease.

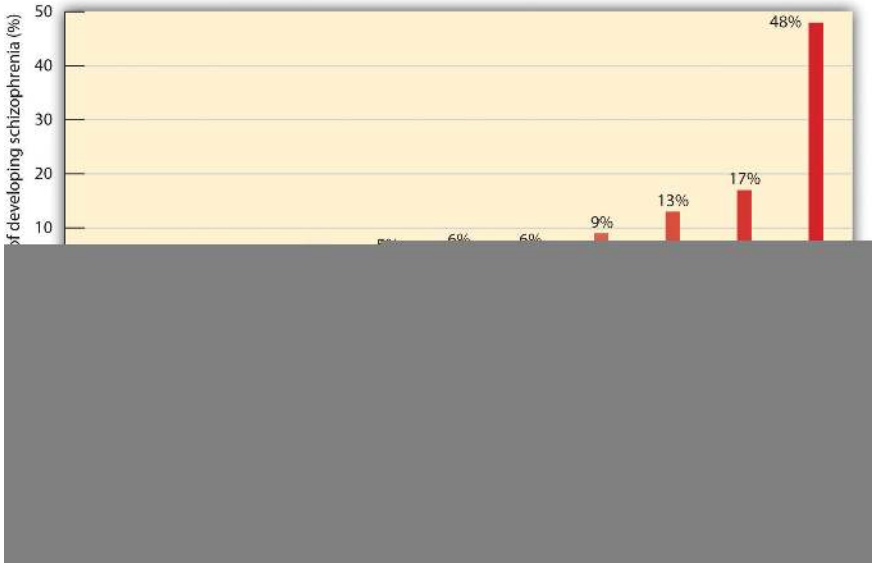


Figure 17.14 Genetic Disposition to Develop Schizophrenia. The risk of developing schizophrenia increases substantially if a person has a relative with the disease. [Long Description]

Neuroimaging studies have found some differences in brain structure between schizophrenic and normal patients. In some people with schizophrenia, the cerebral ventricles (fluid-filled spaces in the brain) are enlarged (Suddath, Christison, Torrey, Casanova, & Weinberger, 1990). People with schizophrenia also frequently show an overall loss of neurons in the cerebral cortex, and some show less activity in the frontal and temporal lobes, which are the areas of the brain involved in language, attention, and memory. This would explain the deterioration of functioning in language and thought processing that is commonly experienced by schizophrenic patients (Galderisi et al., 2008).

Many researchers believe that schizophrenia is caused in part by excess dopamine, and this theory is supported by the fact that most of the drugs useful in treating schizophrenia inhibit dopamine activity in the brain (Javitt & Laruelle, 2006). Levels of serotonin may also play a part (Inayama et al., 1996). But recent evidence suggests that the role of neurotransmitters in schizophrenia is more complicated than was once believed. It also remains unclear whether observed differences in the neurotransmitter systems of people with schizophrenia cause the disease, or if they are the result of the disease itself or its treatment (Csernansky & Grace, 1998).

A genetic predisposition to developing schizophrenia does not always develop into the actual disorder. Even if a person has an identical twin with schizophrenia, that person still has less than a 50% chance of developing it, and over 60% of all schizophrenic people have no first- or second-degree relatives with schizophrenia (Gottesman & Erlenmeyer-Kimling, 2001; Riley & Kendler, 2005). This suggests that there are important environmental causes as well.

One hypothesis is that schizophrenia is caused in part by disruptions to normal brain development in infancy that may be caused by poverty, malnutrition, and disease (Brown et al., 2004; Murray & Bramon, 2005; Susser et al., 1996; Waddington, Lane, Larkin, & O'Callaghan, 1999). Stress also increases the likelihood that a person will develop schizophrenic symptoms; onset and relapse of schizophrenia typically occur during periods of increased stress (Walker, Mittal, & Tessner, 2008). However, it may be that people

who develop schizophrenia are more vulnerable to stress than others and not necessarily that they experience more stress than others (Walker, Mittal, & Tessner, 2008). Many homeless people are likely to be suffering from undiagnosed schizophrenia.

Another social factor that has been found to be important in schizophrenia is the degree to which one or more of the patient's relatives is highly critical or highly emotional in their attitude toward the patient. Hooley and Hiller (1998) found that schizophrenic patients who ended a stay in a hospital and returned to a family with high expressed emotion were three times more likely to relapse than patients who returned to a family with low expressed emotion. It may be that the families with high expressed emotion are a source of stress to the patient.

Key Takeaways

- Schizophrenia is a serious psychological disorder marked by delusions, hallucinations, and loss of contact with reality.
- Schizophrenia is accompanied by a variety of symptoms, but not all patients have all of them.
- Because the schizophrenic patient has lost contact with reality, we say that he or she is experiencing psychosis.
- Positive symptoms of schizophrenia include hallucinations, delusions, derailment, disorganized behaviour, inappropriate affect, and catatonia.
- Negative symptoms of schizophrenia include social withdrawal, poor hygiene and grooming, poor problem-solving abilities, and a distorted sense of time.
- Cognitive symptoms of schizophrenia include difficulty comprehending and using information and problems maintaining focus.
- There is no single cause of schizophrenia. Rather, there are a variety of biological and environmental risk factors that interact in a complex way to increase the likelihood that someone might develop schizophrenia.

Image Attributions

Figure 17.13: by Max Avdeev, http://www.flickr.com/photos/avdeev/4203380988

Figure 17.14: Adapted from Gottesman, 1991.

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Long Descriptions

Figure 17.14 long description: Genetic disposition to develop schizophrenia

Genes shared	Relationship to person with schizophrenia	Risk of developing schizophrenia (%)
Third-degree relatives (12.5%)	First cousins	2%
	Uncles and aunts	2%
Second-degree relatives (25%)	Nephews and nieces	4%
	Grandchildren	5%
First-degree relatives (50%)	Half-siblings	6%
	Parents	6%
100%	Siblings	9%
	Children	13%
	Fraternal twins	17%
	Identical twins	48%

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17.6: Personality Disorders

Charles Stangor and Jennifer Walinga

Learning Objectives

- Categorize the different types of personality disorders and differentiate antisocial personality disorder from borderline personality disorder.
- Outline the biological and environmental factors that may contribute to a person developing a personality disorder.

To this point in the chapter we have considered the psychological disorders of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*) categorization system. A **personality disorder** is *a disorder characterized by inflexible patterns of thinking, feeling, or relating to others that cause problems in personal, social, and work situations*. Personality disorders tend to emerge during late childhood or adolescence and usually continue throughout adulthood (Widiger, 2006). The disorders can be problematic for the people who have them, but they are less likely to bring people to a therapist for treatment.

The personality disorders are summarized in Table 17.5, "Descriptions of the Personality Disorders." They are categorized into three types: those characterized by *odd or eccentric behaviour*, those characterized by *dramatic or erratic behaviour*, and those characterized by *anxious or inhibited* behaviour. As you consider the personality types described in Table 13.5, I'm sure you'll think of people that you know who have each of these traits, at least to some degree. Probably you know someone who seems a bit suspicious and paranoid, who feels that other people are always "ganging up on him," and who really do not trust other people very much. Perhaps you know someone who fits the bill of being overly dramatic — the "drama queen" who is always raising a stir and whose emotions seem to turn everything into a big deal. Or you might have a friend who is overly dependent on others and can't seem to get a life of her own.

The personality traits that make up the personality disorders are common — we see them in the people with whom we interact every day — yet they may become problematic when they are rigid, overused, or interfere with everyday behaviour (Lynam & Widiger, 2001). What is perhaps common to all the disorders is the person's inability to accurately understand and be sensitive to the motives and needs of the people around them.

Table 17.5 Descriptions of the Personality Disorders.

Cluster	Personality disorder	Characteristics
A. Odd/eccentric	Schizotypal	Peculiar or eccentric manners of speaking or dressing. Strange beliefs. “Magical thinking” such as belief in ESP or telepathy. Difficulty forming relationships. May react oddly in conversation, not respond, or talk to self. Speech elaborate or difficult to follow. (Possibly a mild form of schizophrenia.)
	Paranoid	Distrust in others, suspicion that people have sinister motives. Apt to challenge the loyalties of friends and read hostile intentions into others’ actions. Prone to anger and aggressive outbursts but otherwise emotionally cold. Often jealous, guarded, secretive, overly serious.
	Schizoid	Extreme introversion and withdrawal from relationships. Prefers to be alone, little interest in others. Humourless, distant, often absorbed with own thoughts and feelings, a daydreamer. Fearful of closeness, with poor social skills, often seen as a “loner.”
B. Dramatic/erratic	Antisocial	Impoverished moral sense or “conscience.” History of deception, crime, legal problems, impulsive and aggressive or violent behaviour. Little emotional empathy or remorse for hurting others. Manipulative, careless, callous. At high risk for substance abuse and alcoholism.
	Borderline	Unstable moods and intense, stormy personal relationships. Frequent mood changes and anger, unpredictable impulses. Self-mutilation or suicidal threats or gestures to get attention or manipulate others. Self-image fluctuation and a tendency to see others as “all good” or “all bad.”
	Histrionic	Constant attention seeking. Grandiose language, provocative dress, exaggerated illnesses, all to gain attention. Believes that everyone loves him. Emotional, lively, overly dramatic, enthusiastic, and excessively flirtatious.
	Narcissistic	Inflated sense of self-importance, absorbed by fantasies of self and success. Exaggerates own achievement, assumes others will recognize they are superior.

Cluster	Personality disorder	Characteristics
		Good first impressions but poor longer-term relationships. Exploitative of others.
C. Anxious/inhibited	Avoidant	Socially anxious and uncomfortable unless he or she is confident of being liked. In contrast with schizoid person, yearns for social contact. Fears criticism and worries about being embarrassed in front of others. Avoids social situations due to fear of rejection.
	Dependent	Submissive, dependent, requiring excessive approval, reassurance, and advice. Clings to people and fears losing them. Lacking self-confidence. Uncomfortable when alone. May be devastated by end of close relationship or suicidal if breakup is threatened.
	Obsessive-compulsive	Conscientious, orderly, perfectionist. Excessive need to do everything "right." Inflexibly high standards and caution can interfere with his or her productivity. Fear of errors can make this person strict and controlling. Poor expression of emotions. (Not the same as obsessive-compulsive disorder.)

Adapted from American Psychiatric Association, 2013.

The personality disorders create a bit of a problem for diagnosis. For one, it is frequently difficult for the clinician to accurately diagnose which of the many personality disorders a person has, although the friends and colleagues of the person can generally do a good job of it (Oltmanns & Turkheimer, 2006). And the personality disorders are highly comorbid; if a person has one, it's likely that he or she has others as well. Also, the number of people with personality disorders is estimated to be as high as 15% of the population (Grant et al., 2004), which might make us wonder if these are really disorders in any real sense of the word.

Although they are considered as separate disorders, the personality disorders are essentially milder versions of more severe disorders (Huang et al., 2009). For example, *obsessive-compulsive personality disorder* is a milder version of **obsessive-compulsive disorder (OCD)**, and *schizoid and schizotypal personality disorders* are characterized by symptoms similar to those of schizophrenia. This overlap in classification causes some confusion, and some theorists have argued that the personality disorders should be eliminated from the *DSM*. But clinicians normally differentiate Axis I and Axis II disorders, and thus the distinction is useful for them (Krueger, 2005; Phillips, Yen, & Gunderson, 2003; Verheul, 2005).

Although it is not possible to consider the characteristics of each of the personality disorders in this book, let's focus on two that have important implications for behaviour. The first, *borderline personality disorder (BPD)*, is important because it is so often associated with suicide, and the second, *antisocial personality disorder (APD)*, because it is the foundation of criminal behaviour. Borderline and antisocial personality disorders are also good examples to consider because they are so clearly differentiated in terms of their focus. BPD (more frequently found in women than men) is known as an *internalizing disorder* because the behaviours that it entails (e.g., suicide and self-mutilation) are mostly directed toward the self. APD (mostly found in men), on the other hand, is a type of *externalizing disorder* in which the problem behaviours (e.g., lying, fighting, vandalism, and other criminal activity) focus primarily on harm to others.

Borderline Personality Disorder

Borderline personality disorder (BPD) is *a psychological disorder characterized by a prolonged disturbance of personality accompanied by mood swings, unstable personal relationships, identity problems, threats of self-destructive behaviour, fears of abandonment, and impulsivity*. BPD is widely diagnosed — up to 20% of psychiatric patients are given the diagnosis, and it may occur in up to 2% of the general population (Hyman, 2002). About three-quarters of diagnosed cases of BDP are women.

People with BPD fear being abandoned by others. They often show a clinging dependency on the other person and engage in manipulation to try to maintain the relationship. They become angry if the other person limits the relationship, but also deny that they care about the person. As a defence against fear of abandonment, borderline people are compulsively social. But their behaviours, including their intense anger, demands, and suspiciousness, repel people.

People with BPD often deal with stress by engaging in self-destructive behaviours, for instance by being sexually promiscuous, getting into fights, binge eating and purging, engaging in self-mutilation or drug abuse, and threatening suicide. These behaviours are designed to call forth a "saving" response from the other person. People with BPD are a continuing burden for police, hospitals, and therapists. Borderline individuals also show disturbance in their concepts of identity: they are uncertain about self-image, gender identity, values, loyalties, and goals. They may have chronic feelings of emptiness or boredom and be unable to tolerate being alone.

BPD has both genetic and environmental roots. In terms of genetics, research has found that those with BPD frequently have neurotransmitter imbalances (Zweig-Frank et al., 2006), and the disorder is heritable (Minzenberg, Poole, & Vinogradov, 2008). In terms of environment, many theories about the causes of BPD focus on a disturbed early relationship between the child and his or her parents. Some theories focus on the development of attachment in early childhood, while others point to parents who fail to provide adequate attention to the child's feelings. Others focus on parental abuse (both sexual and physical) in adolescence, as well as on divorce, alcoholism, and other stressors (Lobbestael & Arntz, 2009). The dangers of BPD are greater when they are associated with childhood sexual abuse, early age of onset, substance abuse, and aggressive behaviours. The problems are amplified when the diagnosis is comorbid (as it often is) with other disorders, such as substance abuse disorder, major depressive disorder, and post-traumatic stress disorder (PTSD) (Skodol et al., 2002).

Research Focus: Affective and Cognitive Deficits in BPD

Posner et al. (2003) hypothesized that the difficulty that individuals with BPD have in regulating their lives (e.g., in developing meaningful relationships with other people) may be due to imbalances in the fast and slow emotional pathways in the brain. Specifically, they hypothesized that the fast emotional pathway through the amygdala is too active, and the slow cognitive-emotional pathway through the prefrontal cortex is not active enough in those with BPD.

The participants in their research were 16 patients with BPD and 14 healthy comparison participants. All participants were tested in a functional magnetic resonance imaging (fMRI) machine while they performed a task that required them to read emotional and nonemotional words, and then press a button as quickly as possible whenever a word appeared in a normal font and not press the button whenever the word appeared in an italicized font.

The researchers found that while all participants performed the task well, the patients with BPD had more errors than the controls (both in terms of pressing the button when they should not have and not pressing it when they should have). These errors primarily occurred on the negative emotional words.

Figure 17.15 shows the comparison of the level of brain activity in the emotional centres in the amygdala (left panel) and the prefrontal cortex (right panel). In comparison to the controls, the BPD patients showed relatively larger affective responses when they were attempting to quickly respond to the negative emotions, and showed less cognitive activity in the prefrontal cortex in the same conditions. This research suggests that excessive affective reactions and lessened cognitive reactions to emotional stimuli may contribute to the emotional and behavioural volatility of borderline patients.

Figure 17.15 BPD Research. Individuals with BPD showed less cognitive and greater emotional brain activity in response to negative emotional words.

Antisocial Personality Disorder (APD)

In contrast to borderline personality disorder, which involves primarily feelings of inadequacy and a fear of abandonment, antisocial personality disorder (APD) is characterized by a disregard of the rights of others, and a tendency to violate those rights without being concerned about doing so. **APD** is *a pervasive pattern of violation of the rights of others that begins in childhood or early adolescence and continues into adulthood*. APD is about three times more likely to be diagnosed in men than in women. To be diagnosed with APD the person must be 18 years of age or older and have a documented history of conduct disorder before the age of 15. People having antisocial personality disorder are sometimes referred to as “sociopaths” or “psychopaths.”

People with APD feel little distress for the pain they cause others. They lie, engage in violence against animals and people, and frequently have drug and alcohol abuse problems. They are egocentric and frequently impulsive, for instance suddenly changing jobs or relationships. People with APD soon end up with a criminal record and often spend time incarcerated. The intensity of antisocial symptoms tends to peak during the 20s and then may decrease over time.

Biological and environmental factors are both implicated in the development of antisocial personality disorder (Rhee & Waldman, 2002). Twin and adoption studies suggest a genetic predisposition (Rhee & Waldman, 2002), and biological abnormalities include low autonomic activity during stress, biochemical imbalances, right hemisphere abnormalities, and reduced gray matter in the frontal lobes (Lyons-Ruth et al., 2007; Raine, Lencz, Bihrle, LaCasse, & Colletti, 2000). Environmental factors include neglectful and abusive parenting styles, such as the use of harsh and inconsistent discipline and inappropriate modelling (Huesmann & Kirwil, 2007).

Key Takeaways

- A personality disorder is a disorder characterized by inflexible patterns of thinking, feeling, or relating to others that causes problems in personal, social, and work situations.
- Personality disorders are categorized into three clusters, characterized by odd or eccentric behaviour, dramatic or erratic behaviour, and anxious or inhibited behaviour.
- Although they are considered as separate disorders, the personality disorders are essentially milder versions of more severe Axis I disorders.
- *Borderline personality disorder* is a prolonged disturbance of personality accompanied by mood swings, unstable personal relationships, and identity problems, and it is often associated with suicide.

- *Antisocial personality disorder* is characterized by a disregard of others' rights and a tendency to violate those rights without being concerned about doing so.

Exercises and Critical Thinking

1. What characteristics of men and women do you think make them more likely to have APD and BDP, respectively? Do these differences seem to you to be more genetic or more environmental?
2. Do you know people who suffer from antisocial personality disorder? What behaviours do they engage in, and why are these behaviours so harmful to them and others?

Image Attributions

Figure 17.15: Adapted from Posner et al., 2003.

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English

18.2: Reducing Disorder by Confronting It- Psychotherapy

Charles Stangor and Jennifer Walinga

Learning Objectives

- Outline and differentiate the psychodynamic, humanistic, behavioural, and cognitive approaches to psychotherapy.
- Explain the behavioural and cognitive aspects of cognitive-behavioural therapy and how CBT is used to reduce psychological disorders.

Treatment for psychological disorder begins when the individual who is experiencing distress visits a counsellor or therapist, perhaps in a church, a community centre, a hospital, or a private practice. The therapist will begin by systematically learning about the patient's needs through a formal **psychological assessment**, which is *an evaluation of the patient's psychological and mental health*. During the assessment the psychologist may give personality tests such as the Minnesota Multiphasic Personal Inventory (MMPI-2), Millon Adolescent Clinical Inventory (MACI), or projective tests, and will conduct a thorough interview with the patient. The therapist may get more information from family members or school personnel.

In addition to the psychological assessment, the patient is usually seen by a physician to gain information about potential Axis III (physical) problems. In some cases of psychological disorder — and particularly for sexual problems — medical treatment is the preferred course of action. For instance, men who are experiencing erectile dysfunction disorder may need surgery to increase blood flow or local injections of muscle relaxants. Or they may be prescribed medications (Viagra, Cialis, or Levitra) that provide an increased blood supply to the penis, and are successful in increasing performance in about 70% of men who take them.

After the medical and psychological assessments are completed, the therapist will make a formal diagnosis using the detailed descriptions of the disorder provided in the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*; see below). The therapist will summarize the information about the patient on each of the five *DSM* axes, and the diagnosis will likely be sent to an insurance company to justify payment for the treatment.

DSM-5-TR Criteria for Diagnosing Attention-Deficit/Hyperactivity Disorder (ADHD)

To be diagnosed with ADHD the individual must display either A or B below (American Psychiatric Association, 2013):

A. **Six or more of the following symptoms of inattention have been present for at least six months to a point that is disruptive and inappropriate for developmental level:**

- Often does not give close attention to details or makes careless mistakes in schoolwork, work, or other activities
- Often has trouble keeping attention on tasks or play activities
- Often does not seem to listen when spoken to directly
- Often does not follow instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behaviour or failure to understand instructions)
- Often has trouble organizing activities
- Often avoids, dislikes, or doesn't want to do things that take a lot of mental effort for a long period of time (such as schoolwork or homework)
- Often loses things needed for tasks and activities (e.g., toys, school assignments, pencils, books, or tools)
- Is often easily distracted
- Is often forgetful in daily activities

B. **Six or more of the following symptoms of hyperactivity-impulsivity have been present for at least six months to an extent that is disruptive and inappropriate for developmental level:**

- Often fidgets with hands or feet or squirms in seat
- Often gets up from seat when remaining in seat is expected
- Often runs about or climbs when and where it is not appropriate (adolescents or adults may feel very restless)
- Often has trouble playing or enjoying leisure activities quietly
- Is often "on the go" or often acts as if "driven by a motor"

- Often talks excessively
- Often blurts out answers before questions have been finished
- Often has trouble waiting one's turn
- Often interrupts or intrudes on others (e.g., butts into conversations or games)

If a diagnosis is made, the therapist will select a course of therapy that he or she feels will be most effective. One approach to treatment is **psychotherapy**, *the professional treatment for psychological disorder through techniques designed to encourage communication of conflicts and insight*. The fundamental aspect of psychotherapy is that the patient directly confronts the disorder and works with the therapist to help reduce it. Therapy includes assessing the patient's issues and problems, planning a course of treatment, setting goals for change, the treatment itself, and an evaluation of the patient's progress. Therapy is practised by thousands of psychologists and other trained practitioners in Canada and around the world, and is responsible for billions of dollars of the health budget.

To many people therapy involves a patient lying on a couch with a therapist sitting behind and nodding sagely as the patient speaks. Though this approach to therapy (known as *psychoanalysis*) is still practised, it is in the minority. It is estimated that there are over 400 different kinds of therapy practised by people in many fields, and the most important of these are psychodynamic, humanistic, cognitive behavioural therapy, and eclectic (i.e., a combination of therapies). The therapists who provide these treatments include psychiatrists (who have a medical degree and can prescribe drugs) and clinical psychologists, as well as social workers, psychiatric nurses, and couples, marriage, and family therapists.

Psychology in Everyday Life: Seeking Treatment for Psychological Difficulties

Many people who would benefit from psychotherapy do not get it, either because they do not know how to find it or because they feel that they will be stigmatized and embarrassed if they seek help. The decision to not seek help is a very poor choice because the effectiveness of mental health treatments is well documented and, no matter where a person lives, there are treatments available (Canadian Mental Health Association, 2013).

The first step in seeking help for psychological problems is to accept the stigma. It is possible that some of your colleagues, friends, and family members will know that you are seeking help and some may at first think more negatively of you for it. But you must get past these unfair and close-minded responses. Feeling good about yourself is the most important thing you can do, and seeking help may be the first step in doing so.

One question is how to determine if someone needs help. This question is not always easy to answer because there is no clear demarcation between normal and abnormal behaviour. Most generally, you will know that you or others need help when the person's psychological state is negatively influencing his or her everyday behaviour, when the behaviour is adversely affecting those around the person, and when the problems continue over a period of time. Often people seek therapy as a result of a life-changing event such as diagnosis of a fatal illness, an upcoming marriage or divorce, or the death of a loved one. But therapy is also effective for general depression and anxiety, as well as for specific everyday problems.

There are a wide variety of therapy choices, many of which are free. Begin in your school, community, or church, asking about community health or counselling centres and pastoral counselling. You may want to ask friends and family members for recommendations. You'll probably be surprised at how many people have been to counselling, and how many recommend it.

There are many therapists who offer a variety of treatment options. Be sure to ask about the degrees that the therapist has earned, and about the reputation of the centre in which the therapy occurs. If you have choices, try to find a person or location that you like, respect, and trust. This will allow you to be more open, and you will get more out of the experience. Your sessions with the help provider will require discussing your family history, personality, and relationships, and you should feel comfortable sharing this information.

Remember also that confronting issues requires time to reflect, energy to get to the appointments and deal with consequential feelings, and discipline to explore your issues on your own. Success at therapy is difficult, and it takes effort.

The bottom line is that going for therapy should not be a difficult decision for you. All people have the right to appropriate mental health care just as they have a right to general health care. Just as you go to a dentist for a toothache, you may go to therapy for psychological difficulties. Furthermore, you can be confident that you will be treated with respect and that your

privacy will be protected, because therapists follow ethical principles in their practices. The following provides a summary of these ethical principles as developed by the Canadian Counselling and Psychotherapy Association (2007).

- **General Orientation.** Counsellors adequately orient and inform clients so that evaluation and assessment results can be placed in proper perspective along with other relevant information.
- **Purposes and Results of Evaluation and Assessment.** Counsellors take responsibility to inform clients about the purpose of any evaluation and assessment instruments and procedures and the meaning of evaluation and assessment results.
- **Evaluation and Assessment Competence.** Counsellors recognize the limits of their competence and offer only those evaluation and assessment services for which they have appropriate preparation and which meet established professional standards.
- **Administrative and Supervisory Conditions.** Counsellors ensure that evaluation and assessment instruments and procedures are administered and supervised under established conditions consistent with professional standards. They note any departures from standard conditions and any unusual behaviour or irregularities that may affect the interpretation of results.
- **Use of Technology.** Counsellors recognize that their ethical responsibilities are not altered, or in any way diminished, by the use of technology for the administration of evaluation and assessment instruments. Counsellors retain their responsibility for the maintenance of the ethical principles of privacy, confidentiality, and responsibility for decisions regardless of the technology used.
- **Appropriateness of Evaluation and Assessment.** Counsellors ensure that evaluation and assessment instruments and procedures are valid,
  reliable, and appropriate to both the client and the intended purposes.
- **Reporting Evaluation and Assessment Results.** Counsellors ensure that when reporting evaluation and assessment results to clients and other individuals care is taken to provide, in an appropriate manner, accurate and sufficient information for an understanding of any conclusions and recommendations made, and to identify the basis for any reservations that might exist.
- **Release of Evaluation and Assessment Data.** Counsellors ensure that evaluation and assessment data are released appropriately and only to the client and persons qualified to interpret and use them properly.
- **Integrity of Evaluation and Assessment Instruments and Procedures.** Counsellors who use psychological tests and other assessment instruments, the value of
  which depends on their novelty to the client, ensure that they are limited to and safeguarded by those with the professional interest and competence to do so.
- **Sensitivity to Diversity when Assessing and Evaluating.** Counsellors proceed with caution when judging and interpreting the performance of minority group members and any other persons not represented in the group on which the evaluation and assessment instruments and procedures were standardized. They recognize and take into account the potential effects of age, ethnicity, disability, culture, gender, religion, sexual orientation and socio-economic status on both the administration of, and the interpretation of data from, such instruments and procedures.
- **Security Maintenance.** Counsellors ensure the integrity and security of evaluation and assessment instruments and procedures consistent with any legal and contractual obligations. They refrain from appropriating, reproducing, or modifying established evaluation and assessment instruments without the expressed permission and adequate recognition of the original author, publisher and copyright holder.

Psychodynamic Therapy

Psychodynamic therapy (psychoanalysis) is *a psychological treatment based on Freudian and neo-Freudian personality theories in which the therapist helps the patient explore the unconscious dynamics of personality*. The analyst engages with the patient, usually in one-on-one sessions, often with the patient lying on a couch and facing away. The goal of the psychotherapy is for the patient to talk about his or her personal concerns and anxieties, allowing the therapist to try to understand the underlying unconscious problems that are causing the symptoms (the process of interpretation). The analyst may try out some interpretations on the patient and observe how he or she responds to them.

The patient may be asked to verbalize his or her thoughts through **free association**, in which the *therapist listens while the client talks about whatever comes to mind, without any censorship or filtering*. The client may also be asked to report on his or her dreams, and the therapist will use **dream analysis** to *analyze the symbolism of the dreams in an effort to probe the unconscious thoughts of the client and interpret their significance*. On the basis of the thoughts expressed by the patient, the analyst discovers the unconscious conflicts causing the patient's symptoms and interprets them for the patient.

The goal of psychotherapy is to help the patient develop **insight** — that is, *an understanding of the unconscious causes of the disorder* (Epstein, Stern, & Silbersweig, 2001; Lubarsky & Barrett, 2006), but the patient often shows resistance to these new understandings, *using defence mechanisms to avoid the painful feelings in his or her unconscious*. The patient might forget or miss appointments, or act out with hostile feelings toward the therapist. The therapist attempts to help the patient develop insight into the causes of the resistance. The sessions may also lead to **transference**, in which *the patient unconsciously redirects feelings experienced in an important personal relationship toward the therapist*. For instance, the patient may transfer feelings of guilt that come from the father or mother to the therapist. Some therapists believe that transference should be encouraged, as it allows the client to resolve hidden conflicts and work through feelings that are present in the relationships.

Important Characteristics and Experiences in Psychoanalysis

- **Free association.** The therapist listens while the client talks about whatever comes to mind, without any censorship or filtering. The therapist then tries to interpret these free associations, looking for unconscious causes of symptoms.
- **Dream analysis.** The therapist listens while the client describes his or her dreams and then analyzes the symbolism of the dreams in an effort to probe the unconscious thoughts of the client and interpret their significance.
- **Insight.** An understanding by the patient of the unconscious causes of his or her symptoms.
- **Interpretation.** The therapist uses the patient's expressed thoughts to try to understand the underlying unconscious problems. The analyst may try out some interpretations on the patient and observe how he or she responds to them.
- **Resistance.** The patient's use of defence mechanisms to avoid the painful feelings in his or her unconscious. The patient might forget or miss appointments, or act out with hostile feelings toward the therapist. The therapist attempts to help the patient develop insight into the causes of the resistance.
- **Transference.** The unconscious redirection of the feelings experienced in an important personal relationship toward the therapist. For instance, the patient may transfer feelings of guilt that come from the father or mother to the therapist.

One problem with traditional psychoanalysis is that the sessions may take place several times a week, go on for many years, and cost thousands of dollars. To help more people benefit, modern psychodynamic approaches frequently use shorter-term, focused, and goal-oriented approaches. In these brief psychodynamic therapies, the therapist helps the client determine the important issues to be discussed at the beginning of treatment and usually takes a more active role than in classic psychoanalysis (Levenson, 2010).

Humanistic Therapies

Just as psychoanalysis is based on the personality theories of Freud and the neo-Freudians, **humanistic therapy** is *a psychological treatment based on the personality theories of Carl Rogers and other humanistic psychologists*. Humanistic therapy is based on the idea that people develop psychological problems when they are burdened by limits and expectations placed on them by themselves and others, and the treatment emphasizes the person's capacity for self-realization and fulfillment. Humanistic therapies attempt to promote growth and responsibility by helping clients consider their own situations and the world around them and how they can work to achieve their life goals.

Carl Rogers (see Figure 18.2, "Portrait of Carl Rogers") developed **person-centred therapy** (or client-centred therapy), *an approach to treatment in which the client is helped to grow and develop as the therapist provides a comfortable, nonjudgmental environment*. In his book *A Way of Being* (1980), Rogers argued that therapy was most productive when the therapist created a positive relationship with the client — a *therapeutic alliance*. The **therapeutic alliance** is *a relationship between the client and the therapist that is facilitated when the therapist is* genuine (i.e., he or she creates no barriers to free-flowing thoughts and feelings), when the therapist treats the client with unconditional positive regard (i.e., he or she values the client without any qualifications, displaying an accepting attitude toward whatever the client is feeling at the moment), and when the therapist develops empathy with the client (i.e., he or she actively listens to and accurately perceives the personal feelings that the client experiences).



Figure 18.2 Portrait of Carl Rogers.

The development of a positive therapeutic alliance has been found to be exceedingly important to successful therapy. The ideas of genuineness, empathy, and unconditional positive regard in a nurturing relationship in which the therapist actively listens to and reflects the feelings of the client is probably the most fundamental part of contemporary psychotherapy (Prochaska & Norcross, 2007).



Figure 18.3 Cognitive Behavioural Therapy. Cognitive behavioural therapy (CBT) is based on the idea that our thoughts, feelings, and behaviour reinforce each other and that changing our thoughts or behaviour can make us feel better.

Psychodynamic and humanistic therapies are recommended primarily for people suffering from generalized anxiety or mood disorders, and who desire to feel better about themselves overall. But the goals of people with other psychological disorders, such as phobias, sexual problems, and obsessive-compulsive disorder (OCD), are more specific. A person with a social phobia may want to be able to leave his or her house, a person with a sexual dysfunction may want to improve his or her sex life, and a person with OCD may want to learn to stop letting his or her obsessions or compulsions interfere with everyday activities. In these cases it is not necessary to revisit childhood experiences or consider our capacities for self-realization — we simply want to deal with what is happening in the present. **Cognitive behavioural therapy (CBT)** is *a structured approach to treatment that attempts to reduce psychological disorders through systematic procedures based on cognitive and behavioural principles*. CBT is based on the idea that there is a recursive link among our thoughts, our feelings, and our behaviour (Figure 18.3, “Cognitive Behavioural Therapy”). For instance, if we are feeling depressed, our negative thoughts (“I am doing poorly in my chemistry class”) lead to negative feelings (“I feel hopeless and sad”), which then contribute to negative behaviours (e.g., lethargy, lack of interest, lack of studying). When we or other people look at the negative behaviour, the negative thoughts are reinforced and the cycle repeats itself (Beck, 1976). Similarly, in panic disorder a patient may misinterpret his or her feelings of anxiety as a sign of an impending physical or mental catastrophe (such as a heart attack), leading to an avoidance of a particular place or social situation. The fact that the patient is avoiding the situation reinforces the negative thoughts. Again, the thoughts, feelings, and behaviour amplify and distort each other.

CBT is a very broad approach that is used for the treatment of a variety of problems, including mood, anxiety, personality, eating, substance abuse, attention-deficit, and psychotic disorders. CBT treats the symptoms of the disorder (the behaviours or the cognitions) and does not attempt to address the underlying issues that cause the problem. The goal is simply to stop the negative cycle by intervening to change cognition or behaviour. The client and the therapist work together to develop the goals of the therapy, the particular ways that the goals will be reached, and the timeline for reaching them. The procedures are problem-solving and action-oriented, and the client is forced to take responsibility for his or her own treatment. The client is assigned tasks to complete that will help improve the disorder and takes an active part in the therapy. The treatment usually lasts between 10 and 20 sessions. Depending on the particular disorder, some CBT treatments may be primarily behavioural in orientation, focusing on the principles of classical, operant, and observational learning, whereas other treatments are more cognitive, focused on changing negative thoughts related to the disorder. But almost all CBT treatments use a combination of behavioural and cognitive approaches.

Behavioural Aspects of CBT

In some cases the primary changes that need to be made are behavioural. **Behaviour therapy** is *psychological treatment that is based on principles of learning*. The most direct approach is through operant conditioning using reward or punishment. Reinforcement may be used to teach new skills to people, such as with those with autism or schizophrenia (Granholm et al., 2008; Herbert et al., 2005; Scattone, 2007). If the patient has trouble dressing or grooming, then reinforcement techniques, such as providing tokens that can be exchanged for snacks, are used to reinforce appropriate behaviours such as putting on one’s clothes in the morning or taking a shower at night. If the patient has trouble interacting with others, reinforcement will be used to teach the client how to respond more appropriately in public, for instance, by maintaining eye contact, smiling when appropriate, and modulating tone of voice.

As the patient practises the different techniques, the appropriate behaviours are shaped through reinforcement to allow the client to manage more complex social situations. In some cases observational learning may also be used; the client may be asked to observe

the behaviour of others who are more socially skilled to acquire appropriate behaviours. People who learn to improve their interpersonal skills through skills training may be more accepted by others and this social support may have substantial positive effects on their emotions.

When the disorder is anxiety or phobia, then the goal of the CBT is to reduce the negative affective responses to the feared stimulus. **Exposure therapy** is *a behavioural therapy based on the classical conditioning principle of extinction, in which people are confronted with a feared stimulus with the goal of decreasing their negative emotional responses to it* (Wolpe, 1973). Exposure treatment can be carried out in real situations or through imagination, and it is used in the treatment of panic disorder, agoraphobia, social phobia, OCD, and post-traumatic stress disorder (PTSD).

In **flooding**, *a client is exposed to the source of his fear all at once*. An agoraphobic might be taken to a crowded shopping mall or someone with an extreme fear of heights to the top of a tall building. The assumption is that the fear will subside as the client habituates to the situation while receiving emotional support from the therapist during the stressful experience. An advantage of the flooding technique is that it is quick and often effective, but a disadvantage is that the patient may relapse after a short period of time.

More frequently, the exposure is done more gradually. **Systematic desensitization** is *a behavioural treatment that combines imagining or experiencing the feared object or situation with relaxation exercises* (Wolpe, 1973). The client and the therapist work together to prepare a *hierarchy of fears*, starting with the least frightening, and moving to the most frightening scenario surrounding the object (Table 18.1, "Hierarchy of Fears Used in Systematic Desensitization"). The patient then confronts the fears in a systematic manner, sometimes using his or her imagination but usually, when possible, in real life.

Table 18.1 Hierarchy of Fears Used in Systematic Desensitization.

Behaviour	Fear rating
Think about a spider.	10
Look at a photo of a spider.	25
Look at a real spider in a closed box.	50
Hold the box with the spider.	60
Let a spider crawl on your desk.	70
Let a spider crawl on your shoe.	80
Let a spider crawl on your pants leg.	90
Let a spider crawl on your sleeve.	95
Let a spider crawl on your bare arm.	100

Desensitization techniques use the principle of **counterconditioning**, in which a *second incompatible response (relaxation; e.g., through deep breathing) is conditioned to an already conditioned response (the fear response)*. The continued pairing of the relaxation responses with the feared stimulus as the patient works up the hierarchy gradually leads the fear response to be extinguished and the relaxation response to take its place.

Behaviour therapy works best when people directly experience the feared object. Fears of spiders are more directly habituated when the patient interacts with a real spider, and fears of flying are best extinguished when the patient gets on a real plane. But it is often difficult and expensive to create these experiences for the patient. Recent advances in virtual reality have allowed clinicians to provide CBT in what seem like real situations to the patient. In **virtual reality CBT**, *the therapist uses computer-generated, three-dimensional, lifelike images of the feared stimulus in a systematic desensitization program*. Specially designed computer equipment, often with a head-mount display, is used to create a simulated environment. A common use is in helping patients who are experiencing PTSD return to the scene of the trauma and learn how to cope with the stress it invokes.

Some of the advantages of the virtual reality treatment approach are that it is economical, the treatment session can be held in the therapist's office with no loss of time or confidentiality, the session can easily be terminated as soon as a patient feels

uncomfortable, and many patients who have resisted live exposure to the object of their fears are willing to try the new virtual reality option first.

Aversion therapy is *a type of behaviour therapy in which positive punishment is used to reduce the frequency of an undesirable behaviour*. An unpleasant stimulus is intentionally paired with a harmful or socially unacceptable behaviour until the behaviour becomes associated with unpleasant sensations and is hopefully reduced. A child who wets his bed may be required to sleep on a pad that sounds an alarm when it senses moisture. Over time, the positive punishment produced by the alarm reduces the bedwetting behaviour (Houts, Berman, & Abramson, 1994). Aversion therapy is also used to stop other specific behaviours such as nail biting (Allen, 1996).

Alcoholism has long been treated with aversion therapy (Baker & Cannon, 1988). In a standard approach, patients are treated at a hospital where they are administered a drug, *antabuse*, that makes them nauseous if they consume any alcohol. The technique works very well if the user keeps taking the drug (Krampe et al., 2006), but unless it is combined with other approaches the patients are likely to relapse after they stop the drug.

Cognitive Aspects of CBT

While behavioural approaches focus on the actions of the patient, **cognitive therapy** is *a psychological treatment that helps clients identify incorrect or distorted beliefs that are contributing to disorder*. In cognitive therapy the therapist helps the patient develop new, healthier ways of thinking about themselves and about the others around them. The idea of cognitive therapy is that changing thoughts will change emotions, and that the new emotions will then influence behaviour.

The goal of cognitive therapy is not necessarily to get people to think more positively but rather to think more accurately. For instance, a person who thinks “no one cares about me” is likely to feel rejected, isolated, and lonely. If the therapist can remind the person that she has a mother or daughter who does care about her, more positive feelings will likely follow. Similarly, changing beliefs from “I have to be perfect” to “No one is always perfect — I’m doing pretty good,” from “I am a terrible student” to “I am doing well in some of my courses,” or from “She did that on purpose to hurt me” to “Maybe she didn’t realize how important it was to me” may all be helpful.

The psychiatrist Aaron T. Beck and the psychologist Albert Ellis (1913-2007) together provided the basic principles of cognitive therapy. Ellis (2004) called his approach *rational emotive behaviour therapy (REBT)* or *rational emotive therapy (RET)*, and he focused on pointing out the flaws in the patient’s thinking. Ellis noticed that people experiencing strong negative emotions tend to personalize and overgeneralize their beliefs, leading to an inability to see situations accurately (Leahy, 2003). In REBT, the therapist’s goal is to challenge these irrational thought patterns, helping the patient replace the irrational thoughts with more rational ones, leading to the development of more appropriate emotional reactions and behaviours.

Beck’s cognitive therapy was based on his observation that people who were depressed generally had a large number of highly accessible negative thoughts that influenced their thinking (Beck, 1995; Beck, Freeman, & Davis, 2004). His goal was to develop a short-term therapy for depression that would modify these unproductive thoughts. Beck’s approach challenges the client to test his or her beliefs against concrete evidence. If a client claims that “everybody at work is out to get me,” the therapist might ask the client to provide instances to corroborate the claim. At the same time the therapist might point out contrary evidence, such as the fact that a certain coworker is actually a loyal friend or that the patient’s boss had recently praised him or her.

Combination (Eclectic) Approaches to Therapy

To this point we have considered the different approaches to psychotherapy under the assumption that a therapist will use only one approach with a given patient. But this is not the case; the most commonly practised approach to therapy is an **eclectic therapy**, *an approach to treatment in which the therapist uses whichever techniques seem most useful and relevant for a given patient*. For bipolar disorder, for instance, the therapist may use both psychological skills training to help the patient cope with the severe highs and lows, but may also suggest that the patient consider biomedical drug therapies (Newman, Leahy, Beck, Reilly-Harrington, & Gyulai, 2002). Treatment for major depressive disorder usually involves antidepressant drugs as well as CBT to help the patient deal with particular problems (McBride, Farvolden, & Swallow, 2007).

As we have seen in Chapter 17, “Defining Psychological Disorders,” one of the most commonly diagnosed disorders is borderline personality disorder (BPD). Consider this description, typical of the type of borderline patient who arrives at a therapist’s office:

Even as an infant, it seemed that there was something different about Bethany. She was an intense baby, easily upset and difficult to comfort. She had very severe separation anxiety — if her mother left the room, Bethany would scream until she returned. In her early teens, Bethany became increasingly sullen and angry. She started acting out more and more — yelling at her parents and teachers and engaging in impulsive behaviour such as promiscuity and running away from home. At times Bethany would have a close friend at school, but some conflict always developed and the friendship would end.

By the time Bethany turned 17, her mood changes were totally unpredictable. She was fighting with her parents almost daily, and the fights often included violent behaviour on Bethany's part. At times she seemed terrified to be without her mother, but at other times she would leave the house in a fit of rage and not return for a few days. One day, Bethany's mother noticed scars on Bethany's arms. When confronted about them, Bethany said that one night she just got more and more lonely and nervous about a recent breakup until she finally stuck a lit cigarette into her arm. She said "I didn't really care for him that much, but I had to do something dramatic."

When she was 18, Bethany rented a motel room where she took an overdose of sleeping pills. Her suicide attempt was not successful, but the authorities required that she seek psychological help.

Most therapists will deal with a case such as Bethany's using an eclectic approach. First, because her negative mood states are so severe, they will likely recommend that she start taking antidepressant medications. These drugs are likely to help her feel better and will reduce the possibility of another suicide attempt, but they will not change the underlying psychological problems. Therefore, the therapist will also provide psychotherapy.

The first sessions of the therapy will likely be based primarily on creating trust. Person-centred approaches will be used in which the therapist attempts to create a therapeutic alliance conducive to a frank and open exchange of information.

If the therapist is trained in a psychodynamic approach, he or she will probably begin intensive face-to-face psychotherapy sessions at least three times a week. The therapist may focus on childhood experiences related to Bethany's attachment difficulties but will also focus in large part on the causes of the present behaviour. The therapist will understand that because Bethany does not have good relationships with other people, she will likely seek a close bond with the therapist, but the therapist will probably not allow the transference relationship to develop fully. The therapist will also realize that Bethany will probably try to resist the work of the therapist.

Most likely the therapist will also use principles of CBT. For one, cognitive therapy will likely be used in an attempt to change Bethany's distortions of reality. She feels that people are rejecting her, but she is probably bringing these rejections on herself. If she can learn to better understand the meaning of other people's actions, she may feel better. And the therapist will likely begin using some techniques of behaviour therapy, for instance, by rewarding Bethany for successful social interactions and progress toward meeting her important goals.

The eclectic therapist will continue to monitor Bethany's behaviour as the therapy continues, bringing into play whatever therapeutic tools seem most beneficial. Hopefully, Bethany will stay in treatment long enough to make some real progress in repairing her broken life.

One example of an eclectic treatment approach that has been shown to be successful in treating BPD is *dialectical behavioural therapy (DBT)* (Linehan & Dimeff, 2001). **DBT** is essentially *a cognitive therapy, but it includes a particular emphasis on attempting to enlist the help of the patient in his or her own treatment*. A dialectical behavioural therapist begins by attempting to develop a positive therapeutic alliance with the client, and then tries to encourage the patient to become part of the treatment process. In DBT the therapist aims to accept and validate the client's feelings at any given time while nonetheless informing the client that some feelings and behaviours are maladaptive, and showing the client better alternatives. The therapist will use both individual and group therapy, helping the patient work toward improving interpersonal effectiveness, emotion regulation, and distress tolerance skills.

Key Takeaways

- Psychoanalysis is based on the principles of Freudian and neo-Freudian personality theories. The goal is to explore the unconscious dynamics of personality.
- Humanist therapy, derived from the personality theory of Carl Rogers, is based on the idea that people experience psychological problems when they are burdened by limits and expectations placed on them by themselves and others. Its focus is on helping

people reach their life goals.

- Behaviour therapy applies the principles of classical and operant conditioning, as well as observational learning, to the elimination of maladaptive behaviours and their replacement with more adaptive responses.
- Albert Ellis and Aaron Beck developed cognitive-based therapies to help clients stop negative thoughts and replace them with more objective thoughts.
- Eclectic therapy is the most common approach to treatment. In eclectic therapy, the therapist uses whatever treatment approaches seem most likely to be effective for the client.

Exercises and Critical Thinking

1. Imagine that your friend has been feeling depressed for several months but refuses to consider therapy as an option. What might you tell her that might help her feel more comfortable about seeking treatment?
2. Imagine that you have developed a debilitating fear of bees after recently being attacked by a swarm of them. What type of therapy do you think would be best for your disorder?
3. Imagine that your friend has a serious drug abuse problem. Based on what you've learned in this section, what treatment options would you explore in your attempt to provide him with the best help available? Which combination of therapies might work best?

Image Attributions

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18.3: Reducing Disorder Biologically- Drug and Brain Therapy

Charles Stangor and Jennifer Walinga

Learning Objectives

- Classify the different types of drugs used in the treatment of mental disorders and explain how they each work to reduce disorder.
- Critically evaluate direct brain intervention methods that may be used by doctors to treat patients who do not respond to drug or other therapy.

Like other medical problems, psychological disorders may in some cases be treated biologically. **Biomedical therapies** are *treatments designed to reduce psychological disorder by influencing the action of the central nervous system*. These therapies primarily involve the use of medications but also include direct methods of brain intervention, including *electroconvulsive therapy (ECT)*, *transcranial magnetic stimulation (TMS)*, and *psychosurgery*.

Drug Therapies

Psychologists understand that an appropriate balance of neurotransmitters in the brain is necessary for mental health. If there is a proper balance of chemicals, then the person's mental health will be acceptable, but psychological disorder will result if there is a chemical imbalance. The most frequently used biological treatments provide the patient with medication that influences the production and reuptake of neurotransmitters in the central nervous system (CNS). The use of these drugs is rapidly increasing, and drug therapy is now the most common approach to treatment of most psychological disorders.

Unlike some medical therapies that can be targeted toward specific symptoms, current psychological drug therapies are not so specific; they don't change particular behaviours or thought processes, and they don't really solve psychological disorders. However, although they cannot "cure" disorders, drug therapies are nevertheless useful therapeutic approaches, particularly when combined with psychological therapy, in treating a variety of psychological disorders. The best drug combination for the individual patient is usually found through trial and error (Biedermann & Fleischhacker, 2009).

The major classes and brand names of drugs used to treat psychological disorders are shown in Table 18.2.

Table 18.2 Common Medications Used to Treat Psychological Disorders.

Class	Type	Brand names	Disorder	Notes
Psychostimulants		Ritalin, Adderall, Dexedrine	Attention-deficit/hyperactivity disorder (ADHD)	Very effective in most cases, at least in the short term, at reducing hyperactivity and inattention
Antidepressants	Tricyclics	Elavil, Tofranil	Depression and anxiety disorders	Less frequently prescribed today than are the serotonin reuptake inhibitors (SSRIs)
	Monamine oxidase inhibitors (MAIOs)	Ensam, Nardil, Parnate, Marpaln	Depression and anxiety disorders	Less frequently prescribed today than are the SSRIs
	SSRIs	Prozac, Paxil, Zoloft	Depression and anxiety disorders	The most frequently prescribed antidepressant medications; work by blocking the reuptake of serotonin
	Other reuptake inhibitors	Effexor, Celexa, Wellbutrin	Depression and anxiety disorders	Prescribed in some cases; work by blocking the reuptake of serotonin, norepinephrine, and dopamine
Mood stabilizers		Eskalith, Lithobid, Depakene	Bipolar disorder	Effective in reducing the mood swings associated with bipolar disorder
Anti-anxiety drugs	Tranquilizers (benzodiazepines)	Valium, Xanax	Anxiety, panic, and mood disorders	Work by increasing the action of the neurotransmitter GABA (gamma-aminobutyric acid)
Anti-psychotics (neuroleptics)		Thorazine, Haldol, Clozaril, Risperdal, Zyprexa	Schizophrenia	Treat the positive and to some extent, the negative symptoms of schizophrenia by reducing the transmission of dopamine and increasing the transmission of serotonin

Using Stimulants to Treat ADHD

Attention-deficit/hyperactivity disorder (ADHD) is frequently treated with biomedical therapy, usually along with cognitive behavioural therapy (CBT). The most commonly prescribed drugs for ADHD are psychostimulants, including Ritalin, Adderall, and Dexedrine. Short-acting forms of the drugs are taken as pills and last between four and 12 hours, but some of the drugs are also available in long-acting forms (skin patches) that can be worn on the hip and last up to 12 hours. The patch is placed on the child early in the morning and worn all day.

Stimulants improve the major symptoms of ADHD, including inattention, impulsivity, and hyperactivity, often dramatically, in about 75% of the children who take them (Greenhill, Halperin, & Abikof, 1999). But the effects of the drugs wear off quickly. Additionally, the best drug and best dosage varies from child to child, so it may take some time to find the correct combination.

It may seem surprising to you that a disorder that involves hyperactivity is treated with a psychostimulant, a drug that normally increases activity. The answer lies in the dosage. When large doses of stimulants are taken, they increase activity, but in smaller doses the same stimulants improve attention and decrease motor activity (Zahn, Rapoport, & Thompson, 1980).

The most common side effects of psychostimulants in children include decreased appetite, weight loss, sleeping problems, and irritability as the effect of the medication tapers off. Stimulant medications may also be associated with a slightly reduced growth rate in children, although in most cases growth isn't permanently affected (Spencer, Biederman, Harding, & O'Donnell, 1996).

Antidepressant Medications

Antidepressant medications are *drugs designed to improve moods*. Although they are used primarily in the treatment of depression, they are also effective for patients who suffer from anxiety, phobias, and obsessive-compulsive disorders. Antidepressants work by influencing the production and reuptake of neurotransmitters that relate to emotion, including serotonin, norepinephrine, and dopamine. Although exactly why they work is not yet known, as the amount of the neurotransmitters in the CNS is increased through the action of the drugs, the person often experiences less depression.

The original antidepressants were the **tricyclic antidepressants**, with the brand names of Tofranil and Elavil, and the **monamine oxidase inhibitors (MAOIs)**. These medications work by *increasing the amount of serotonin, norepinephrine, and dopamine at the synapses*, but they also have severe side effects including potential increases in blood pressure and the need to follow particular diets.

The antidepressants most prescribed today are the **selective serotonin reuptake inhibitors (SSRIs)**, including Prozac, Paxil, and Zoloft, which are *designed to selectively block the reuptake of serotonin at the synapse, thereby leaving more serotonin available in the CNS*. SSRIs are safer and have fewer side effects than the tricyclics or the MAOIs (Fraser, 2000; Hollon, Thase, & Markowitz, 2002). SSRIs are effective, but patients taking them often suffer a variety of sometimes unpleasant side effects, including dry mouth, constipation, blurred vision, headache, agitation, drowsiness, as well as a reduction in sexual enjoyment.

There has been concern that SSRIs may increase the risk of suicide among teens and young adults, probably because when the medications begin working they give patients more energy, which may lead them to commit the suicide that they had been planning but lacked the energy to go through with (Barbui, Esposito, & Cipriani, 2009). This concern has led doctors to be more selective about prescribing antidepressants to this age group (Healy & Whitaker, 2003; Simon, 2006; Simon, Savarino, Operskalski, & Wang, 2006).

Because the effects of antidepressants may take weeks or even months to develop, doctors usually work with each patient to determine which medications are most effective, and may frequently change medications over the course of therapy. In some cases other types of antidepressants may be used instead of or in addition to the SSRIs. These medications also work by blocking the reuptake of neurotransmitters, including serotonin, norepinephrine, and dopamine. Brand names of these medications include Effexor and Wellbutrin.

Patients who are suffering from bipolar disorder are not helped by the SSRIs or other antidepressants because their disorder also involves the experience of overly positive moods. Treatment is more complicated for these patients, often involving a combination of antipsychotics and antidepressants along with *mood stabilizing medications* (McElroy & Keck, 2000). The most well-known mood stabilizer, lithium carbonate (or lithium), is used widely to treat mania associated with bipolar disorder. Available in Canada for more than 60 years, the medication is used to treat acute manic episodes and as a long-term therapy to reduce their frequency and severity. Anticonvulsant medications can also be used as mood stabilizers. Another drug, Depakote, has also proven very effective, and some bipolar patients may do better with it than with lithium (Kowatch et al., 2000).

People who take lithium must have regular blood tests to be sure that the levels of the drug are in the appropriate range. Potential negative side effects of lithium are loss of coordination, slurred speech, frequent urination, and excessive thirst. Though side effects often cause patients to stop taking their medication, it is important that treatment be continuous, rather than intermittent. Recently, Health Canada updated safety information and treatment recommendations for lithium after finding that taking lithium carries a

risk of high blood calcium, or hypercalcemia, and is sometimes associated with a hormone disorder known as hyperparathyroidism (Canadian Press, 2014). There is no cure for bipolar disorder, but drug therapy does help many people.

Antianxiety Medications

Antianxiety medications are *drugs that help relieve fear or anxiety*. They work by increasing the action of the neurotransmitter GABA. The increased level of GABA helps inhibit the action of the sympathetic division of the autonomic nervous system, creating a calming experience.

The most common class of antianxiety medications is the *tranquilizers*, known as *benzodiazepines*. These drugs, which are prescribed millions of times a year, include Ativan, Valium, and Xanax. The benzodiazepines act within a few minutes to treat mild anxiety disorders but also have major side effects. They are addictive, frequently leading to tolerance, and they can cause drowsiness, dizziness, and unpleasant withdrawal symptoms including relapses into increased anxiety (Otto et al., 1993). Furthermore, because the effects of the benzodiazepines are very similar to those of alcohol, they are very dangerous when combined with it.

Antipsychotic Medications

Until the middle of the 20th century, schizophrenia was inevitably accompanied by the presence of positive symptoms, including bizarre, disruptive, and potentially dangerous behaviour. As a result, schizophrenics were locked in asylums to protect them from themselves and to protect society from them. In the 1950s, a drug called chlorpromazine (Thorazine) was discovered that could reduce many of the positive symptoms of schizophrenia. Chlorpromazine was the first of many *antipsychotic drugs*.

Antipsychotic drugs (neuroleptics) are *drugs that treat the symptoms of schizophrenia and related psychotic disorders*. Today there are many antipsychotics, including Thorazine, Haldol, Clozaril, Risperdal, and Zyprexa. Some of these drugs treat the positive symptoms of schizophrenia, and some treat the positive, negative, and cognitive symptoms.

The discovery of chlorpromazine and its use in clinics has been described as the single greatest advance in psychiatric care, because it has dramatically improved the prognosis of patients in psychiatric hospitals worldwide. Using antipsychotic medications has allowed hundreds of thousands of people to move out of asylums into individual households or community mental health centres, and in many cases to live near-normal lives.

Antipsychotics reduce the positive symptoms of schizophrenia by reducing the transmission of dopamine at the synapses in the limbic system, and they improve negative symptoms by influencing levels of serotonin (Marangell, Silver, Goff, & Yudofsky, 2003). Despite their effectiveness, antipsychotics have some negative side effects, including restlessness, muscle spasms, dizziness, and blurred vision. In addition, their long-term use can cause permanent neurological damage, a condition called **tardive dyskinesia** that *causes uncontrollable muscle movements, usually in the mouth area* (National Institute of Mental Health, 2008). Newer antipsychotics treat more symptoms with fewer side effects than older medications do (Casey, 1996).

Direct Brain Intervention Therapies

In cases of severe disorder it may be desirable to directly influence brain activity through electrical activation of the brain or through brain surgery. **Electroconvulsive therapy (ECT)** is *a medical procedure designed to alleviate psychological disorder in which electric currents are passed through the brain, deliberately triggering a brief seizure* (Figure 18.4, “Electroconvulsive Therapy (ECT)”). ECT has been used since the 1930s to treat severe depression.

When it was first developed, the procedure involved strapping the patient to a table before the electricity was administered. The patient was knocked out by the shock, went into severe convulsions, and awoke later, usually without any memory of what had happened. Today ECT is used only in the most severe cases when all other treatments have failed, and the practice is more humane. The patient is first given muscle relaxants and a general anesthesia, and precisely calculated electrical currents are used to achieve the most benefit with the fewest possible risks.

ECT is very effective; about 80% of people who undergo three sessions of ECT report dramatic relief from their depression. ECT reduces suicidal thoughts and is assumed to have prevented many suicides (Kellner et al., 2005). On the other hand, the positive effects of ECT do not always last; over one-half of patients who undergo ECT experience relapse within one year, although

antidepressant medication can help reduce this outcome (Sackheim et al., 2001). ECT may also cause short-term memory loss or cognitive impairment (Abrams, 1997; Sackheim et al., 2007).



Figure 18.4 Electroconvulsive Therapy (ECT). Today's ECT uses precisely calculated electrical currents to achieve the most benefit with the fewest possible risks.

Although ECT continues to be used, newer approaches to treating chronic depression are also being developed. A newer and gentler method of brain stimulation is **transcranial magnetic stimulation (TMS)**, *a medical procedure designed to reduce psychological disorder that uses a pulsing magnetic coil to electrically stimulate the brain* (Figure 18.5, "Transcranial Magnetic Stimulation [TMS]"). TMS seems to work by activating neural circuits in the prefrontal cortex, which is less active in people with depression, causing an elevation of mood. TMS can be performed without sedation, does not cause seizures or memory loss, and may be as effective as ECT (Loo, Schweitzer, & Pratt, 2006; Rado, Dowd, & Janicak, 2008). TMS has also been used in the treatment of Parkinson's disease and schizophrenia.



Figure 18.5 Transcranial Magnetic Stimulation (TMS). TMS is a noninvasive procedure that uses a pulsing magnetic coil to electrically stimulate the brain. Recently, TMS has been used in the treatment of Parkinson's disease.

Still other biomedical therapies are being developed for people with severe depression that persists over years. One approach involves implanting a device in the chest that stimulates the vagus nerve, a major nerve that descends from the brain stem toward the heart (Corcoran, Thomas, Phillips, & O'Keane, 2006; Nemeroff et al., 2006). When the vagus nerve is stimulated by the device, it activates brain structures that are less active in severely depressed people.

Psychosurgery, that is, *surgery that removes or destroys brain tissue in the hope of improving disorder*, is reserved for the most severe cases. The most well-known psychosurgery is the *prefrontal lobotomy*. Developed in 1935 by Nobel Prize winner Egas Moniz to treat severe phobias and anxiety, the procedure destroys the connections between the prefrontal cortex and the rest of the brain. Lobotomies were performed on thousands of patients. The procedure — which was never validated scientifically — left many patients in worse condition than before, subjecting the already suffering patients and their families to further heartbreak (Valenstein, 1986). Perhaps the most notable failure was the lobotomy performed on Rosemary Kennedy, the sister of U.S. President John F. Kennedy, which left her severely incapacitated.

There are very few centres that still conduct psychosurgery today, and when such surgeries are performed they are much more limited in nature and called *cingulotomy* (Dougherty et al., 2002). The ability to more accurately image and localize brain structures using modern neuroimaging techniques suggests that new, more accurate, and more beneficial developments in psychosurgery may soon be available (Sachdev & Chen, 2009).

Key Takeaways

- Psychostimulants are commonly prescribed to reduce the symptoms of ADHD.
- Antipsychotic drugs play a crucial role in the treatment of schizophrenia. They do not cure schizophrenia, but they help reduce the positive, negative, and cognitive symptoms, making it easier to live with the disease.
- Antidepressant drugs are used in the treatment of depression, anxiety, phobias, and obsessive-compulsive disorder. They gradually elevate mood by working to balance neurotransmitters in the CNS. The most commonly prescribed antidepressants are the SSRIs.
- Antianxiety drugs (tranquilizers) relieve apprehension, tension, and nervousness and are prescribed for people with diagnoses of generalized anxiety disorder (GAD), obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), and panic disorder. The drugs are effective but have severe side effects including dependence and withdrawal symptoms.
- Electroconvulsive therapy (ECT) is a controversial procedure used to treat severe depression, in which electric currents are passed through the brain, deliberately triggering a brief seizure.
- A newer method of brain stimulation is transcranial magnetic stimulation (TMS), a noninvasive procedure that employs a pulsing magnetic coil to electrically stimulate the brain.

Exercises and Critical Thinking

1. What are your opinions about taking drugs to improve psychological disorders? Would you take an antidepressant or antianxiety medication if you were feeling depressed or anxious? Do you think children with ADHD should be given stimulants? Why or why not?
2. Based on what you have just read, would you be willing to undergo ECT or TMS if you were chronically depressed and drug therapy had failed? Why or why not?

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18.4: Reducing Disorder by Changing the Social Situation

Charles Stangor and Jennifer Walinga

Learning Objectives

- Explain the advantages of group therapy and self-help groups for treating disorder.
- Evaluate the procedures and goals of community mental health services.

Although the individual therapies that we have discussed so far in this chapter focus primarily on the psychological and biological aspects of the bio-psycho-social model of disorder, the social dimension is never out of the picture. Therapists understand that disorder is caused, and potentially prevented, in large part by the people with whom we interact. A person with schizophrenia does not live in a vacuum. He interacts with his family members and with the other members of the community, and the behaviour of those people may influence his disease. And depression and anxiety are created primarily by the affected individual's perceptions (and misperceptions) of the important people around them. Thus prevention and treatment are influenced in large part by the social context in which the person is living.

Group, Couples, and Family Therapy

Practitioners sometimes incorporate the social setting in which disorder occurs by conducting therapy in groups. **Group therapy** is *psychotherapy in which clients receive psychological treatment together with others*. A professionally trained therapist guides the group, usually between six and 10 participants, to create an atmosphere of support and emotional safety for the participants (Yalom & Leszcz, 2005).

Group therapy provides a safe place where people come together to share problems or concerns, to better understand their own situations, and to learn from and with each other (Figure 18.6, "Group Therapy"). Group therapy is often cheaper than individual therapy, as the therapist can treat more people at the same time, but economy is only one part of its attraction. Group therapy allows people to help each other, by sharing ideas, problems, and solutions. It provides social support, offers the knowledge that other people are facing and successfully coping with similar situations, and allows group members to model the successful behaviours of other group members. Group therapy makes explicit the idea that our interactions with others may create, intensify, and potentially alleviate disorders.

Group therapy has met with much success in the more than 50 years it has been in use, and it has generally been found to be as or more effective than individual therapy (McDermut, Miller, & Brown, 2001). Group therapy is particularly effective for people who have life-altering illness, as it helps them cope better with their disease, enhances the quality of their lives, and in some cases has even been shown to help them live longer (American Group Psychotherapy Association, 2000).



Figure 18.6 Group Therapy. Group therapy provides a therapeutic setting where people meet with others to share problems or concerns, to better understand their own situation, and to learn from and with each other.

Sometimes group therapy is conducted with people who are in close relationships. **Couples therapy** is *treatment in which two people who are cohabitating, married, or dating meet together with the practitioner to discuss their concerns and issues about their*

relationship. These therapies are in some cases educational, providing the couple with information about what is to be expected in a relationship. The therapy may focus on such topics as sexual enjoyment, communication, or the symptoms of one of the partners (e.g., depression).

Family therapy involves *families meeting together with a therapist*. In some cases the meeting is precipitated by a particular problem with one family member, such as a diagnosis of bipolar disorder in a child. Family therapy is based on the assumption that the problem, even if it is primarily affecting one person, is the result of an interaction among the people in the family.

Self-Help Groups

Group therapy is based on the idea that people can be helped by the positive social relationships that others provide. One way for people to gain this social support is by joining a **self-help group**, which is *a voluntary association of people who share a common desire to overcome psychological disorder or improve their well-being* (Humphreys & Rappaport, 1994). Self-help groups have been used to help individuals cope with many types of addictive behaviours. Three of the best-known self-help groups are Alcoholics Anonymous, Gamblers Anonymous, and Overeaters Anonymous.

The idea behind self-groups is very similar to that of group therapy, but the groups are open to a broader spectrum of people. As in group therapy, the benefits include social support, education, and observational learning. Religion and spirituality are often emphasized, and self-blame is discouraged. Regular group meetings are held with the supervision of a trained leader.

Community Mental Health: Service and Prevention

The social aspect of disorder is also understood and treated at the community level. **Community mental health services** are *psychological treatments and interventions that are distributed at the community level*. Community mental health services are provided by nurses, psychologists, social workers, and other professionals in sites such as schools, hospitals, police stations, drug treatment clinics, and residential homes. The goal is to establish programs that will help people get the mental health services that they need (Gonzales, Kelly, Mowbray, Hays, & Snowden, 1991).

Unlike traditional therapy, the primary goal of community mental health services is prevention. Just as widespread vaccination of children has eliminated diseases such as polio and smallpox, mental health services are designed to prevent psychological disorder (Institute of Medicine, 1994). Community prevention can be focused on one or more of three levels: *primary prevention*, *secondary prevention*, and *tertiary prevention*.

Primary prevention is *prevention in which all members of the community receive the treatment*. Examples of primary prevention are programs designed to encourage all pregnant women to avoid cigarettes and alcohol because of the risk of health problems for the fetus, and programs designed to remove dangerous lead paint from homes.

Secondary prevention is more limited and focuses on people who are most likely to need it — those who display *risk factors* for a given disorder. **Risk factors** are *the social, environmental, and economic vulnerabilities that make it more likely than average that a given individual will develop a disorder* (Werner & Smith, 1992). The following presents a list of potential risk factors for psychological disorders.

Some Risk Factors for Psychological Disorders

Community mental health workers practising secondary prevention will focus on youths with these markers of future problems.

- Academic difficulties
- Attention-deficit/hyperactivity disorder (ADHD)
- Child abuse and neglect
- Developmental disorders
- Drug and alcohol abuse
- Dysfunctional family
- Early pregnancy
- Emotional immaturity
- Homelessness

- Learning disorder
- Low birth weight
- Parental mental illness
- Poor nutrition
- Poverty

Finally, **tertiary prevention** is *treatment, such as psychotherapy or biomedical therapy, that focuses on people who are already diagnosed with disorder*.

Community prevention programs are designed to provide support during childhood or early adolescence with the hope that the interventions will prevent disorders from appearing or will keep existing disorders from expanding. Interventions include such things as help with housing, counselling, group therapy, emotional regulation, job and skills training, literacy training, social responsibility training, exercise, stress management, rehabilitation, family therapy, or removal of a child from a stressful or dangerous home situation.

The goal of community interventions is to make it easier for individuals to continue to live a normal life in the face of their problems. Community mental health services are designed to make it less likely that vulnerable populations will end up in institutions or on the streets. In summary, their goal is to allow at-risk individuals to continue to participate in community life by assisting them within their own communities.

Research Focus: The Implicit Association Test as a Behavioural Marker for Suicide

Secondary prevention focuses on people who are at risk for disorder or harmful behaviours. Suicide is a leading cause of death worldwide, and prevention efforts can help people consider other alternatives, particularly if it can be determined who is most at risk. Determining whether a person is at risk of suicide is difficult, however, because people are motivated to deny or conceal such thoughts to avoid intervention or hospitalization. One recent study found that 78% of patients who die by suicide explicitly deny suicidal thoughts in their last verbal communications before killing themselves (Busch, Fawcett, & Jacobs, 2003).

Nock et al. (2010) tested the possibility that implicit measures of the association between the self-concept and death might provide a more direct behavioural marker of suicide risk that would allow professionals to more accurately determine whether a person is likely to commit suicide in comparison to existing self-report measures. They measured implicit associations about death and suicide in 157 people seeking treatment at a psychiatric emergency department.

The participants all completed a version of the Implicit Association Test (IAT), which was designed to assess the strength of a person's mental associations between death and the self (Greenwald, McGhee, & Schwartz, 1998). Using a notebook computer, participants classified stimuli representing the constructs of "death" (i.e., die, dead, deceased, lifeless, and suicide) and "life" (i.e., alive, survive, live, thrive, and breathing) and the attributes of "me" (i.e., I, myself, my, mine, and self) and "not me" (i.e., they, them, their, theirs, and other). Response latencies for all trials were recorded and analyzed, and the strength of each participant's association between "death" and "me" was calculated.

The researchers then followed participants over the next six months to test whether the measured implicit association of death with self could be used to predict future suicide attempts. The authors also tested whether scores on the IAT would add to prediction of risk above and beyond other measures of risk, including questionnaire and interview measures of suicide risk. Scores on the IAT predicted suicide attempts in the next six months above all the other risk factors that were collected by the hospital staff, including past history of suicide attempts. These results suggest that measures of implicit cognition may be useful for determining risk factors for clinical behaviours such as suicide.

Key Takeaways

- Group therapy is psychotherapy in which clients receive psychological treatment together with others. A professionally trained therapist guides the group. Types of group therapy include couples therapy and family therapy.
- Self-help groups have been used to help individuals cope with many types of disorder.
- The goal of community health service programs is to act during childhood or early adolescence with the hope that interventions might prevent disorders from appearing or keep existing disorders from expanding. The prevention provided can be primary,

secondary, or tertiary.

Exercise and Critical Thinking

1. Imagine the impact of a natural disaster like the 2013 floods in Calgary would have on the population of that city and cities like it. How would you expect such an event to affect the prevalence of psychological disorders in the community? What recommendations would you make in terms of setting up community support centres to help the people in the city?

Image Attributions:

Figure 18.6: "Family Constellation" by Arden Wong is licensed under CC BY-SA 3.0 license (http://creativecommons.org/licenses/by-sa/3.0/deed.en).

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18.5: Evaluating Treatment and Prevention- What Works?

Charles Stangor and Jennifer Walinga

Learning Objectives

- Summarize the ways that scientists evaluate the effectiveness of psychological, behavioural, and community service approaches to preventing and reducing disorders.
- Summarize which types of therapy are most effective for which disorders.

We have seen that psychologists and other practitioners employ a variety of treatments in their attempts to reduce the negative outcomes of psychological disorders. But we have not yet considered the important question of whether these treatments are effective, and if they are, which approaches are most effective for which people and for which disorders. Accurate empirical answers to these questions are important as they help practitioners focus their efforts on the techniques that have been proven to be most promising and will guide societies as they make decisions about how to spend public money to improve the quality of life of their citizens (Hunsley & Di Giulio, 2002).

Psychologists use **outcome research**, that is, *studies that assess the effectiveness of medical treatments*, to determine the effectiveness of different therapies. As you can see in Figure 18.7, "Outcome Research," in these studies the independent variable is the type of the treatment — for instance, whether it was psychological or biological in orientation or how long it lasted. In most cases characteristics of the client (e.g., his or her gender, age, disease severity, and prior psychological histories) are also collected as control variables. The dependent measure is an assessment of the benefit received by the client. In some cases we might simply ask the client if he or she feels better, and in other cases we may directly measure behaviour: Can the client now get in the airplane and take a flight? Has the client remained out of juvenile detention?

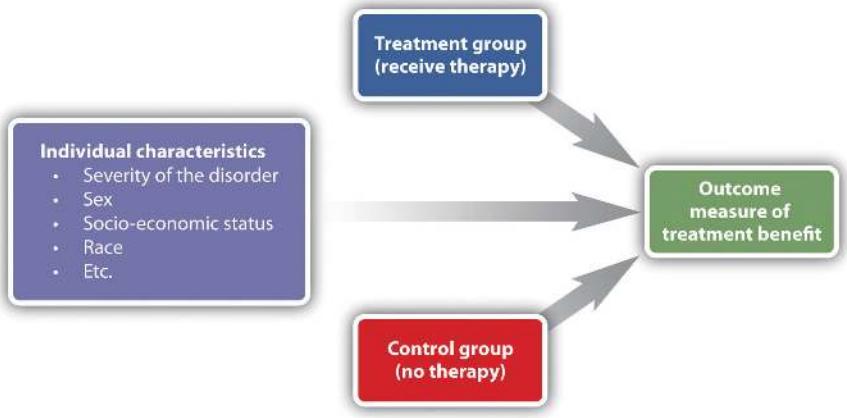


Figure 18.7 Outcome Research. The design of an outcome study includes a dependent measure of benefit received by the client, as predicted by independent variables including type of treatment and characteristics of the individual. [Long Description]

In every case the scientists evaluating the therapy must keep in mind the potential that other effects rather than the treatment itself might be important, that some treatments that seem effective might not be, and that some treatments might actually be harmful, at least in the sense that money and time are spent on programs or drugs that do not work.

One threat to the validity of outcome research studies is **natural improvement** — *the possibility that people might get better over time, even without treatment.* People who begin therapy or join a self-help group do so because they are feeling bad or engaging in unhealthy behaviours. After being in a program over a period of time, people frequently feel that they are getting better. But it is possible that they would have improved even if they had not attended the program, and that the program is not actually making a difference. To demonstrate that the treatment is effective, the people who participate in it must be compared with another group of people who do not get treatment.

Another possibility is that therapy works, but that it doesn't really matter which type of therapy it is. **Nonspecific treatment effects** occur when the *patient gets better over time simply by coming to therapy, even though it doesn't matter what actually happens at*

the therapy sessions. The idea is that therapy works, in the sense that it is better than doing nothing, but that all therapies are pretty much equal in what they are able to accomplish. Finally, **placebo effects** are *improvements that occur as a result of the expectation that one will get better rather than from the actual effects of a treatment*.

Effectiveness of Psychological Therapy

Thousands of studies have been conducted to test the effectiveness of psychotherapy, and by and large they find evidence that it works. Some outcome studies compare a group that gets treatment with another (control) group that gets no treatment. For instance, Ruwaard, Broeksteeg, Schrieken, Emmelkamp, and Lange (2010) found that patients who interacted with a therapist over a website showed more reduction in symptoms of panic disorder than did a similar group of patients who were on a waiting list but did not get therapy. Although studies such as this one control for the possibility of natural improvement (the treatment group improved more than the control group, which would not have happened if both groups had only been improving naturally over time), they do not control for either nonspecific treatment effects or for placebo effects. The people in the treatment group might have improved simply by being in the therapy (nonspecific effects), or they may have improved because they expected the treatment to help them (placebo effects).

An alternative is to compare a group that gets real therapy with a group that gets only a placebo. For instance, Keller et al. (2001) had adolescents who were experiencing anxiety disorders take pills that they thought would reduce anxiety for eight weeks. However, one-half of the patients were randomly assigned to actually receive the antianxiety drug Paxil, while the other half received a placebo drug that did not have any medical properties. The researchers ruled out the possibility that only placebo effects were occurring because they found that both groups improved over the eight weeks, but the group that received Paxil improved significantly more than the placebo group did.

Studies that use a control group that gets no treatment or a group that gets only a placebo are informative, but they also raise ethical questions. If the researchers believe that their treatment is going to work, why would they deprive some of their participants, who are in need of help, of the possibility for improvement by putting them in a control group?

Another type of outcome study compares different approaches with each other. For instance, Herbert et al. (2005) tested whether social skills training could boost the results received for the treatment of social anxiety disorder with cognitive behavioural therapy (CBT) alone. As you can see in Figure 18.8, they found that people in both groups improved, but CBT coupled with social skills training showed significantly greater gains than CBT alone.

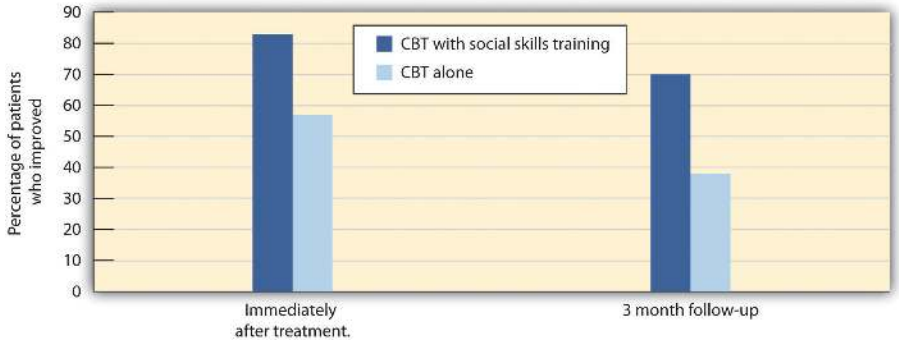


Figure 18.8 CBT Research. Herbert and colleagues compared the effectiveness of CBT alone with CBT along with social skills training. Both groups improved, but the group that received both therapies had significantly greater gains than the group that received CBT alone. [Long Description]

Other studies (Crits-Christoph, 1992; Crits-Christoph et al., 2004) have compared brief sessions of psychoanalysis with longer-term psychoanalysis in the treatment of anxiety disorder, humanistic therapy with psychodynamic therapy in treating depression, and cognitive therapy with drug therapy in treating anxiety (Dalgleish, 2004; Hollon, Thase, & Markowitz, 2002). These studies are advantageous because they compare the specific effects of one type of treatment with another, while allowing all patients to get treatment.

Research Focus: Meta-Analyzing Clinical Outcomes

Because there are thousands of studies testing the effectiveness of psychotherapy, and the independent and dependent variables in the studies vary widely, the results are often combined using a *meta-analysis*. A **meta-analysis** is *a statistical technique that uses the results of existing studies to integrate and draw conclusions about those studies*. In one important meta-analysis analyzing the effect of psychotherapy, Smith, Glass, and Miller (1980) summarized studies that compared different types of therapy or that compared the effectiveness of therapy against a control group. To find the studies, the researchers systematically searched computer databases and the reference sections of previous research reports to locate every study that met the inclusion criteria. Over 475 studies were located, and these studies used over 10,000 research participants.

The results of each of these studies were systematically coded, and *a measure of the effectiveness of treatment* known as the **effect size** was created for each study. Smith and her colleagues found that the average effect size for the influence of therapy was 0.85, indicating that psychotherapy had a relatively large positive effect on recovery. What this means is that, overall, receiving psychotherapy for behavioural problems is substantially better for the individual than not receiving therapy (Figure 18.9, "Normal Curves of Those Who Do and Do Not Get Treatment"). Although they did not measure it, psychotherapy presumably has large societal benefits as well — the cost of the therapy is likely more than made up for by the increased productivity of those who receive it.

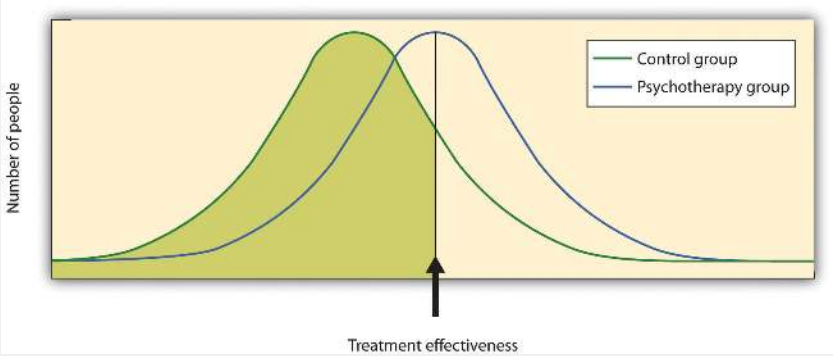


Figure 18.9 Normal Curves of Those Who Do and Do Not Get Treatment. Meta-analyses of the outcomes of psychotherapy have found that, on average, the distribution for people who get treatment is higher than for those who do not get treatment.

Other meta-analyses have also found substantial support for the effectiveness of specific therapies, including cognitive therapy, CBT (Butler, Chapman, Forman, & Beck, 2006; Deacon & Abramowitz, 2004), couples and family therapy (Shadish & Baldwin, 2002), and psychoanalysis (Shedler, 2010). On the basis of these and other meta-analyses, a list of *empirically supported therapies* — that is, therapies that are known to be effective — has been developed (Chambless & Hollon, 1998; Hollon, Stewart, & Strunk (2006). These therapies include cognitive therapy and behaviour therapy for depression; cognitive therapy, exposure therapy, and stress inoculation training for anxiety; CBT for bulimia; and behaviour modification for bed-wetting.

Smith, Glass, and Miller (1980) did not find much evidence that any one type of therapy was more effective than any other type, and more recent meta-analyses have not tended to find many differences either (Cuijpers, van Straten, Andersson, & van Oppen, 2008). What this means is that a good part of the effect of therapy is nonspecific, in the sense that simply coming to any type of therapy is helpful in comparison to not coming. This is true partly because there are fewer distinctions among the ways that different therapies are practised than the theoretical differences among them would suggest. What a good therapist practising psychodynamic approaches does in therapy is often not much different from what a humanist or a cognitive-behavioural therapist does, and so no one approach is really likely to be better than the other.

What all good therapies have in common is that they give people hope; help them think more carefully about themselves and about their relationships with others; and provide a positive, empathic, and trusting relationship with the therapist — the therapeutic alliance (Ahn & Wampold, 2001). This is why many self-help groups are also likely to be effective and perhaps why having a psychiatric service dog may also make us feel better.

Effectiveness of Biomedical Therapies

Although there are fewer of them because fewer studies have been conducted, meta-analyses also support the effectiveness of drug therapies for psychological disorder. For instance, the use of psychostimulants to reduce the symptoms of attention-deficit/hyperactivity disorder (ADHD) is well known to be successful, and many studies find that the positive and negative symptoms of schizophrenia are substantially reduced by the use of antipsychotic medications (Lieberman et al., 2005).

People who take antidepressants for mood disorders or antianxiety medications for anxiety disorders almost always report feeling better, although drugs are less helpful for phobic disorder and obsessive-compulsive disorder. Some of these improvements are almost certainly the result of placebo effects (Cardeña & Kirsch, 2000), but the medications do work, at least in the short term. An analysis of the Health Canada database found a success rate of 26% for Prozac and Zoloft, 24% for Celexa, and 31% for Lexapro and Cymbalta (Deshauer et al., 2008). The overall average success rate for antidepressant medications approved by Health Canada and the FDA between 1987 and 2004 was 30% (Deshauer et al., 2008; Turner, Matthews, Linardatos, Tell, & Rosenthal, 2008).

One problem with drug therapies is that although they provide temporary relief, they don't treat the underlying cause of the disorder. Once the patient stops taking the drug, the symptoms often return in full force. In addition many drugs have negative side effects, and some also have the potential for addiction and abuse. Different people have different reactions, and all drugs carry warning labels. As a result, although these drugs are frequently prescribed, doctors attempt to prescribe the lowest doses possible for the shortest possible periods of time.

Older patients face special difficulties when they take medications for mental illness. Older people are more sensitive to drugs, and drug interactions are more likely because older patients tend to take a variety of different drugs every day. They are more likely to forget to take their pills, to take too many or too few, or to mix them up due to poor eyesight or faulty memory.

Like all types of drugs, medications used in the treatment of mental illnesses can carry risks to an unborn infant. Tranquilizers should not be taken by women who are pregnant or expecting to become pregnant, because they may cause birth defects or other infant problems, especially if taken during the first trimester. Some selective serotonin reuptake inhibitors (SSRIs) may also increase risks to the fetus (Louik, Lin, Werler, Hernandez, & Mitchell, 2007; U.S. Food and Drug Administration, 2004), as do antipsychotics (Diav-Citrin et al., 2005).

Decisions on medication should be carefully weighed and based on each person's needs and circumstances. Medications should be selected based on available scientific research, and they should be prescribed at the lowest possible dose. All people must be monitored closely while they are on medications.

Effectiveness of Social-Community Approaches

Measuring the effectiveness of community action approaches to mental health is difficult because they occur in community settings and impact a wide variety of people, and it is difficult to find and assess valid outcome measures. Nevertheless, research has found that a variety of community interventions can be effective in preventing a variety of psychological disorders (Price, Cowen, Lorion, & Ramos-McKay,1988). Data suggest that prevention programs that provide supplemental foods, health-care referral, and nutrition education for low-income families are successful in leading to higher birth weight babies and lower infant mortality (Ripple & Zigler, 2003).

Although some of the many community-based programs designed to reduce alcohol, tobacco, and drug abuse; violence and delinquency; and mental illness have been successful, the changes brought about by even the best of these programs are, on average, modest (Wandersman & Florin, 2003; Wilson, Gottfredson, & Najaka, 2001). This does not necessarily mean that the programs are not useful. What is important is that community members continue to work with researchers to help determine which aspects of which programs are most effective, and to concentrate efforts on the most productive approaches (Weissberg, Kumpfer, & Seligman, 2003). The most beneficial preventive interventions for young people involve coordinated, systemic efforts to enhance their social and emotional competence and health. Many psychologists continue to work to promote policies that support community prevention as a model of preventing disorder.

Key Takeaways

- Outcome research is designed to differentiate the effects of a treatment from natural improvement, nonspecific treatment effects, and placebo effects.
- Meta-analysis is used to integrate and draw conclusions about studies.
- Research shows that getting psychological therapy is better at reducing disorder than not getting it, but many of the results are due to nonspecific effects. All good therapies give people hope and help them think more carefully about themselves and about their relationships with others.
- Biomedical treatments are effective, at least in the short term, but overall they are less effective than psychotherapy.
- One problem with drug therapies is that although they provide temporary relief, they do not treat the underlying cause of the disorder.
- Federally funded community mental health service programs are effective, but their preventive effects may in many cases be minor.

Exercises and Critical Thinking

1. Revisit the chapter opener that focuses on the use of psychiatric service dogs. What factors might lead you to believe that such therapy would or would not be effective? How would you propose to empirically test the effectiveness of the therapy?
2. Given your knowledge about the effectiveness of therapies, what approaches would you take if you were making recommendations for a person who is seeking treatment for severe depression?

Image Attributions

Figure 18.8: Adapted from Herbert et al., 2005.

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Long Descriptions

Figure 18.7 long description: In outcome research, individual characteristics like severity of the disorder, sex, socio-economic status, and race are controlled for. The treatment group receives therapy while the control group receives no therapy. By comparing

the two groups, the researcher can determine the outcome benefits of the therapy.

Figure 18.8 long description: Effectiveness of CBT combined with social skills training.

	Percentage of patients who improved with CBT alone	Percentage of patients who improved with CBT and social skills training
Immediately after treatment	57%	83%
3 month follow-up	38%	70%

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18.6: Summary, Key Terms, and Self-Test

Charles Stangor, Jennifer Walinga, and Jorden A. Cummings

Summary

Psychological disorders create a tremendous individual, social, and economic drain on society. Psychologists work to reduce this burden by preventing and treating disorder. Psychologists base this treatment and prevention of disorder on the bio-psycho-social model, which proposes that disorder has biological, psychological, and social causes, and that each of these aspects can be the focus of reducing disorder.

Treatment for psychological disorder begins with a formal psychological assessment. In addition to the psychological assessment, the patient is usually seen by a physician to gain information about potential Axis III (physical) problems.

One approach to treatment is psychotherapy. The fundamental aspect of psychotherapy is that the patient directly confronts the disorder and works with the therapist to help reduce it.

Psychodynamic therapy (also known as psychoanalysis) is a psychological treatment based on Freudian and neo-Freudian personality theories. The analyst engages with the patient in one-on-one sessions during which the patient verbalizes his or her thoughts through free associations and by reporting on his or her dreams. The goal of the therapy is to help the patient develop insight — that is, an understanding of the unconscious causes of the disorder.

Humanistic therapy is a psychological treatment based on the personality theories of Carl Rogers and other humanistic psychologists. Humanistic therapies attempt to promote growth and responsibility by helping clients consider their own situations and the world around them and how they can work to achieve their life goals.

The humanistic therapy promotes the ideas of genuineness, empathy, and unconditional positive regard in a nurturing relationship in which the therapist actively listens to and reflects the feelings of the client; this relationship is probably the most fundamental part of contemporary psychotherapy

Cognitive behavioural therapy (CBT) is a structured approach to treatment that attempts to reduce psychological disorder through systematic procedures based on cognitive and behavioural principles. CBT is a very broad approach used for the treatment of a variety of problems.

Behavioural aspects of CBT may include operant conditioning using reward or punishment. When the disorder is anxiety or phobia, the goal of the CBT is to reduce the negative affective responses to the feared stimulus through exposure therapy, flooding, or systematic desensitization. Aversion therapy is a type of behaviour therapy in which positive punishment is used to reduce the frequency of an undesirable behaviour.

Cognitive aspects of CBT include treatment that helps clients identify incorrect or distorted beliefs that are contributing to disorder.

The most commonly used approaches to therapy are eclectic, such that the therapist uses whichever techniques seem most useful and relevant for a given patient.

Biomedical therapies are treatments designed to reduce psychological disorder by influencing the action of the central nervous system. These therapies primarily involve the use of medications but also include direct methods of brain intervention, including electroconvulsive therapy (ECT), transcranial magnetic stimulation (TMS), and psychosurgery.

Attention-deficit/hyperactivity disorder (ADHD) is treated using low doses of psychostimulants, including Ritalin, Adderall, and Dexedrine.

Mood disorders are most commonly treated with the antidepressant medications known as selective serotonin reuptake inhibitors (SSRIs), including Prozac, Paxil, and Zoloft. The SSRIs selectively block the reuptake of serotonin at the synapse. Bipolar disorder is treated with mood stabilizing medications.

Antianxiety medications, including the tranquilizers Ativan, Valium, and Xanax, are used to treat anxiety disorders.

Schizophrenia is treated with antipsychotic drugs, including Thorazine, Haldol, Clozaril, Risperdal, and Zyprexa. Some of these drugs treat the positive symptoms of schizophrenia, and some treat the positive, negative, and cognitive symptoms.

Practitioners frequently incorporate the social setting in which disorder occurs by conducting therapy in groups, with couples, or with families. One way for people to gain social support is by joining a self-help group.

Community mental health services refer to psychological treatments and interventions that are distributed at the community level. These centres provide primary, secondary, and tertiary prevention.

Psychologists use outcome research to determine the effectiveness of different therapies. These studies help determine if improvement is due to natural improvement, nonspecific treatment effects, or placebo effects. Research finds that psychotherapy and biomedical therapies are both effective in treating disorder, but there is not much evidence that any one type of therapy is more effective than any other type. What all good therapies have in common is that they give people hope; help them think more carefully about themselves and about their relationships with others; and provide a positive, empathic, and trusting relationship with the therapist — the therapeutic alliance.

One problem with drug therapies is that although they provide temporary relief, they don't treat the underlying cause of the disorder. Once the patient stops taking the drug, the symptoms often return in full force.

Data suggest that although some community prevention programs are successful, the changes brought about by even the best of these programs are, on average, modest.

Key Terms

- Antianxiety Medications
- Antidepressant Medications
- Antipsychotic Drugs (Neuroleptics)
- Aversion Therapy
- Behaviour Therapy
- Biomedical Approach to Reducing Disorders
- Biomedical Therapies
- Cognitive Behavioural Therapy (CBT)
- Cognitive Therapy
- Community Mental Health Services
- Counterconditioning
- Couples Therapy
- Dialectical Behavioral Therapy (DBT)
- Dream Analysis
- Eclectic Therapy
- Effect Size
- Electroconvulsive Therapy (ECT)
- Exposure Therapy
- Family Therapy
- Flooding
- Free Association
- Group Therapy
- Humanistic Therapy
- Insight
- Interpretation
- Meta-Analysis
- Monamine Oxidase Inhibitors (MAOIs)
- Natural Improvement
- Nonspecific Treatment Effects
- Outcome Research
- Person-Centred Therapy (or Client-Centred Therapy)
- Placebo Effects
- Primary Prevention
- Psychiatric Service Dogs
- Psychodynamic Therapy (Psychoanalysis)
- Psychological Approach to Reducing Disorders
- Psychological Assessment
- Psychosurgery
- Psychotherapy
- Resistance
- Risk Factors
- Selective Serotonin Reuptake Inhibitors (SSRIs)
- Self-Help Group
- Social Approach to Reducing Disorders
- Systematic Desensitization
- Tardive Dyskinesia
- Tertiary Prevention
- Therapeutic Alliance
- Transcranial Magnetic Stimulation (TMS)
- Transference
- Tricyclic Antidepressants
- Virtual Reality CBT

Self-Test

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19.4: Glossary

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A

Ability Model: an approach that views EI as a standard intelligence that utilizes a distinct set of mental abilities that (1) are intercorrelated, (2) relate to other extant intelligences, and (3) develop with age and experience.

Abnormal Psychology: The application of psychological science to understanding and treating mental disorders.

Absolute Threshold of a Sensation: the intensity of a stimulus that allows an organism to just barely detect it.

Access: Conscious experience that recalls experiences from memory.

Accommodation: helps determine visual depth. As the lens changes its curvature to focus on distant or close objects, information relayed from the muscles attached to the lens helps us determine an object's distance.

Accommodation: Learning new information and thus changing the schema.

Action Potential: The change in electrical charge that occurs in a neuron when a nerve impulse is transmitted.

Activation-Synthesis Theory of Dreaming: A prominent neurobiological theory of dreaming that states dreams don't actually mean anything, and people construct dream stories after they wake up to make sense of nonsensical brain impulses.

Active Imagination: Activating our imaginal processes in waking life in order to tap into the unconscious meanings of our symbols.

Adaptations: Internal mechanisms that are products of natural selection and helped our ancestors get around the world, survive, and reproduce. Evolved solutions to problems that historically contributed to reproductive success.

Addiction: When the user powerfully craves the drug and is driven to seek it out, over and over again, no matter what the physical, social, financial, and legal cost.

Adherence: Accurately and regularly following medical orders and recommendations.

Adolescence: The years between the onset of puberty and the beginning of adulthood.

Adoption Study: A behavior genetic research method that involves comparison of biologically related people, including twins, who have been reared either separately or apart. Often includes a comparison of adopted children to their adoptive and biological parents.

Adrenal Glands: Two triangular glands found atop each kidney. Responsible for the production of hormones that regulate salt and water balance in the body and secrete epinephrine and norepinephrine when a person experiences excitement, threat, or stress. The two glands are also involved in metabolism, the immune system, and sexual development and function.

Adrenaline: A hormone that increases heart rate, elevates blood pressure, and boosts energy supplies.

Affect: The experience of a feeling or emotion.

Affective Forecasting: Predictions of one's future feelings.

Agonist: A drug that has chemical properties similar to a particular neurotransmitter and thus mimics the effects of the neurotransmitter.

Agoraphobia: Anxiety about being in places or situations from which escape might be difficult or embarrassing, or in which help may not be available.

Agreeableness: A core trait that includes dispositional characteristics as being sympathetic, generous, forgiving, and helpful, and behavioral tendencies toward harmonious social relations and likeability. The tendency to agree and go along with others rather than to assert one's own opinions and choices.

Alcohol: a colorless liquid, produced by the fermentation of sugar or starch, that is the intoxicating agent in fermented drinks.

Altruism: Helping with the aim of improving the wellbeing of others.

Alzheimer's Disease: A form of dementia that, over a period of years, leads to a loss of emotions, cognitions, and physical functioning, and that is ultimately fatal.

Ambivalent Attachment Style: When a child is wary about the situation in general, particularly the stranger, and stays close or even clings to the mother rather than exploring the toys.

Ambivalent Sexism: Recognizes the complex nature of gender attitudes, in which women are often associated with positive and negative qualities.

Amnesia: a memory disorder that involves the inability to remember information.

Amniotic Sac: The fluid-filled reservoir in which the embryo will live until birth, and which acts as both a cushion against outside pressure and as a temperature regulator.

Amphetamine: a stimulant that produces increased wakefulness and focus, along with decreased fatigue and appetite.

Amplitude: the height of a sound wave. Determines how much energy sound contains.

Amygdala: Located within the limbic system. This structure consists of two "almond-shaped" clusters and is primarily responsible for regulating our perceptions of, and reactions to, aggression and fear.

Anchoring: the bias to be affected by an initial anchor, even if the anchor is arbitrary, and to insufficiently adjust our judgments away from that anchor.

Anima: An archetype symbolizing the unconscious female component of the male psyche.

Animus: An archetype symbolizing the unconscious male component of the female psyche.

Anonymity: protecting a participant's identity by not collecting or disclosing any personally identifiable information.

Antagonist: A drug that reduces or stops the normal effects of a neurotransmitter.

Anterograde Amnesia: the inability to transfer information from short-term into long-term memory, making it impossible to form new memories after the onset of amnesia.

Antianxiety Medications: Drugs that help relieve fear or anxiety by increasing the action of the neurotransmitter GABA.

Antidepressant Medications: Drugs designed to improve moods.

Antipsychotic Drugs (Neuroleptics): Drugs that treat the symptoms of schizophrenia and related psychotic disorders.

Antisocial Personality Disorder (APD): A pervasive pattern of violation of the rights of others that begins in childhood or early adolescence and continues into adulthood.

Anxiety Disorders: Psychological disturbances marked by irrational fears, often of everyday objects and situations.

Anxiety: The nervousness or agitation that we sometimes experience, often about something that is going to happen.

APA Ethical Code: a set of 150 ethical standards that psychologists and students in psychology are expected to follow in their activities including clinical work, teaching, and research.

Aphasia: a condition in which language functions are severely impaired.

Applied Research: research that investigates issues that have implications for everyday life and provides solutions to everyday problems.

Appreciation Effects: Having people around us makes us feel good about ourselves.

Aptitude Tests: tests designed to measure one's ability to perform a given task.

Archetypes: Primordial images that reflect basic patterns or universal themes common to us all.

Arithmetic Mean (M): the sum of all the scores of the variable divided by the number of participants in the distribution; Arithmetic Average.

Arousal Cost–Reward Model: Focuses on the aversive feelings aroused by seeing another in need.

Arousal: Our experiences of the bodily responses created by the sympathetic division of the autonomic nervous system.

Assimilation: Using already developed schemas to understand new information.

Association Areas: The area within the cortex where sensory and motor information is combined and associated with stored knowledge. Responsible for most of the things that make humans seem human and are involved in higher mental functions, such as learning, thinking, planning, judging, moral reflecting, figuring, and spatial reasoning.

Associative Shifting: It is possible to shift any response from occurring with one stimulus to occurring with another stimulus.

At-Risk Research: research that exposes participants to harm that is greater than that found in everyday circumstances (i.e., greater than minimal risk) and must be reviewed by the full Institutional Review Board committee.

Attachment: The emotional bonds that we develop with those with whom we feel closest, and particularly the bonds that an infant develops with the mother or primary caregiver.

Attention: A state of focused awareness on a subset of the available perceptual information.

Attitudes: Opinions, feelings, and beliefs about a person, concept, or group. Our evaluations of things that can bias us toward having a particular response to it.

Attraction: Being sexually interested in another person.

Audience Design: constructing utterances to suit the audience's knowledge.

Auditory Cortex: Located in the temporal cortex. Responsible for hearing and language.

Authoethnography: A narrative approach to introspective analysis.

Authoritarian Parents: Demanding but not responsive.

Authoritative Parents: Demanding but they also responsive to the needs and opinions of the child.

Autobiographical Memory: memory for the events of one's life.

Automatic Behavior: an unconscious behavior that is not self-censored and is typically spontaneous.

Automatic Empathy: a social perceiver unwittingly taking on the internal state of another person, usually because of mimicking the person's expressive behavior and thereby feeling the expressed emotion.

Automatic: A behavior or process that is unintentional, uncontrollable, occurs outside of conscious awareness, or is cognitively efficient.

Autonomic Nervous System (ANS): A division of the peripheral nervous system (PNS) that regulates autonomic processes, or internal activities of the human body including heart rate, breathing, digestion, salivation, perspiration, urination, and sexual arousal.

Autonomy: a fundamental right that describes a person's ability to make his or her own decisions freely without being coerced by others.

Availability Heuristic: the tendency to make judgments of the frequency or likelihood that an event occurs on the basis of the ease with which it can be retrieved from memory.

Availability: The ease of getting a specific response.

Aversion Therapy: A type of behaviour therapy in which positive punishment is used to reduce the frequency of an undesirable behaviour.

Aversive Racism: The tendency for people to dislike admitting their own racial biases to themselves or others.

Avoidance Learning: A learned response to avoid an unpleasant stimulus or event.

Avoidant Attachment Style: When a child avoids or ignores his or her mother, showing little emotion when the mother departs or returns.

Axon: A long, segmented fibre within the neuron that transmits information away from the cell body toward other neurons or to the muscles and glands.

B

Babbling: the beginning stages of speech. Occurs at about seven months, babies engage in intentional vocalizations that lack specific meaning.

Balance: Putting less effort into a focal goal by working towards other goals.

Barbiturates: depressants that are commonly prescribed as sleeping pills and painkillers.

Basic Research: Research that answers fundamental questions about behavior.

Basic-Level Category: the neutral, preferred category for a given object, at an intermediate level of specificity.

Behavioral Genetics: A variety of research techniques that scientists use to learn about the genetic and environmental influences on human behaviour by comparing the traits of biologically and nonbiologically related family members

Behavioral Medicine: Focuses on the application of research on health predictors and risk factors, or interventions that prevent and treat illness.

Behaviour Therapy: Psychological treatment that is based on principles of learning.

Behaviourism: a school of psychology that is based on the premise that it is not possible to objectively study the mind, and therefore that psychologists should limit their attention to the study of behaviour itself. Focuses on observable behaviour as a means to studying the human psyche.

Belmont Report: a set of federal guidelines created in 1978 after the Tuskegee study that articulates ethical guidelines for research.

Beneficence: an ethical principle from the Belmont Report that emphasizes the importance of maximizing benefits and minimizing harm to research participants and society.

Benevolent Sexism: Refers to the perception that women need to be protected, supported, and adored by men.

Benzodiazepines: a family of depressants used to treat anxiety, insomnia, seizures, and muscle spasms.

Beta Effect: the perception of motion that occurs when different images are presented next to each other in succession.

Bias (i.e., test bias): a test that predicts outcomes better for one group than it does for another.

Biases: the systematic and predictable mistakes that influence the judgment of even very talented human beings.

Bilingualism: the ability to speak two languages.

Binocular Depth Cues: depth cues that are created by retinal image disparity and require the coordination of both eyes.

Bio-Psycho-Social Model of Illness: A way of understanding disorder that assumes that disorder is caused by biological, psychological, and social factors.

Biofeedback: A stress reduction technique where the individual is shown bodily information that is not normally available to them, and then taught strategies to alter this signal.

Biological Drive: A drive powering human behaviour including hunger, thirst, and intimacy.

Biological Psychology: School of psychology interested in measuring biological, physiological, or genetic variables in an attempt to relate them to psychological or behavioural variables.

Biological Rhythms: regularly occurring cycles of behaviours.

Biomedical Approach to Reducing Disorders: An approach that is based on the use of medications to treat mental disorders as well as the employment of brain intervention techniques.

Biomedical Model of Health: Posits that physical or pathogenic factors primarily contribute to illness.

Biomedical Therapies: Treatments designed to reduce psychological disorder by influencing the action of the central nervous system.

Biopsychosocial Model of Health: Posits that biology, psychology, and social factors are just as important in the development of disease as biological causes.

Bipolar Disorder: A psychological disorder characterized by swings in mood from overly "high" to sad and hopeless, and back again, with periods of near-normal mood in between.

Black Box Model: An interaction of stimuli, consumer characteristics, decision processes, and consumer responses.

Blatant Biases: Conscious beliefs, feelings, and behavior that people are perfectly willing to admit, which mostly express hostility toward other groups while unduly favoring one's own group.

Blind Spot: a hole in one's vision due to a lack of photoreceptor cells. Occurs the optic nerve leaves the retina.

Blind to Condition: when the experimenter or the participants do not know which conditions the participants are assigned to.

Blind to the Research Hypothesis: When research participants are not aware of what is being studied.

Blindsight: a condition in which people are unable to consciously report on visual stimuli but nevertheless are able to accurately answer questions about what they are seeing.

Blocking: in classical conditioning, the finding that no conditioning occurs to a stimulus if it is combined with a previously conditioned stimulus during conditioning trials. Suggests that information, surprise value, or prediction error is important in conditioning.

Blood Alcohol Content (BAC): a measure of the percentage of alcohol found in a person's blood. This measure is typically the standard used to determine the extent to which a person is intoxicated, as in the case of being too impaired to drive a vehicle.

Borderline Personality Disorder (BPD): A psychological disorder characterized by a prolonged disturbance of personality accompanied by mood swings, unstable personal relationships, identity problems, threats of self-destructive behaviour, fears of abandonment, and impulsivity.

Bounded Awareness: the systematic ways in which we fail to notice obvious and important information that is available to us.

Bounded Ethicality: the systematic ways in which our ethics are limited in ways we are not even aware of ourselves.

Bounded Rationality: model of human behavior that suggests that humans try to make rational decisions but are bounded due to cognitive limitations.

Bounded Self-Interest: the systematic and predictable ways in which we care about the outcomes of others.

Bounded Willpower: the tendency to place greater weight on present concerns rather than future concerns.

Brain Lateralization: The idea that the left and the right hemispheres of the brain are specialized to perform different functions.

Brain Stem: The oldest and innermost region of the brain that is designed to control the most basic functions of life, including breathing, attention, and motor responses.

Broca's Area: an area in front of the left hemisphere near the motor cortex responsible for language production.

Bruxism: a sleep disorder in which the sufferer grinds their teeth during sleep.

Bystander Intervention: A phenomenon in which people intervene to help others, including strangers.

C

Caffeine: a bitter psychoactive drug found in the beans, leaves, and fruits of plants.

Cannon-Bard Theory of Emotion: A theory proposed by Walter Cannon and Philip Bard that states that the experience of an emotion is accompanied by physiological arousal.

Cartesian Catastrophe: the idea that mental processes taking place outside conscious awareness are impossible.

Case Studies: descriptive records of one or more individual's experience and behavior.

Cataplexy: a symptom of narcolepsy where an individual loses muscle tone, resulting in a partial or complete collapse.

Categories: networks of associated memories that have features in common with each other – a fundamental part of human nature.

Categorize: to sort or arrange different items into classes or categories.

Category Prototype: the member of the category that is most average or typical of the category.

Category: a set of entities that are equivalent in some way. Usually the items are similar to one another.

Central Executive: the part of working memory that directs attention and processing.

Central Nervous System (CNS): The collection of neurons that make up the brain and the spinal cord. Is the major controller of the body's functions, charged with interpreting sensory information and responding to it with its own directives.

Central Tendency: the point in the distribution around which the data are centred. Typically measured using the arithmetic mean.

Cerebellum: (i.e., little brain) Consists of two wrinkled ovals behind the brain stem. It functions to coordinate voluntary movement.

Cerebral Cortex: The outer bark-like layer of our brain that allows us to so successfully use language, acquire complex skills, create tools, and live in social groups. The aspect of the brain that sets humans apart from other animals.

Challenge: Seeing change and new experiences as exciting opportunities to learn and develop.

Chameleon Effect: A phenomenon that occurs when individuals nonconsciously mimic the postures, mannerisms, facial expressions, and other behaviors of their interaction partners.

Character Strengths: A psychological and intellectual virtue.

Childhood: The period between infancy and the onset of puberty.

Chromosomes: Multiple strands of DNA (deoxyribonucleic acid) that are grouped together.

Chronic Disease: Illnesses that persist over time.

Chunking: the process of organizing information into smaller groupings (chunks), thereby increasing the number of items that can be held in short term memory.

Cilia: a bundle of fibres that are located on each of the hair cells found in the cochlea.

Circadian Rhythm: the strongest and most important biorhythm. It guides the daily waking and sleeping cycle in many animals and is influenced by exposure to sunlight as well as daily schedule and activity. Biologically, it includes changes in body temperature, blood pressure and blood sugar.

Classical Conditioning Effects: how we learn, often without effort or awareness, to associate neutral stimuli with another stimulus, which creates a naturally occurring response.

Classical Conditioning: A type of learning in which we develop responses to certain stimuli that are not naturally occurring.

Classical Conditioning: the procedure in which an initially neutral stimulus (the conditioned stimulus, or CS) is paired with an unconditioned stimulus (or US). The result is that the conditioned stimulus begins to elicit a conditioned response (CR). Classical conditioning is nowadays considered important as both a behavioral phenomenon and as a method to study simple associative learning. Same as Pavlovian conditioning. Describes stimulus-stimulus associative learning.

Client- or Person-Centred Therapy: relies on clients' capacity for self-direction, empathy, and acceptance to promote clients' development.

Clock Time: the hour on the timepiece that governs the beginning and ending of activities.

Cocaine: an addictive drug obtained from the leaves of the coca plant.

Cochlea: a snail-shaped liquid-filled tube in the inner ear that contains the cilia.

Cochlear Implant: a device made up of a series of electrodes that are placed inside the cochlea.

Cocktail Party Phenomenon: the ability to focus one's auditory attention on a stimulus while filtering out other competing stimuli.

Codeine: an analgesic that is weaker and less addictive than morphine and heroin. Also a member of the opiate family.

Cognition: the processes of acquiring and using knowledge.

Cognitive Accessibility: the extent to which knowledge is activated in memory, and thus likely to be used in cognition and behavior.

Cognitive Appraisal: The cognitive interpretations that accompany emotions.

Cognitive Behavioural Therapy (CBT): A structured approach to treatment that attempts to reduce psychological disorders through systematic procedures based on cognitive and behavioural principles.

Cognitive Biases: errors in memory or judgment that are caused by the inappropriate use of cognitive processes

Cognitive Psychology: A field of psychology that studies mental processes, including perception, thinking, memory, and judgement.

Cognitive Therapy: A psychological treatment that helps clients identify incorrect or distorted beliefs that are contributing to disorder.

Cognitive-Behavioural Therapy (CBT): Focuses on helping individuals challenge their patterns and beliefs and replace erroneous thinking with more realistic and effective thoughts, thus decreasing self-defeating emotions and behaviour and breaking what can otherwise become a negative cycle.

Cohort Effects: Refer to the possibility that differences in cognition or behaviour at two points in time may be caused by differences that are unrelated to the changes in age.

Collective Unconscious: An aspect of the unconscious that manifests in universal themes that run through all human life.

Collectivism: Emphasizes connectedness among people and the importance of working towards common goals. A norm in East Asian cultures that are centered around interdependence, including developing harmonious social relationships with others.

Color Blindness: the inability to detect green and/or red colors.

Commitment: Results from the perceived value and attainability of a goal. The tendency to see the world as interesting and meaningful.

Common Ground: information that is shared by people who engage in a conversation.

Common-Causal Variable: a variable that is not part of the research hypothesis but that causes both the predictor and the outcome variable and thus produces the observed correlation between them.

Community Learning: Occurs when children serve as both teachers and learners.

Community Mental Health Services: Psychological treatments and interventions that are distributed at the community level.

Comorbidity: Occurs when people who suffer from one disorder also suffer at the same time from other disorders.

Competence: The recognition of one's own abilities relative to other children.

Complexes: Usually unconscious and repressed emotionally toned symbolic material that is incompatible with consciousness.

Compulsions: Repetitive behaviours.

Concept: the mental representation of a category.

Conception: Occurs when an egg from the mother is fertilized by a sperm from the father.

Conceptual Replication: scientific attempt to copy the scientific hypothesis used in an earlier study in an effort to determine whether the results will generalize to different samples, times, or situations. The same – or similar – results are an indication that the findings are generalizable.

Conceptual Variables: abstract ideas that form the basis of research hypotheses.

Concrete Operational Stage: Marked by more frequent and more accurate use of transitions, operations, and abstract concepts.

Conditioned Compensatory Response: in classical conditioning, a conditioned response that opposes, rather than is the same as, the unconditioned response. It functions to reduce the strength of the unconditioned response. Often seen in conditioning when

drugs are used as unconditioned stimuli.

Conditioned Response (CR): the response that is elicited by the conditioned stimulus after classical conditioning has taken place.

Conditioned Stimulus (CS): an initially neutral stimulus (like a bell, light, or tone) that elicits a conditioned response after it has been associated with an unconditioned stimulus.

Cones: visual neurons that are specialized in detecting fine detail and colors.

Confederate: An actor working with the researcher. Most often, this individual is used to deceive unsuspecting research participants.

Confidentiality: refers to an agreement between researchers and participants that states that the researcher(s) will not reveal participants' personal information without their consent or legal authorization.

Confirmation Bias: the tendency to verify and confirm our existing memories rather than to challenge and disconfirm them. A result of our schemas influencing how we seek out and interpret new information. Confirmation bias influences memory in such a way that information that fits our schemas is better remembered than information that disconfirms our schemas.

Conformity: a process in which people change their beliefs and behaviours to be similar to those of the people that they care about.

Conformity: The tendency to act and think like the people around us.

Confounding Variables: variables other than the independent on which the participants in one experimental condition differ systematically from those in the other condition.

Conscientiousness: The tendency to be careful, on-time for appointments, to follow rules, and to be hardworking.

Conscious: Having knowledge of something external or internal to oneself; being aware of and responding to one's surroundings. The ability to accurately report on a stimuli's existence (or its nonexistence) more than 50% of the time.

Consciousness: The awareness or deliberate perception of a stimulus. OR our subjective awareness of ourselves and our environment.

Consent Form: a written document in which informed consent is outlined and obtained from clients and participants.

Consolidation: the process occurring after encoding that is believed to stabilize memory traces.

Construct Validity: Tests that actually measure intelligence rather than something else; the extent to which the variables used in the research adequately assess the conceptual variables they were designed to measure.

Context-Dependent Learning: an increase in retrieval when the external situation in which information is learned matches the situation in which it is remembered.

Context: stimuli that are in the background whenever learning occurs. For instance, the Skinner box or room in which learning takes place is the classic example of a context. However, "context" can also be provided by internal stimuli, such as the sensory effects of drugs (e.g., being under the influence of alcohol has stimulus properties that provide a context) and mood states (e.g., being happy or sad). It can also be provided by a specific period in time—the passage of time is sometimes said to change the "temporal context."

Contextual Information: the information surrounding language that help us interpret language. Examples include the knowledge that we have and that we know that other people have, and nonverbal expressions such as facial expressions, postures, gestures, and tone of voice.

Continual-Activation Theory: Proposes that dreaming is a result of brain activation and synthesis.

Continuous Distributions: A distribution in which most scores fall somewhere in the middle, with smaller numbers showing more extreme levels.

Contralateral Control: How the brain is wired such that in most cases the left hemisphere receives sensations from and controls the right side of the body, and vice versa.

Control: The belief in one's own ability to control or influence events.

Controlled Behavior: a conscious behavior that is self-censored.

Convergence: the inward turning of our eyes that is required to focus on objects that are less than about 50 feet away from us.

Convergent Thinking: thinking that is directed toward finding the correct answer to a given problem.

Cornea: a clear covering that protects the eye and begins to focus the incoming light.

Corpus Callosum: The region that normally connects the two halves of the brain and supports communication between the hemispheres.

Correlational Research: research designed to discover relationships among variables and to allow the prediction of future events from present knowledge; involves the measurement of two or more relevant variables and an assessment of the relationships between or among those variables.

Cortisol: A primary stress hormone that increases sugars (glucose) in the bloodstream, enhances the brain's use of glucose, and increases the availability of substances that repair tissues.

Cost–Benefit Analysis: The process that potential helpers engage in to determine the costs and benefits associated with helping. Or, when costs are compared with the benefits in a research project to determine the ethical standing of that research project.

Counterconditioning: A second incompatible response (relaxation) is conditioned to an already conditioned response (the fear response).

Counterfactual Thinking: the tendency to think about and experience events according to "what might have been".

Couples Therapy: Treatment in which two people who are cohabitating, married, or dating meet together with the practitioner to discuss their concerns and issues about their relationship.

Critical Period: a time in which learning can easily occur.

Cross-Cultural Psychology: Research that uses standard scales to compare cultural groups.

Cross-Cultural Studies: Research that uses standard forms of measurement to compare people from different cultures and identify their differences.

Cross-Sectional Research Design: Research designs in which age comparisons are made between samples of different people at different ages at one time.

Crystallized Intelligence: General knowledge about the world, as reflected in semantic knowledge, vocabulary, and language.

Crystallized Intelligence: the accumulated knowledge of the world we have acquired throughout our lives.

Cue Overload Principle: the principle stating that the more memories that are associated to a particular retrieval cue, the less effective the cue will be in prompting retrieval of any one memory.

Cues: a stimulus that has a particular significance to the perceiver (e.g., a sight or a sound that has special relevance to the person who saw or heard it).

Cultural Differences: Refers to the differences across cultures.

Cultural Display Rules: Rules that are learned early in life that specify the management and modification of our emotional expressions according to social circumstances.

Cultural Intelligence: The ability to understand why members of other cultures act in the ways they do.

Cultural Psychology: Attempts to understand and appreciate culture from the point of view of the people within it.

Cultural Relativism: The principle of regarding and valuing the practices of a culture from the point of view of that culture.

Cultural Scripts: How a person is taught how to behave according to regional cultural norms; people can have multiple cultural scripts.

Cultural Similarities: Refers to the similarities across cultures.

Culture of Honor: A cultural background that emphasizes personal or family reputation and social status.

Culture: It is a collective understanding of the way the world works, shared by members of a group and passed down from one generation to the next. Represents the common set of social norms, including religious and family values and other moral beliefs, shared by the people who live in a geographical region.

Curvilinear Relationship: relationships that change in direction and thus are not described by a single straight line.

D

Daily Hassles: Everyday minor stressors that can raise blood pressure, alter stress hormones, and suppress the immune system function. Our everyday interactions with the environment that are essentially negative.

Data: any information that is collected through formal observation or measurement that is used within a research study.

Debriefing: refers to the process of informing research participants as soon as possible after the study about its purpose, disclosing any deception involved, and minimizing harm or misunderstandings that result from participating.

Decay: the fading of memories with the passage of time.

Deception: occurs whenever research participants are not completely and fully informed about the nature of the research project before participating in it.

Decibel: a unit of relative loudness.

Declaration of Helsinki: an ethics code that was created in 1964 by the World Medical Council.

Declarative Memory: conscious memories for facts and events.

Deep Structure of an Idea: how the idea is represented in the fundamental universal grammar that is common to all languages.

Deficiency Needs: The bottom four levels of Maslow's pyramid, including physiological, safety, and social needs.

Deliberative Phase: A person must decide which of many potential goals to pursue at a given point in time.

Delusions: False beliefs not commonly shared by others within one's culture and maintained even though they are obviously out of touch with reality.

Dementia: A progressive neurological disease that includes loss of cognitive abilities significant enough to interfere with everyday behaviours.

Dendrite: A branching treelike fibre that collects information from other cells and sends the information to the soma.

Dependence: a need to use a drug or other substance regularly.

Dependent Variable: a measured variable that is expected to be influenced by the experimental manipulations.

Depressants: a class of drugs (psychoactive) that slow down the body's physiological and mental processes. Also reduces the activity of the CNS.

Depression: a psychological disorder that affects millions of people worldwide and is known to be caused by biological, social, and cultural factors.

Depth Cues: messages from our bodies and the external environment that supply us with information about space and distance.

Depth Perception: the ability to perceive three-dimensional space and to accurately judge distance.

Derailment: The shifting from one subject to another, without following any one line of thought to conclusion.

Descriptive Norms: We act the way most people—or most people like us—act.

Descriptive Research: designed to provide a snapshot of the current state of affairs.

Descriptive Statistics: used to analyze descriptive research results by summarizing the distribution of scores.

Development: The physiological, behavioural, cognitive, and social changes that occur throughout human life, which are guided by both genetic predispositions (nature) and by environmental influences (nurture).

Developmental Intergroup Theory: Postulates that adults' heavy focus on gender leads children to pay attention to gender as a key source of information about themselves and others, to seek out any possible gender differences, and to form rigid stereotypes based on gender that are subsequently difficult to change

Diagnostic and Statistical Manual of Mental Disorders (DSM): A document that provides a common language and standard criteria for the classification of mental disorders.

Dialectical Behavioral Therapy (DBT): Essentially a cognitive therapy, but it includes a particular emphasis on attempting to enlist the help of the patient in his or her own treatment.

Dichotic Listening: an experimental task in which two messages are presented to different ears.

Difference Threshold (or Just Noticeable Difference [JND]): the change in a stimulus that can just barely be detected by the organism.

Diffusion of Responsibility: A phenomenon in which bystanders are relived of personal responsibility and do not intervene because they know that someone else could help.

Direct Effects of Social Support: Having people we can trust and rely on helps us directly by allowing us to share favours when we need them.

Directional Goals: When we want a situation to turn out a particular way or our belief to be true.

Discrimination: When a person is biased against an individual, simply because of the individual's membership in a social category.

Discriminative Stimulus: in operant conditioning, a stimulus that signals whether the response will be reinforced. It is said to "set the occasion" for the operant response.

Disorganized Attachment Style: When a child has no consistent way of coping with the stress of the strange situation.

Dispersion: the extent to which the scores are all tightly clustered around the central tendency.

Dissociation: the heightened focus on one stimulus or thought such that many other things around you are ignored; a disconnect between one's awareness of their environment and the one object the person is focusing on.

Dissociative Amnesia: A psychological disorder that involves extensive, but selective, memory loss, but in which there is no physiological explanation for the forgetting.

Dissociative Amnesia: loss of autobiographical memories from a period in the past in the absence of brain injury or disease.

Dissociative Disorder: A condition that involves disruptions or breakdowns of memory, awareness, and identity.

Dissociative Fugue: A psychological disorder in which an individual loses complete memory of his or her identity and may even assume a new one, often far from home.

Dissociative Identity Disorder: A psychological disorder in which two or more distinct and individual personalities exist in the same person, and there is an extreme memory disruption regarding personal information about the other personalities.

Distinctiveness: the principle that unusual events (in a context of similar events) will be recalled and recognized better than uniform (nondistinctive) events.

Distractor Task: a task that is designed to make a person think about something unrelated to an impending decision.

Distribution: the central tendency and spread of data for a particular variable

Divergent Thinking: the ability to generate many different ideas for or solutions to a single problem.

Divided Attention: A person's ability to focus on two or more things at one time; the ability to flexibly allocate attentional resources between two or more concurrent tasks.

DNA Methylation: Covalent modifications of mammalian DNA occurring via the methylation of cytosine, typically in the context of the CpG dinucleotide.

DNA Methyltransferases (DNMTs): Enzymes that establish and maintain DNA methylation using methyl-group donor compounds or cofactors. The main mammalian DNMTs are DNMT1, which maintains methylation state across DNA replication, and DNMT3a and DNMT3b, which perform de novo methylation.

Double-Blind Experiment: both the researcher and the participants are blind to condition.

Down Syndrome: a chromosomal disorder leading to mental retardation caused by the presence of all or part of an extra 21st chromosome.

Dream Analysis: The therapist listens while the client describes his or her dreams and then analyzes the symbolism of the dreams in an effort to probe the unconscious thoughts of the client and interpret their significance.

Dreams: The succession of images, thoughts, sounds, and emotions that passes through our minds while sleeping; Specific expressions of the unconscious that have a definite, purposeful structure indicating an underlying idea or intention.

Drive State: An affective experience (something you feel) that motivates organisms to fulfill goals that are generally beneficial to their survival and reproduction.

Dualism: a term used by Descartes that states that the mind is fundamentally different from the mechanical body; the idea that the mind, a nonmaterial entity, is separate from (although connected to) the physical body.

Durability Bias: The tendency for people to overestimate how long positive and negative events will affect them.

Dysthymia: A condition characterized by mild, but chronic, depressive symptoms that last for at least two years.

E

Early Adulthood: Roughly the ages between 25 and 45.

Echoic Memory: auditory sensory memory. Decays slower than iconic memory (4 seconds).

Eclectic Therapy: An approach to treatment in which the therapist uses whichever techniques seem most useful and relevant for a given patient.

EEG (Electroencephalography): the recording of the brain's electrical activity over a period of time by placing electrodes on the scalp.

Effect Size: A measure of the effectiveness of treatment.

Ego-Depletion: The exhaustion of resource that occurs from resisting a temptation.

Egocentric: The inability to readily see and understand other people's viewpoints.

Egoism: Being primarily concerned with one's own cost–benefit outcomes.

Eidetic Imagery (or Photographic Memory): a type of memory that allows people the ability to report details of an image over long periods of time.

Elaborative Encoding: process new information in ways that make it more relevant or meaningful.

Electroconvulsive Therapy (ECT): A medical procedure designed to alleviate psychological disorder in which electric currents are passed through the brain, deliberately triggering a brief seizure.

Electroencephalography (EEG): A technique that records the electrical activity produced by the brain's neurons through the use of electrodes that are placed around the research participant's head.

Electromagnetic Energy: pulses of energy waves that can carry information from place to place.

Embodied: becoming so closely in touch with the environment that the person's body and the sensed environment becomes linked with our cognition, such that the world around us becomes part of our brain.

Embryo: A zygote that attaches to the wall of the uterus.

Emotion Regulation: The ability to control and productively use one's emotions.

Emotion-Focused Coping: Regulates the emotions that come with stress.

Emotion: A mental and physiological feeling state that directs attention and guides behavior.

Emotional Intelligence (EI): the ability to monitor one's own and others' feelings and emotions, to discriminate among them, to use this information to guide one's thinking and actions, and to effectively control one's own emotions. EI includes four specific abilities: perceiving, using, understanding, and managing emotions.

Empathic Concern: When potential helpers become primarily interested in increasing the well-being of the victim, even if the helper must incur some costs that might otherwise be easily avoided.

Empathy–Altruism Model: Posits that the key for altruism is empathizing with the victim, that is, putting oneself in the shoes of the victim and imagining how the victim must feel.

Empirical Methods: refer to a set of methods used by scientists and include the processes of collecting and organizing data and drawing conclusions about those data.

Empirical: to be based on systematic collection and analysis of data.

Encoding Specificity Principle: the hypothesis that a retrieval cue will be effective to the extent that information encoded from the cue overlaps or matches information in the engram or memory trace.

Encoding: The initial experience of perceiving and learning events. It is the process by which we place the things that we experience into memory. The pact of putting information into memory.

Enculturation: Refers to the ways people learn about and shared cultural knowledge.

Endocrine System: The chemical regulator of the body that consists of glands that secrete hormones.

Engrams: a term indicating the change in the nervous system representing an event; also, memory trace.

Epigenetics: The study of heritable changes in gene expression or cellular phenotype caused by mechanisms other than changes in the underlying DNA sequence. Epigenetic marks include covalent DNA modifications and posttranslational histone modifications.

Epigenome: The genome-wide distribution of epigenetic marks.

Episodic Memory: Memory of autobiographical events that can be explicitly stated with a particular time and place. OR The firsthand experiences that we have had.

Error Management Theory (EMT): A theory of selection under conditions of uncertainty in which recurrent cost asymmetries of judgment or inference favor the evolution of adaptive cognitive biases that function to minimize the more costly errors.

Escape Learning: A learned behaviour to terminate an unpleasant stimulus.

Estrogen: One of two female sex hormones secreted by the ovaries. Estrogen is involved in the development of female sexual features, including breast growth, the accumulation of body fat around the hips and thighs, and the growth spurt that occurs during puberty. Also involved in pregnancy and the regulation of the menstrual cycle.

Ethical Review Board (ERB): a committee of at least five members whose goal it is to determine the cost-benefit ratio of research conducted within in institution. Also known as an Institutional Review Board (IRB).

Ethics: a broad area within psychology that is concerned with what it means to be moral and how to act morally.

Ethnocentric Bias: The researcher who designs the study might be influenced by personal biases that could affect research outcomes, without even being aware of it.

Ethnographic Studies: Research in which the scientist spends time observing a culture and conducting interviews.

Eugenics: the proposal that one could improve the human species by encouraging or permitting reproduction of only those people with genetic characteristics judged desirable.

Euphoria: an intense feeling of pleasure, excitement or happiness.

Eureka Experience: when a creative product enters consciousness.

Eustress: Stress that is not necessarily debilitative and could be potentially facilitative to a person's sense of well-being, capacity, or performance.

Evaluative Priming Task: An implicit test that measures how quickly the participant labels the valence of the attitude object when it appears immediately after a positive or negative image.

Event Time: scheduling is determined by the flow of the activity. Events begin and end when, by mutual consensus, participants "feel" the time is right.

Evolution: Certain traits and behaviors developing over time because they are advantageous to our survival.

Evolutionary Psychology: A branch of psychology that applies the Darwinian theory of natural selection to human and animal behaviour. Seeks to develop and understand ways of expanding the emotional connection between individuals and the natural world, thereby assisting individuals with developing sustainable lifestyles and remedying alienation from nature.

Exact (or Direct) Replication: scientific attempt to exactly copy the scientific methods used in an earlier study in an effort to determine whether the results are consistent. The same – or similar – results are an indication that the findings are accurate.

Excitation Transfer: The phenomenon that occurs when people who are already experiencing arousal from one event tend to also experience unrelated emotions more strongly.

Excitatory: Neurotransmitters that make the cell more likely to fire.

Exemplar: an example in memory that is labeled as being in a particular category.

Exempt Research: research projects in which the federal regulations do not apply given its nature (e.g., using data from public sources).

Existential Therapy: focuses on "man in the world" by emphasizing the choices to be made in the present and future and enabling a new freedom and responsibility to act.

Expectation Fulfillment Theory: posits that dreaming serves to discharge emotional arousals that haven't been expressed during the day.

Experimental Research: research in which initial equivalence among research participants in more than one group is created, followed by a manipulation of a given experience for these groups and a measurement of the influence of the manipulation.

Experimenter Bias: a situation in which the experimenter subtly treats the research participants in the various experimental conditions differently, resulting in an invalid confirmation of the research hypothesis.

Explicit Attitude: An attitude that a person verbally or overtly expresses.

Explicit Memory: A type of memory that is conscious. Includes memories that are intentionally recollected, typically information that are factual such as previous experiences and concepts. Knowledge or experiences that can be consciously remembered. There are two types of explicit memory – episodic and semantic.

Exposure Therapy: A behavioural therapy based on the classical conditioning principle of extinction, in which people are confronted with a feared stimulus with the goal of decreasing their negative emotional responses to it.

External Locus of Control: When a person believes that his or her achievements and outcomes are determined by fate, luck, or other. If the person does not succeed, he or she believes it is due to external forces outside of the person's control.

External Validity: the extent to which the results of a research design can be generalized beyond the specific way the original experiment was conducted.

Extinction: decrease in the strength of a learned behavior that occurs when the conditioned stimulus is presented without the unconditioned stimulus (in classical conditioning) or when the behavior is no longer reinforced (in instrumental conditioning). The term describes both the procedure (the US or reinforcer is no longer presented) as well as the result of the procedure (the learned response declines). Behaviors that have been reduced in strength through extinction are said to be "extinguished."

Extraversion: The tendency to be talkative, sociable, and to enjoy others; the tendency to have a dominant style.

Extravert: A person who is outer-directed.

Extrinsic Motivation: Motivation that comes from the benefits associated with achieving a goal.

F

Facets: More specific, lower-level units of personality.

Facial Feedback Hypothesis: Proposes that the movement of our facial muscles can trigger corresponding emotions.

Factor Analysis: A statistical method that helps to determine whether a small number of dimensions underlie a larger system.

Facts: objective statements that are determined to be accurate through empirical study.

False Memories: memory for an event that never actually occurred, implanted by experimental manipulation or other means.

False-Belief Test: an experimental procedure that assesses whether a perceiver recognizes that another person has a false belief—a belief that contradicts reality.

Falsified Data (or Faked Data): data that are fabricated, or made up, by researchers intentionally trying to pass off research results that are inaccurate. This is a serious ethical breach and can even be a criminal offense

Family Study: Starts with one person who has a trait of interest — for instance, a developmental disorder such as autism — and examines the individual's family tree to determine the extent to which other members of the family also have the trait.

Family Therapy: Involves families meeting together with a therapist; in some cases, the meeting is precipitated by a particular problem with one family member.

Farsighted: an image is focused behind the retina, rather than on the retina. Occurs when the light rays bend incorrectly.

Fear Conditioning: a type of classical or Pavlovian conditioning in which the conditioned stimulus (CS) is associated with an aversive unconditioned stimulus (US), such as a foot shock. As a consequence of learning, the CS comes to evoke fear. The phenomenon is thought to be involved in the development of anxiety disorders in humans.

Feature Detector Neurons: Specialized neurons, located in the visual cortex, that respond to the strength, angles, shapes, edges, and movements of a visual stimulus.

Federal Policy for the Protection of Human Subjects: a set of laws that were created from the Belmont Report that guides the conduct of research that is conducted, supported, or regulated by the federal government.

Feeling Function: Creative, warm, intimate.

Fetal Alcohol Syndrome (FAS): A condition caused by maternal alcohol drinking that can lead to numerous detrimental developmental effects.

Fight-or-Flight Response: A reflex that prepares the body to respond to danger in the environment; An emotional and behavioral reaction to stress that increases the readiness for action.

Fitness: refers to the extent to which having a given characteristic helps the individual organism survive and reproduce at a higher rate than do other members of the species who do not have the characteristic.

Flashbulb Memory: vivid and emotional personal memories of receiving the news of some momentous (and usually emotional and unusual) event that people believe they can remember very well.

Flexible Correction Model: the ability for people to correct or change their beliefs and evaluations if they believe these judgments have been biased (e.g., if someone realizes they only thought their day was great because it was sunny, they may revise their evaluation of the day to account for this "biasing" influence of the weather).

Flooding: A therapeutic technique in which a client is exposed to the source of his or her fear all at once.

Flourish: To grow and function successfully.

Flow: A state of optimal performance.

Fluid Intelligence: The ability to think and acquire information quickly and abstractly. The capacity to learn new ways of solving problems and performing activities.

Flynn Effect: the observation that scores on intelligence tests worldwide have increased substantially over the past decades.

Foils: any member of a lineup (whether live or photograph) other than the suspect.

Forgiveness: Creates a possibility for a relationship to recover from the damage caused by the offending party's offense.

Formal Operational Stage: Marked by the ability to think in abstract terms and to use scientific and philosophical lines of thought.

Four-Branch Model: an ability model developed by Drs. Peter Salovey and John Mayer that includes four main components of EI, arranged in hierarchical order, beginning with basic psychological processes and advancing to integrative psychological processes. The branches are (1) perception of emotion, (2) use of emotion to facilitate thinking, (3) understanding emotion, and (4) management of emotion.

Fovea: the central point of the retina.

Framing: the bias to be systematically affected by the way in which information is presented, while holding the objective information constant.

Free Association: The therapist listens while the client talks about whatever comes to mind, without any censorship or filtering.

Frequency Theory of Hearing: proposes that whatever the pitch of a sound wave, nerve impulses of a corresponding frequency will be sent to the auditory nerve.

Frequency: the wavelength of the sound wave. Measured in terms of the number of waves that arrive per second.

Frontal Lobe: A portion of the brain located behind the forehead, also known as the motor cortex, that is involved in motor skills, higher level cognition (thinking, planning, memory, and judgment), and expressive language.

Functional Fixedness: occurs when people's schemas prevent them from using an object in new and non-traditional ways.

Functional Magnetic Resonance Imaging (fMRI): A type of brain scan that uses a magnetic field to create images of brain activity in each brain area. Detects the amount of blood flow in each brain region and is an indicator of neural activity.

Functionalism (or School of Functionalism): School of psychology aimed at understanding why animals and humans have developed the particular psychological aspects that they currently possess

Fundamental Attribution Error: The consistent way we attribute people's actions to personality traits while overlooking situational influences.

G

Gamification: A growing approach to behaviour modification today that involves applying game incentives such as prompts, competition, badges, and rewards to ordinary activities.

Gate Control Theory of Pain: proposes that pain is determined by the operation of two types of nerve fibres in the spinal cord.

Gender Constancy: By the third birthday, children can consistently identify their own gender and learn that gender is constant and can't change simply by changing external attributes.

Gender Discrimination: Differential treatment on the basis of gender.

Gender Identity: Refers to a person's psychological sense of being male or female.

Gender Roles: The behaviors, attitudes, and personality traits that are designated as either masculine or feminine in a given culture.

Gender Schema Theory: Argues that children are active learners who essentially socialize themselves.

Gender Stereotypes: The beliefs and expectations people hold about the typical characteristics, preferences, and behaviors of men and women.

Gender: Refers to the cultural, social, and psychological meanings that are associated with masculinity and femininity.

Gene Selection Theory: The modern theory of evolution by selection by which differential gene replication is the defining process of evolutionary change.

Gene: A specific deoxyribonucleic acid (DNA) sequence that codes for a specific polypeptide or protein or an observable inherited trait. This basic biological unit transmits characteristics from one generation to the next.

General Adaptation Syndrome (GAS) Model: Describes three distinct phases of physiological change that occur in response to long-term stress: alarm, resistance, and exhaustion.

General Intelligence Factor (g): a construct that the different abilities and skills measured on intelligence tests have in common.

Generalization: the extent to which relationships among conceptual variables can be demonstrated in a wide variety of people and a wide variety of manipulated or measured variables.

Generalized Anxiety Disorder (GAD): A psychological disorder diagnosed in situations in which a person has been excessively worrying about money, health, work, family life, or relationships.

Generativity: speakers of a language can compose sentences to represent new ideas that they have never before been exposed to.

Genotype: The DNA content of a cell's nucleus, whether a trait is externally observable or not.

Gestalt Therapy: Focuses on the skills and techniques that permit an individual to be more aware of his or her feelings.

Gestalt: a meaningfully organized whole; a whole is more than the sum of its parts.

Gland: A gland in the endocrine system that is made up of a groups of cells that function to secrete hormones.

Glial Cells: (i.e., glia) Cells that surround and link to the neurons, protecting them, providing them with nutrients, and absorbing unused neurotransmitters.

Glutamate: a neurotransmitter and a form of the amino acid glutamic acid, is perhaps the most important neurotransmitter in memory.

Goal-Directed Behavior: instrumental behavior that is influenced by the animal's knowledge of the association between the behavior and its consequence and the current value of the consequence. Sensitive to the reinforcer devaluation effect.

Goal: The cognitive representation of a desired state or mental idea of how we would like things to turn out.

Gratitude: A feeling of appreciation or thankfulness in response to receiving a benefit.

Group Therapy: Psychotherapy in which clients receive psychological treatment together with others.

Growth Need: the fifth level of Maslow's pyramid that allows people to reach his or her fullest potential.

H

Habit: instrumental behavior that occurs automatically in the presence of a stimulus and is no longer influenced by the animal's knowledge of the value of the reinforcer. Insensitive to the reinforcer devaluation effect.

Habituation Procedure: When a baby is placed in a high chair and presented with visual stimuli while a video camera records the infant's eye and face movements.

Habituation: The decreased responsiveness toward a stimulus after it has been presented numerous times in succession.

Hallucinations: Imaginary sensations that occur in the absence of a real stimulus or which are gross distortions of a real stimulus.

Hallucinogens: psychoactive drugs/substances that, when ingested, alter a person's sensations and perceptions, often by creating hallucinations that are not real or distorting their perceptions of time.

Hardiness Theoretical Model: Refers to the resilient stress response patterns in individuals and groups.

Health Behaviors: Behaviors that can improve or harm health.

Helpfulness: People high in helpfulness believe they can be effective with the help they give they are more likely to be helpful in the future.

Helping: Prosocial behaviour that involves providing assistance to another person or group who is in need of help.

Heritability Coefficient: An easily misinterpreted statistical construct that purports to measure the role of genetics in the explanation of differences among individuals. The heritability coefficient varies from 0 to 1 and is meant to provide a single measure of genetics' influence of a trait.

Heritability of the Characteristic: refers to the proportion of the observed differences of characteristics among people that is due to genetics.

Heritability: (i.e., genetic influence) Is indicated when the correlation coefficient for identical twins exceeds that for fraternal twins, indicating that shared DNA is an important determinant of personality.

Heroin: a strong addictive drug derived from opium; twice as addictive than morphine.

Hertz: vibrations per second.

Heuristics: Cognitive (or thinking) strategies that simplify decision making by reducing complex problem-solving to simpler, rule-based decisions. These information processing strategies are useful in many cases but may lead to errors when misapplied. Two frequently applied heuristics include the representativeness heuristic and the availability heuristic.

HEXACO Model: Posits that one important class of individual differences was omitted from the Five-Factor Model: Honesty-Humility.

High-Stakes Testing: Situations in which test scores are used to make important decisions about individuals.

Highlight: Prioritizing and putting greater effort towards goals.

Hindsight Bias: refers to the tendency to think that we could have predicted something that has already occurred that we probably would not have been able to predict.

Hippocampus: Located within the limbic system and consists of two "horns" that curve back from the amygdala. Important for the storage of information in long-term memory.

Histone Acetyltransferases (HATs) and Histone Deacetylases (HDACs): HATs are enzymes that transfer acetyl groups to specific positions on histone tails, promoting an "open" chromatin state and transcriptional activation. HDACs remove these acetyl groups, resulting in a "closed" chromatin state and transcriptional repression.

Histone Modifications: Posttranslational modifications of the N-terminal "tails" of histone proteins that serve as a major mode of epigenetic regulation. These modifications include acetylation, phosphorylation, methylation, sumoylation, ubiquitination, and ADP-ribosylation.

Holist: Believing the whole is more than the sum of the parts.

Homeostasis: The natural balance in the body's system. The tendency of an organism to maintain this stability across all the different physiological systems in the body.

Honeymoon Effect: The tendency for newlyweds to produce unrealistically positive ratings.

Hormone: A chemical that moves throughout the body to help regulate emotions and behaviours.

Host Personality: The personality in control of the body most of the time.

Hostile Sexism: Refers to the negative attitudes of women as inferior and incompetent relative to men.

Hostility: A pattern of arousal that involves becoming easily upset, angry, and having a negative personality style.

Hot Cognition: The mental processes that are influenced by desires and feelings.

HPA Axis: A physiological response to stress involving interactions among the (H) hypothalamus, the (P) pituitary, and the (A) adrenal glands.

Hue: the shade of a color.

Human Factors: the field of psychology that uses psychological knowledge, including the principles of sensation and perception, to improve the development of technology.

Human Intelligence: the ability to think, to learn from experience, to solve problems, and to adapt to new situations.

Humanistic Psychology: holds a hopeful, constructive view of human beings and of their substantial capacity to be self-determining.

Humanistic Therapy: A psychological treatment that emphasizes the person's capacity for self-realization and fulfillment.

Humility: A clear and accurate sense of one's abilities and achievements; the ability to acknowledge one's mistakes, imperfections, gaps in knowledge, and limitations.

Hypnosis: the state of consciousness whereby a person is highly responsive to the suggestions of another; this state usually involves a dissociation with one's environment and an intense focus on a single stimulus, which is usually accompanied by a sense of relaxation. OR a trancelike state of consciousness, usually induced by a procedure known as hypnotic induction, which consists of heightened suggestibility, deep relaxation, and intense focus

Hypnotherapy: The use of hypnotic techniques such as relaxation and suggestion to help engineer desirable change such as lower pain or quitting smoking.

Hypothalamus: A brain region that is located in the lower, central part of the brain that is responsible for synthesizing and secreting hormones and plays an important role in eating behavior.

Hypothalamus: Part of the limbic system, located just under the thalamus. A brain structure that contains a number of small areas that perform a variety of functions, including the regulation of hunger and sexual behaviour, as well as linking the nervous system to the endocrine system via the pituitary gland. Helps regulate body temperature, hunger, thirst, and sex, and responds to the satisfaction of these needs by creating feelings of pleasure.

Hypothesis: A proposed explanation for phenomenon that researchers test through research.

I

Iconic Memory: visual sensory memory. Decays rapidly (250 milliseconds).

Identical Elements Theory of Transfer: The more similar the situations are, the greater the amount of information that will transfer.

Identical Twins: Two individual organisms that originated from the same zygote and therefore are genetically identical or very similar. The epigenetic profiling of identical twins discordant for disease is a unique experimental design as it eliminates the DNA sequence-, age-, and sex-differences from consideration.

Identifiability: Identification or placement of a situation is a first response of the nervous system, which can recognize it.

Illusions: occurs when the perceptual processes that normally help us correctly perceive the world around us are fooled by a particular situation so that we see something that does not exist or that is incorrect.

Imaginary Audience: Refers to when teenagers are so highly self-conscious that they feel that everyone is constantly watching them.

Impact Bias: The tendency for a person to overestimate the intensity of their future feelings.

Implemental Phase: Planning specific actions related to the goal and involves having a mindset that is conducive to the effective implementation of a goal.

Implicit Association Test (IAT): A measure that assesses how quickly the participant pairs a concept with an attribute. A computer reaction time test measures a person's automatic associations with concepts. For instance, the IAT could be used to measure how quickly a person makes positive or negative evaluations of members of various ethnic groups.

Implicit Attitude: An attitude that a person does not verbally or overtly express.

Implicit Learning: occurs when we acquire information without intent that we cannot easily express.

Implicit Measures of Attitudes: Measures that infer the participant's attitude rather than having the participant explicitly report it.

Implicit Memory: a type of long-term memory that does not require conscious thought to encode. It's the type of memory one makes without intent. Or, a memory that is acquired and used unconsciously. Implicit memories can affect a person's thoughts and behaviors. Also the influence of experience on behavior, even if the individual is not aware of those influences.

Implicit Motives: Goals in which a person is not consciously aware of and that cannot be assessed via self-report.

Inattentional Blindness: the failure to notice a fully visible object when attention is devoted to something else.

Incidence: refers to the estimated frequency or occurrence (prevalence) of a psychological disorder within a population.

Incidental Learning: any type of learning that happens without the intention to learn.

Independent Self: Views people as unique with a stable collection of personal traits that drive behavior; people tend to express their emotions to influence others.

Independent Variable: the causing variable that is created (manipulated) by the experimenter.

Individual Differences: the variations among people on physical or psychological dimensions.

Individualism: Emphasizes the uniqueness between people, personal freedom, and individual expression of opinions and decision-making. Norms in Western cultures that center on valuing the self and one's independence from others.

Individuation: The process of integrating the conscious with the unconscious, synergizing the many components of the psyche.

Infancy: The developmental stage that begins at birth and continues to one year of age.

Information Processor: A system for taking information in one form and transforming it into another.

Informational Influence: People go along with the crowd because people are often a source of information.

Informed Consent: information given before a participant begins a research session, designed to explain the research procedures and inform that participant of his or her rights during the investigation.

Ingroup: group to which a person belongs.

Inhibitory: Neurotransmitters that make the cell less likely to fire.

Insight: An understanding by the patient of the unconscious causes of his or her symptoms.

Insomnia: persistent difficulty falling or staying asleep.

Instincts: Complex inborn patterns of behaviors that help ensure survival and reproduction.

Institutional Review Board (IRB): a committee of at least five members whose goal it is to determine the cost-benefit ratio of research conducted within in institution. Also known as an Ethical Review Board (ERB).

Instrumental Conditioning: process in which animals learn about the relationship between their behaviors and their consequences. Also known as operant conditioning.

Integrative Psychology: Psychology that combines the nature and actions of mind, body, and spirit.

Intentional Learning: any type of learning that happens when motivated by intention.

Intentional: an agent's mental state of committing to perform an action that the agent believes will bring about a desired outcome.

Intentionality: the quality of an agent's performing a behavior intentionally—that is, with skill and awareness and executing an intention (which is in turn based on a desire and relevant beliefs).

Interdependent Self. Views people as being different in each new social context and the social context as the primary drivers of behavior; people tend to control and suppress their emotions to adjust to others.

Interference: other memories get in the way of retrieving a desired memory

Internal Locus of Control: When a person believes that his or her achievements and outcomes are determined by his or her own decisions and efforts. If the person does not succeed, he or she believes it is due to his or her own lack of effort.

Internal Validity: the extent to which we can trust the conclusions that have been drawn about the causal relationship between the independent and dependent variables.

Interneuron: The most common type of neuron and is located primarily within the CNS. Responsible for communication among neurons. Interneurons allow the brain to combine the multiple sources of available information to create a coherent picture of the sensory information being conveyed.

Interpersonal Functions of Emotion: The role that emotions play between individuals within a group.

Interpersonal Intelligence: the capacity to understand the emotions, intentions, motivations, and desires of other people.

Interpretation: The therapist uses the patient's expressed thoughts to try to understand the underlying unconscious problems.

Intersexual Selection: A process of sexual selection by which evolution (change) occurs as a consequences of the mate preferences of one sex exerting selection pressure on members of the opposite sex.

Intrapersonal Functions of Emotion: The role that emotions play within each of us individually.

Intrapersonal Intelligence: the capacity to understand oneself, including one's emotions.

Intrasexual Competition: A process of sexual selection by which members of one sex compete with each other, and the victors gain preferential mating access to members of the opposite sex.

Intrinsic Motivation: A drive that powers human behaviour that results from the joy of the task itself. Motivation that comes from the benefits associated with the process of pursing a goal.

Introspection: A method used by structuralists to attempt to create a map of consciousness by asking research participants to describe exactly what they experience as they work on mental tasks. Asking research participants to describe exactly what they experience as they work on mental tasks.

Introvert: A person who is inner-directed.

Intuitive: Sees many possibilities in situations; goes with hunches; impatient with earthy details; impractical; sometimes not present.

Inverted U Hypothesis: Asserts that, up to a point, stress can be growth inducing but that there is a turning or tipping point when stress just becomes too much and begins to become debilitative.

IQ: A measure of intelligence that is adjusted for age.

Iris: The coloured part of the eye that controls the size of the pupil by constricting or dilating in response to light intensity.

J

James-Lange Theory of Emotion: A theory proposed by William James and Carl Lange that states that arousal and emotion are not independent, but rather that emotion depends on the pattern of arousal.

Jet Lag: The state of being fatigued and/or having difficulty adjusting to a new time zone after traveling a long distance (across multiple time zones).

Job Analysis: determining what knowledge, skills, abilities, and personal characteristics (KSAPs) are required for a given job.

Joint Attention: two people attending to the same object and being aware that they both are attending to it.

Justice: an ethical principle from the Belmont Report that emphasizes distributing risks and benefits fairly across different groups within society.

K

Kin Selection: The favoritism shown for helping our blood relatives.

Knocked Out: The action that certain genes will be eliminated during the creation of DNA.

L

Lack of Executive Control: Difficulty comprehending information and using it to make decisions.

Language: a system of communication that uses symbols in a regular way to create meaning. Gives the ability communicate our intelligence to others by talking, reading, and writing.

Late Adulthood: The final life stage, beginning in the 60s.

Latent Content: Content within dreams that relates to deep unconscious wishes or fantasies. Or, the hidden psychological meaning of a dream.

Laws: (in relation to psychology) principles that are so general as to apply to all situations in a given domain of inquiry.

Law of Disuse: The longer an association is unused, the weaker it becomes.

Law of Effect: The idea that instrumental or operant responses are influenced by their effects. Responses that are followed by a pleasant state of affairs will be strengthened and those that are followed by discomfort will be weakened. Nowadays, the term refers to the idea that operant or instrumental behaviors are lawfully controlled by their consequences.

Law of Readiness: A quality in responses and connections that results in readiness to act.

Law of Recency: The most recent response is most likely to reoccur.

Law of Use: The more often an association is used, the stronger it becomes.

Lens: a structure that focuses the incoming light on the retina.

Lesions: Areas of the brain that are damaged by surgeries, strokes, falls, automobile accidents, gunshots, tumors, etc.

Letter of Recommendation Effect: The tendency for informants to produce unrealistically positive ratings.

Levels of Analysis: The different levels at which scientists might understand a single event.

Levels of Explanation: the perspectives that are used to understand behaviour, with lower levels being tied closely to biological influences, middle levels being tied closely to the abilities and characteristics of individual people, and the highest level relating to social groups, organizations, and cultures.

Lexical Hypothesis: States that all important personality characteristics should be reflected in the language that we use to describe other people.

Limbic System: A brain area, located between the brain stem and the two cerebral hemispheres, that governs emotion and memory. The system includes the amygdala, the hypothalamus, and the hippocampus.

Limited Capacity: the notion that humans have limited mental resources that can be used at a given time.

Limiting Condition: when the results from a research study are different across cultures.

Linear Relationship: when the association between variables on a scatter plot can be easily approximated with a straight line.

Linguistic Intergroup Bias: a tendency for people to characterize positive things about their ingroup using more abstract expressions, but negative things about their outgroups using more abstract expressions.

Linguistic Relativity: the idea that language and its structures influence and limit human thought.

Long-Term Memory: memory storage that can hold information for days, months, and years. There are three processes that are central to long-term memory – encoding, storage, and retrieval.

Long-Term Potentiation (LTP): the strengthening of the synaptic connections between neurons as result of frequent stimulation.

Longitudinal Research Designs: Research designs in which individuals in the sample are followed and contacted over an extended period of time, often over multiple developmental stages.

Loudness: the degree of sound volume.

M

Ma: Roughly translates to the “space” between things, or the “pause” (a Japanese term).

Maintenance Rehearsal: the process of repeating information mentally or out loud with the goal of keeping it in memory.

Major Depressive Disorder (Clinical Depression): A mental disorder characterized by an all-encompassing low mood accompanied by low self-esteem and loss of interest or pleasure in normally enjoyable activities.

Major Life Stressors: Large stressful events (e.g., a family death, a natural disaster) that increase the likelihood of getting sick.

Maladaptive: The extent to which a behavior causes distress (e.g., pain and suffering) and dysfunction (impairment in one or more important areas of functioning) to the individual.

Mandala: A symbol of wholeness, completeness, and perfection, and symbolized the self.

Manifest Content: Superficial and meaningless content within dreams; or, the literal dream as it is remembered (i.e., literal actions that occur during dreams).

Maximum Observed Score: the largest observed value of the variable.

Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT): a 141-item performance assessment of EI that measures the four emotion abilities (as defined by the four-branch model of EI) with a total of eight tasks.

McGurk Effect: an error in perception that occurs when we misperceive sounds because the audio and visual parts of the speech are mismatched.

Means: Activities and objects that help us attain goals.

Measured Variables: variables consisting of numbers that represent the conceptual variables.

Medial Temporal Lobes: inner region of the temporal lobes that includes the hippocampus.

Median: the score in the center of the distribution, meaning that 50% of the scores are greater than the median and 50% of scores are les than the median.

Meditation: techniques in which the individual focuses on something specific, such as an object, a word, or one's breathing, with the goal of ignoring external distractions, focusing on one's internal state, and achieving a state of relaxation and well-being.

Medulla: The area of the brain stem that controls heart rate and breathing.

Melatonin: A hormone associated with increased drowsiness and sleep.

Memory Stages: there are three major memory stages – sensory, short-term, and long-term.

Memory Traces: a term indicating the change in the nervous system representing an event.

Memory: the ability to store and retrieve information over time.

Menarche: The first menstrual period, typically experienced at around 12 or 13 years of age.

Menopause: The cessation of the menstrual cycle, which usually occurs at around age 50.

Mental Retardation: a generalized disorder ascribed to people who have an IQ below 70, who have experienced deficits since childhood, and who have trouble with basic life skills, such as dressing and feeding themselves and communicating with others

Mere-Exposure Effects: the result of developing a more positive attitude towards a stimulus after repeated instances of mere exposure to it.

Meta-Analysis: A statistical technique that uses the results of existing studies to integrate and draw conclusions about those studies.

Metacognition: Conscious thought about thought processes. Describes the knowledge and skills people have in monitoring and controlling their own learning and memory.

Methodologies: Research study design principles.

Middle Adulthood: Roughly the ages between 45 and 65.

Mimicry: Copying others' behavior, usually without awareness.

Mind–Body Connection: The role that different feelings can have on our body's function.

Mindfulness: a state of heightened focus on the thoughts passing through one's head, as well as a more controlled evaluation of those thoughts (e.g., do you reject or support the thoughts you're having?).

Minimal Risk Research: research that exposes participants to risks that do not exceed that found in daily life and/or routine health examinations.

Minimum Observed Score: the smallest observed value of the variable.

Mirror Neurons: neurons identified in monkey brains that fire both when the monkey performs a certain action and when it perceives another agent performing that action.

Misattribution of Arousal: The tendency for people to incorrectly label the source of the arousal that they are experiencing.

Misinformation Effect: when erroneous information occurring after an event is remembered as having been part of the original event. New information influences existing memories creating errors within our memory. Is caused by exposure to incorrect information between the original event (e.g., a crime) and later memory test (e.g., an interview, lineup, or day in court).

Mixed and Trait Models: approaches that view EI as a combination of self-perceived emotion skills, personality traits, and attitudes.

Mock Witnesses: a research subject who plays the part of a witness in a study.

Mode: the value that occurs most frequently in the distribution.

Molecular Genetics: The study of which genes are associated with which personality traits.

Monamine Oxidase Inhibitors (MAOIs): The original antidepressants that work by increasing the amount of serotonin, norepinephrine, and dopamine at the synapses.

Monochronic (M-time): typically used among people and organizations in clock-time cultures, where it is important to focus on one activity at a time.

Monocular Depth Cues: depth cues that help us perceive depth using only one eye.

Mood (or Affective) Disorders: Psychological disorders in which the person's mood negatively influences his or her physical, perceptual, social, and cognitive processes.

Mood-Congruent Memory: The tendency to recall memories similar in valence to our current mood.

Mood: The positive or negative feelings that are in the background of our everyday experiences.

Moon Illusion: the moon is perceived to be about 50% larger when it is near the horizon than when it is seen overhead, despite the fact that in both cases the moon is the same size and casts the same size retinal image.

Morality: Standards of behaviour that are generally agreed on within a culture to be right or proper.

Morpheme: a string of one or more phonemes that makes up the smallest units of meaning in a language.

Morphine: a strong addictive drug derived from opium; however, less addictive than heroin.

Motivated Skepticism: When we are skeptical of evidence that goes against what we want to believe despite the strength of the evidence.

Motivation Theory: Posits that all work consists of simple, uninteresting tasks, and that the only viable method to get people to undertake these tasks is to provide incentives and monitor them carefully.

Motivation: A psychological driving force that initiates and directs behavior.

Motor Cortex: The part of the cortex that controls and executes movements of the body by sending signals to the cerebellum and the spinal cord.

Motor Neuron (or Efferent Neuron): A type of neuron that transmits information to the muscles and glands.

Mueller-Lyer Illusion: one line segment looks longer than another, even though they are both actually the same length. The result of the failure of monocular depth cues.

Multiple Regression: a statistical technique, based on correlation coefficients among variables, that allows predicting a single outcome variable from more than one predictor variable.

Multiple Response: An animal will try multiple responses (trial and error) if the first response does not lead to a specific state of affairs.

Multiply Determined: behaviour, for example, that is produced by many factors that occur at different levels of explanation.

Myelin Sheath: A layer of fatty tissue surrounding the axon of a neuron that both acts as an insulator and allows faster transmission of the electrical signal.

Myers-Briggs Type Indicator: A psychometric questionnaire designed to measure psychological preferences in how people perceive the world and make decisions.

Mystery: Life is a great mystery.

N

Narcolepsy: a disorder characterized by extreme daytime sleepiness with frequent episodes of nodding off.

Natural Improvement: The possibility that people might get better over time, even without treatment.

Natural Selection: Differential reproductive success as a consequence of differences in heritable attributes.

Naturalistic Observations: research based on the observation of everyday events.

Nature Approach to Language: the belief that human brains contain a language acquisition device that includes a universal grammar that underlies all human language

Nearsighted: an image is focused in front of the retina, rather than on the retina. Occurs when the light rays bend incorrectly.

Need for Closure: The desire to come to a firm conclusion.

Need to Belong: The human need to make friends, start families, and spend time together.

Negative Linear Relationship: when above-average values for one variable tend to be associated with below-average values for the other variable.

Negative Reinforcement: Taking something negative away in order to increase a response.

Negative State Relief Model: People sometimes help in order to make themselves feel better.

Nerves: Bundles of interconnected neurons that fire in synchrony to carry messages.

Nervous System: A collection of hundreds of billions of specialized and interconnected cells through which messages are sent between the brain and the rest of the body.

Neural Correlates of Consciousness (NCC): Seeks to link activity within the brain to subjective human experiences in the physical world.

Neurogenesis: The generation or growth of new brain cells, specifically when neurons are created from neural stem cells.

Neuroimaging: the use of various techniques to provide pictures of the structure and function of the living brain.

Neuron: A cell in the nervous system that is responsible for receiving and transmitting information.

Neurophilosophy: Views neuronal correlates of consciousness as its cause, and consciousness as a state-dependent property of some undefined complex, adaptive, and highly interconnected biological system.

Neuroplasticity: The brain's ability to change its structure and function in response to experience or damage. Enables our ability to remember new things and adjust to new experiences.

Neurosis: A force that shatters the personality of the patient.

Neuroticism: The tendency to frequently experience negative emotions such as anger, worry, and sadness, as well as being interpersonally sensitive.

Neurotransmitter: A chemical that relays signals from terminal buttons and across the synapses between neurons to receiving dendrites using a lock and key type system.

Nicotine: a psychoactive drug found in tobacco and other members of the nightshade family of plants, where it acts as a natural pesticide.

No Relationship: when there is no relationship at all between the two variables, variables are then said to be independent.

Node of Ranvier: A series of breaks between the sausage-like segments of the myelin sheath that allow electrical charges to move down the axon.

Non-Rapid Eye Movement (non-REM) Sleep: a deep sleep, characterized by very slow brainwaves, that is further subdivided into three stages: N1, N2, and N3. A sleep state that processes conscious-related memory (declarative memory).

Nonassociative Learning: occurs when a single repeated exposure leads to a change in behavior.

Nonconscious: Refers to when a person is unaware of why he or she is pursuing a goal and may not even realize that he or she is pursing it.

Nonlinear Relationship: relationships between variables that cannot be described with a straight line.

Nonshared Environment: Is indicated when identical twins do not have similar traits. These influences refer to experiences that are not accounted for either by heritability or by shared environmental factors. Nonshared environmental factors are the experiences that make individuals within the same family less alike.

Nonspecific Treatment Effects: Occur when the patient gets better over time simply by coming to therapy, even though it doesn't matter what actually happens at the therapy sessions.

Nonverbal Communication: Communication that does not involve words.

Normal Distribution (or Bell Curve): the pattern of scores usually observed in a variable that clusters around its average. The bulk of the scores fall toward the middle, with many fewer scores falling at the extremes.

Normal Distribution: a data distribution in which most scores fall within the centre of the distribution and are symmetrical and bell-shaped.

Normative Influence: People go along with the crowd because they are concerned about what others think of them.

Nuremberg Code: a set of 10 ethics principles written in 1947 for human participants that emphasizes the importance of informed consent and weighing risks against benefits.

O

Obedience: Following orders or requests from people in authority.

Object Permanence: The child's ability to know that an object exists even when the object cannot be perceived.

Objective: to be free from personal bias or emotions.

Observational Learning: learning by observing the behavior of others.

Obsessions: Repetitive thoughts.

Obsessive-Compulsive Disorder (OCD): A psychological disorder that is diagnosed when an individual continuously experiences distressing or frightening thoughts and engages in obsessions (repetitive thoughts) or compulsions (repetitive behaviours) in an attempt to calm these thoughts.

Occipital Lobe: A portion of the brain, also known as the visual cortex, that is involved in interpreting visual stimuli and information.

Olfactory Membrane: located within the upper nasal passage and embedded with 10 to 20 million receptor cells.

Olfactory Receptor Cells: embedded within the olfactory membrane. Topped with tentacle-like protrusions that contain receptor proteins.

Open Ended Questions: Research questions that ask participants to answer in their own words.

Openness: The tendency to appreciate new art, ideas, values, feelings, and behaviors.

Operant Conditioning: A type of learning that refers to how an organism operates on the environment or how it responds to what is presented to it in the environment. Describes stimulus-response associative learning. Also see instrumental conditioning.

Operant: a behavior that is controlled by its consequences. The simplest example is the rat's lever-pressing, which is controlled by the presentation of the reinforcer.

Operational Definition: a precise statement of how a conceptual variable is turned into a measured variable.

Opioids: chemicals that increase activity in opioid receptor neurons in the brain and in the digestive system, producing euphoria, analgesia, slower breathing, and constipation.

Opium: the dried juice of the unripe seed capsule of the opium poppy.

Opponent-Process Color Theory: a theory that proposes that we analyze sensory information not in terms of three colours but rather in three sets of "opponent colours": red-green, yellow-blue, and white-black.

Optic Nerve: a collection of millions of ganglion neurons that sends vast amounts of visual information, via the thalamus, to the brain.

Optimism: The general tendency to expect positive outcomes.

Ossicles: three tiny bones located within the middle ear. Includes the hammer, the anvil, and the stirrup.

Other-Oriented Empathy: A characteristic that involves having a strong sense of social responsibility, the ability to empathize with and feel emotionally tied to those in need, understand the problems the victim is experiencing, and have a heightened sense of moral obligation to be helpful.

Outcome Research: Studies that assess the effectiveness of medical treatments to determine the effectiveness of different therapies.

Outgroup: group to which a person does not belong.

Outliers: one or more extreme scores which lay far outside the distribution.

Oval Window: the membrane covering the opening of the cochlea.

Ovaries: The female sex glands that are located in the pelvis. The ovaries produce eggs and secrete the female hormones estrogen and progesterone.

Overconfidence: the tendency for people to be too certain about their ability to accurately remember events and to make judgments.

Overconfident: the bias to have greater confidence in your judgment than is warranted based on a rational assessment.

Overextensions: the use of a given word in a broader context than appropriate. Generally a mistake made by children.

Overlearning: continuing to practice and study even when we think that we have mastered the material.

Ovulation: When an ovum, or egg (the largest cell in the human body), which has been stored in one of the mother's two ovaries, matures and is released into the fallopian tube.

P

Pace of Life: the speed at which changes and events occur for individuals. Dependent on individual temperament, cultural norms, between places, at different times, during different activities.

Pancreas: Part of the endocrine system. Secretes hormones designed to keep the body supplied with fuel to produce and maintain stores of energy.

Panic Disorder: A psychological disorder characterized by sudden attacks of anxiety and terror that have led to significant behavioural changes in the person's life.

Paradigm: Prevailing model that guides an area of study.

Parasympathetic Nervous System or Parasympathetic Division: A division of the autonomic nervous system that tends to calm the body by slowing the heart and breathing and by allowing the body to recover from the activities that are caused by the sympathetic system. Works to bring the body back to its normal state after a fight-or-flight response.

Parathyroid Gland: The area responsible for determining how quickly the body uses energy and hormones (in conjunction with the thyroid gland), and controls the amount of calcium in the blood and bones.

Parenting Styles: Parental behaviours that determine the nature of parent-child interactions and that guide their interaction with the child.

Parietal Lobe: A portion of the brain that xtends from the middle to the back of the skull, also known as the somatosensory cortex, that is involved in the processing of other tactile sensory information (information about touch).

Pavlovian Conditioning: see classical conditioning.

Pearson Correlation Coefficient (*r*): the most common statistical measure of the strength of linear relationships among variables.

People's (Folk) Explanations of Behavior: people's natural explanations for why somebody did something, felt something, etc. (differing substantially for unintentional and intentional behaviors).

Perception of Social Support: The perception that a person has positive social relationships with others.

Perception: the organization and interpretation of sensations.

Perceptual Constancy: the ability to perceive a stimulus as constant despite changes in sensation.

Perceptual Learning: occurs when aspects of our perception changes as a function of experience.

Performance Assessment: a method of measurement associated with ability models of EI that evaluate the test taker's ability to solve emotion-related problems.

Periodic Limb Movement Disorder: a sleep disorder that involves sudden involuntary movement of limbs.

Peripheral Nervous System (PNS): The collection of neurons that link the central nervous system (CNS) to the body's sense receptors, muscles, and glands. **D**ivided into the somatic and autonomous nervous systems.

Permissive Parents: Tend to make few demands and give little punishment, but they are responsive in the sense that they generally allow their children to make their own rules.

Person-Centred Therapy (or Client-Centred Therapy): An approach to treatment in which the client is helped to grow and develop as the therapist provides a comfortable, nonjudgmental environment.

Person-Situation Debate: Places the power of personality against the power of situational factors as determinants of the behavior that people exhibit.

Person' Mental Age: age at which a person is performing intellectually.

Persona: The mask or image a person presents to the world.

Personal Distress: Helpers who do not empathize with a victim may experience feelings of being worried and upset and will have an egoistic motivation for helping.

Personal Selection: the use of structured tests to select people who are likely to perform well at given jobs.

Personal Unconscious: An aspect of the psyche does not usually enter an individual's awareness but appears in overt behaviour or in dreams.

Personal: The damaging impact of stress on physical and mental health.

Personality Disorder: A disorder characterized by inflexible patterns of thinking, feeling, or relating to others that cause problems in personal, social, and work situations.

Personality Traits: Reflect basic personality dimensions on which people differ.

Personality: The characteristic ways that people differ from one another.

Phenomenal: In the moment conscious experience.

Phenotype: The pattern of expression of the genotype or the magnitude or extent to which it is observably expressed—an observable characteristic or trait of an organism, such as its morphology, development, biochemical or physiological properties, or behavior.

Phi Phenomenon: to perceive a sensation of motion caused by the appearance and disappearance of objects that are near each other.

Phobia: A specific fear of a certain object, situation, or activity.

Phoneme: the smallest unit of sound that makes a meaningful difference in a language.

Photo Spreads: a selection of normally small photographs of faces given to a witness for the purpose of identifying a perpetrator.

Physiological Adaptations: Adaptations that occur in the body as a consequence of one's environment.

Pineal Gland: Located in the middle of the brain and secretes melatonin (a hormone that helps regulate the wake-sleep cycle).

Pinna: the external and visible part of the ear. Draws in sound waves and guide them into the auditory canal.

Pitch: the perceived frequency of a sound.

Pituitary Gland: A pea-sized gland located near the centre of the brain that also known as the "master gland". The pituitary gland is responsible for controlling the body's growth, as well as secreting hormones that signal the ovaries and testes to make sex hormones and influence our responses to pain. The gland also controls ovulation and the menstrual cycle in women and is important in regulating behaviour.

Place Theory of Hearing: proposes that different areas of the cochlea respond to different frequencies.

Placebo Effects: Improvements that occur as a result of the expectation that one will get better rather than from the actual effects of a treatment.

Placenta: An organ that allows the exchange of nutrients between the embryo and the mother, while at the same time filtering out harmful material.

Planning Fallacy: The tendency to underestimate how much time it will take to complete a task.

Plasticity: the brain's ability to develop new neural connections.

Pluralistic Ignorance: Relying on others to define the situation and to then erroneously conclude that no intervention is necessary when help is actually needed.

Polychronic (P-time): typically used among people and organizations in event-time cultures, where there is a preference for focusing on several things at once.

Pons: A structure in the brain stem that helps control the movements of the body, playing a particularly important role in balance and walking.

Positive Affective States: Pleasant emotional arousal or feelings.

Positive Linear Relationship: when above-average values from one variable also tend to have above-average values for the other variable

Positive Psychology: A branch of psychology that focuses the on the strengths, virtues, and talents that contribute to successful functioning and enable individuals and communities to **flourish.** Also a self-help movement that has concepts grounded in emotion and intuition.

Positive Reinforcement: Adding something in order to increase a response.

Post-Traumatic Stress Disorder (PTSD): A psychological disorder that is diagnosed when an individual experiences high levels of anxiety along with reexperiencing the trauma (flashbacks), and a strong desire to avoid any reminders of the event.

Pre-Screening: identifying and excluding participants who are at high risk.

Preconscious: Those thoughts that are unconscious at the particular moment in question, but that are not repressed and are available for recall and easily capable of becoming conscious.

Prediction Error: when the outcome of a conditioning trial is different from that which is predicted by the conditioned stimuli that are present on the trial (i.e., when the US is surprising). Prediction error is necessary to create Pavlovian conditioning (and associative learning generally). As learning occurs over repeated conditioning trials, the conditioned stimulus increasingly predicts the unconditioned stimulus, and prediction error declines. Conditioning works to correct or reduce prediction error.

Prejudice: Refers to how a person feels about an individual based on their group membership.

Preoperational Stage: At about two years of age, and until about seven years of age, children begin to use language and to think more abstractly about objects, with capacity to form mental images.

Preoptic Area: A region in the anterior hypothalamus (front of the hypothalamus) that strongly influences male sexual behavior.

Preparedness: the idea that an organism's evolutionary history can make it easy to learn a particular association. Because of preparedness, you are more likely to associate the taste of tequila, and not the circumstances surrounding drinking it, with getting sick. Similarly, humans are more likely to associate images of spiders and snakes than flowers and mushrooms with aversive outcomes like shocks.

Prepotency of Elements: A subject can filter out irrelevant aspects of a problem and focus on and respond to significant elements of a problem.

Prevalence: The frequency of occurrence of a given condition in a population at a given time.

Prevention: Emphasizes safety, responsibility, and security needs, and views goals as "oughts."

Primacy Effect: a tendency to better remember stimuli that are presented early in a list.

Primary Appraisal: Determining whether the stressor poses a threat.

Primary Mental Abilities: seven clusters of abilities – word fluency, verbal comprehension, spatial ability, perceptual speed, numerical ability, inductive reasoning, and memory.

Primary Prevention: Prevention in which all members of the community receive the treatment.

Primary Sex Characteristics: The sex organs concerned with reproduction.

Prime: Cues in a person's immediate environment that activate a goal

Primed: When concepts and behaviors have been repeatedly associated with each other, one of them is made more cognitively accessible.

Priming: Process by which exposing people to one stimulus makes certain thoughts, feelings, or behaviours more salient**.** The activation of certain thoughts or feelings that make them easier to think of and act upon.

Privacy: refers to people's right to decide what information about them is shared with others.

Pro-Social: Benefits to promoting and maintaining human life.

Proactive Interference: occurs when earlier learning impairs our ability to encode information that we try to learn later.

Problem Restructuring: To restructure or reorganize the representation of the problem and capitalize on relevant information not previously noticed, switch strategies, or rearrange problem information in a manner more conducive to solution pathways.

Problem-Focused Coping: Actively addressing the event that is causing stress in an effort to solve the issue at hand.

Procedural Memory: Memory for the performance of particular types of action.; our often unexplainable knowledge of how to do things.

Progesterone Female sex hormones.

Progress: Describes the perception of a reduced discrepancy between the current state and desired end state.

Projection: a social perceiver's assumption that the other person wants, knows, or feels the same as the perceiver wants, know, or feels.

Projective Hypothesis: Posits that if a person is asked to describe or interpret ambiguous stimuli—that is, things that can be understood in a number of different ways—their responses will be influenced by nonconscious needs, feelings, and experiences.

Promotion: Emphasizes hopes, accomplishments, and advancement needs, and views goals as "ideals."

Proprioception: the ability to sense the position and movement of our body parts.

Prosocial Behavior: Behavior that benefit another person or group.

Prosocial Personality Orientation: Personality characteristics that are highly correlated with prosocial behavior.

Protocol: a written detailed description of a research project involving human participants that is reviewed by an independent committee for ethical approval.

Psychiatric Service Dogs: Dogs that are trained to help people with mental disorders.

Psychoactive Drug: a chemical that changes our states of consciousness, and particularly our perceptions and moods.

Psychoanalysis: A process used within the psychodynamic approach that involves exploring unconscious drives by using talk therapy and dream analysis to deeply and thoroughly explore a person's early sexual experiences and current sexual desires. A type of analysis that involves attempting to affect behavioural change through having patients talk about their difficulties.

Psychodynamic Psychology: Approach to understanding human behaviour that focuses on the role of unconscious thoughts, feelings, and memories.

Psychodynamic Therapy (Psychoanalysis): A psychological treatment based on Freudian and neo-Freudian personality theories in which the therapist helps the patient explore the unconscious dynamics of personality.

Psychological Adaptations: Mechanisms of the mind that evolved to solve specific problems of survival or reproduction; conceptualized as information processing devices.

Psychological Approach to Reducing Disorders: An approach that involves providing help to individuals or families through psychological therapy.

Psychological Assessment: An evaluation of the patient's psychological and mental health.

Psychological Disorder: An ongoing dysfunctional pattern of thought, emotion, and behaviour that causes significant distress, and that is considered deviant in that person's culture or society.

Psychological Essentialism: the belief that members of a category have an unseen property that causes them to be in the category and to have the properties associated with it.

Psychologist-Practitioners: psychologists who use existing research to enhance the everyday life of others, including clinical, counselling, industrial-organizational, and school psychologists.

Psychology: the scientific study of the mind and behaviour.

Psychoneuroimmunology: Focused on understanding how psychological factors can "get under the skin" and influence our physiology in order to better understand how factors like stress can make us sick.

Psychophysics: the branch of psychology that studies the effects of physical stimuli on sensory perceptions and mental states.

Psychosis: A psychological condition characterized by a loss of contact with reality.

Psychosomatic Medicine: Focused on understanding how psychological factors can "get under the skin" and influence our physiology in order to better understand how factors like stress can make us sick.

Psychosurgery: Surgery that removes or destroys brain tissue in the hope of improving disorder; reserved for the most severe cases.

Psychotherapy: The professional treatment for psychological disorder through techniques designed to encourage communication of conflicts and insight.

Puberty: A developmental period in which hormonal changes cause rapid physical alterations in the body, culminating in sexual maturity.

Punisher: A stimulus that decreases the strength of an operant behavior when it is made a consequence of the behavior.

Punishment: Adding something aversive in order to decrease a behaviour.

Pupil: a small opening in the centre of the eye.

Q

Quantitative Genetics: Scientific and mathematical methods for inferring genetic and environmental processes based on the degree of genetic and environmental similarity among organisms.

Quantitative Law of Effect: a mathematical rule that states that the effectiveness of a reinforcer at strengthening an operant response depends on the amount of reinforcement earned for all alternative behaviors. A reinforcer is less effective if there is a lot of reinforcement in the environment for other behaviors.

R

Radical Behaviourism: The philosophy of the science of behaviour.

Random Assignment to Conditions: a procedure in which the condition that each participant is assigned to is determined through a random process.

Range: a simple measure of the dispersion where you subtract the minimum from the maximum observed score.

Rapid Eye Movement (REM) Sleep: A sleep state characterized by the presence of quick eye movements and dreaming, and that processes the unconscious-related memory (procedural memory).

Reappraisal: Describes the process of continually reappraising both the nature of the stressor and the resources available for responding to the stressor.

Recall Memory Test: a measure of explicit memory that involves bringing from memory information that has previously been remembered.

Recency Effect: the tendency to better remember stimuli that are presented later in a list.

Reciprocal Altruism: If helping someone now increases the chances that a person will be helped later, then his or her overall chances of survival are increased.

Reciprocity: Describes how giving to others put them in the frame of mind to give back.

Recoding: the ubiquitous process during learning of taking information in one form and converting it to another form, usually one more easily remembered.

Recognition Memory Test: a measure of explicit memory that involves determining whether information has been seen or learned before.

Reductionist: Believing the simple is the source of the complex.

Reference Group Effect: People base their self-perceptions, in part, on how they compare to others in their sociocultural reference group.

Reflex: An involuntary and nearly instantaneous movement in response to a stimulus.

Refractory Period: A brief time after the firing of the axon in which the axon cannot fire again because the neuron has not yet returned to its resting potential.

Reinforcement: Any stimulus which strengthens or increases the probability of a specific response.

Reinforcer Devaluation Effect: the finding that an animal will stop performing an instrumental response that once led to a reinforcer if the reinforcer is separately made aversive or undesirable.

Reinforcer: any consequence of a behavior that strengthens the behavior or increases the likelihood that it will be performed it again.

Rejecting-Neglecting Parents: Undemanding and unresponsive.

Relearning: a measure of memory that assesses how much more quickly information is processed or learned when it is studied again after it has already been learned but then forgotten.

Reliability: The consistency of test scores across repeated assessments; the consistency of a measured variable.

Reliable: tests that are consistent over time.

REM Sleep Behaviour Disorder: a condition in which people (usually middle-aged or older men) engage in vigorous and bizarre physical activities during REM sleep in response to intense, violent dreams.

Renewal Effect: recovery of an extinguished response that occurs when the context is changed after extinction. Especially strong when the change of context involves return to the context in which conditioning originally occurred. Can occur after extinction in either classical or instrumental conditioning.

Replicate: to repeat, add to, or modify (usually in relation to previous research findings).

Replication: the process of repeating previous research, which forms the basis of all scientific inquiry.

Representativeness Heuristic: Basing one's judgments on information that seems to represent, or match, what we expect will happen, while ignoring other potentially more relevant statistical information. The tendency for people to arrive at a decision quickly by simply judging the likelihood of the object belonging to a category, based on how similar it is to one's mental representation of that category.

Repressed: a term coined by Sigmund Freud that refers to memories that remain outside consciousness.

Research Confederate: A person working with a researcher who acts as a research participant or bystander.

Research Design: the specific method a researcher uses to collect, analyze, and interpret data.

Research Hypothesis: a specific and falsifiable prediction about the relationship between or among two or more variables.

Research Participant: A person being studied as part of a research program.

Research Psychologists: Psychologists who use scientific methods to create new knowledge about the causes of behaviour.

Resilience: The ability to bounce back from adversity.

Resistance: The patient's use of defence mechanisms to avoid the painful feelings in his or her unconscious.

Respect for Persons: an ethical guideline from the Belmont Report that recognizes the importance using informed consent as a way to allow people to fully exercise their rights as autonomous people.

Response Bias: a behavioural tendency to respond "yes" to the trials, which is independent of sensitivity.

Response by Analogy: Responses from a related or similar context may be used in a new context.

Response: Describes stress as a physiological response pattern.

Resting Potential: A state in which the interior of the neuron contains a greater number of negatively charged ions than does the area outside the cell.

Restless Legs Syndrome: a sleep disorder in which the sufferer reports an itching, burning, or otherwise uncomfortable feeling in his legs, usually exacerbated when resting or asleep.

Reticular Formation: A long, narrow network of neurons that run through the medulla and the pons. Its job is to filter out some of the stimuli that are coming into the brain from the spinal cord, to relay the remainder of the signals to other areas of the brain, and to play a role in walking, eating, sexual activity, and sleeping.

Retina: the layer of tissue at the back of the eye that contains photoreceptor cells.

Retrieval: the process of accessing, reactivating, and utilizing information that has been stored in memory.

Retroactive Interference: occurs when learning something new impairs our ability to retrieve information that was learned earlier. OR The phenomenon whereby events that occur after some particular event of interest will usually cause forgetting of the original event.

Retrograde Amnesia: a memory disorder that produces an inability to retrieve memories for facts and events that occurred before the onset of amnesia.

Reuptake: A process in which neurotransmitters that are in the synapse are reabsorbed into the transmitting terminal buttons, ready to again be released after the neuron fires.

Reward Value: Affects an organism's motivation to consume food and is sensitive to the level of hunger experienced.

Reward-Punishment Drive: A drive powering human behaviour that produces the expected performance results.

Right-Wing Authoritarianism (RWA): Describes a belief that endorses respect for obedience and authority in the service of group conformity.

Risk Factors: The social, environmental, and economic vulnerabilities that make it more likely than average that a given individual will develop a disorder.

Rituals: Cultural behaviors that teach people what is important.

Rods: visual neurons that specialize in detecting black, white, and gray colours.

S

Saccades: the thousands of tiny movements made by the eye every minute.

Safety Ratio: One way to determine how dangerous a recreational drug may be. Based on the dose that is likely to be fatal divided by the normal dose needed to feel the effects of the drug.

Sample Size: number of participants in a study. Sample size is important because it can influence the confidence scientists have in the accuracy and generalizability of their results

Sample: the people chosen to participate in the research.

Sapir-Whorf Hypothesis: the hypothesis that the language that people use determines their thoughts.

Satiation: The decline of hunger and the eventual termination of eating behavior.

Scatter Plot: a visual image of the relationship between two variables.

Schema: A mental model, or representation, of any of the various things we come across in our daily lives.

Schemas (also known as Schematas): also known as a memory template, created through repeated exposure to a particular class of objects or events. Patterns of knowledge in long-term memory that help people remember, organize, and respond to information.

Schizophrenia: A serious psychological disorder marked by delusions, hallucinations, loss of contact with reality, inappropriate affect, disorganized speech, social withdrawal, and deterioration of adaptive behaviour.

School of Functionalism: a school in psychology that aims to understand why animals and humans have developed the particular psychological aspects that they currently possess.

Scientific Management: Focuses on scientific study of productivity in the workplace.

Scientific Method: the set of assumptions, rules, and procedures that scientists use to conduct empirical research.

Seasonal Affective Disorder (SAD): depression experienced most often during the dark winter months than during the lighter summer months, which can be reduced by exposure to bright lights.

Secondary Appraisal: The individual's evaluation of the resources or coping strategies at his or her disposal for addressing any perceived threats.

Secondary Sex Characteristics: Features that distinguish the two sexes from each other but are not involved in reproduction.

Secure Attachment Style: When a child explores freely while the mother is present and engages with the stranger.

Secure Base: Allows monkeys and human babies to feel safe.

Selective Attention: the ability to select certain stimuli in the environment to process, while ignoring distracting information.

Selective Forgetting: Letting go of certain ideas or concepts that may be inhibiting the problem-solving process.

Selective Serotonin Reuptake Inhibitors (SSRIs): The antidepressants most prescribed today that are designed to selectively block the reuptake of serotonin at the synapse, thereby leaving more serotonin available in the central nervous system.

Self-Actualize: To reach the fullest potential as a human being.

Self-Categorization Theory: People categorize people into categories and tend to favor the groups with people like us and incidentally disfavor the others.

Self-Concept: A knowledge representation or schema that contains knowledge about us.

Self-Construal: The way people define the way they "fit" in relation to others.

Self-Control: The capacity to control impulses, emotions, desires, and actions in order to resist a temptation and protect a valued goal.

Self-Efficacy: The belief in our ability to carry out actions that produce desired outcomes.

Self-Enhancement Bias: People are motivated to ignore (or at least downplay) some of their less desirable characteristics and to focus instead on their more positive attributes.

Self-Help Group: A voluntary association of people who share a common desire to overcome psychological disorder or improve their well-being.

Self-Regulation: The process through which individuals alter their perceptions, feelings, and actions in the pursuit of a goal.

Self-Report Assessment: a method of measurement associated with mixed and trait models of emotional intelligence, which evaluates the test taker's perceived emotion-related skills, distinct personality traits, and other characteristics.

Self: An archetype symbolizing the totality of the personality.

Semantic Memory: Our knowledge of facts and concepts about the world. The more or less permanent store of knowledge that people have.

Sensation: awareness resulting from the stimulation of a sense organ.

Sense of Coherence: A global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable and explicable; (2) the resources are available to one to meet the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement.

Sensing Function: Sensory; oriented toward the body and senses; detailed, concrete, and present.

Sensitivity: the true ability of the individual to detect the presence or absence of signals.

Sensitization: occurs when the response to a stimulus increases with exposure.

Sensorimotor Stage: Refers to the direct physical interactions that babies have with the objects around them, beginning at birth until around the age of two.

Sensory Adaptation: a decreased sensitivity to a stimulus after prolonged and constant exposure.

Sensory Deprivation: the intentional reduction of stimuli affecting one or more of the senses, with the possibility of resulting changes in consciousness.

Sensory Interaction: the working together of different senses to create experience.

Sensory Memory: the brief storage of sensory information.

Sensory Neuron (or Afferent Neuron): A type of neuron that carries information from the sensory receptors.

Serial Position Curve: people are able to retrieve more words that were presented to them at the beginning and the end of the list than they are words that were presented in the middle of the list.

Set (or Attitude): Specific ways animals are predisposed to act in.

Set Point: An ideal level that the state of the system being regulated is monitored and compared.

Sex: Refers to the biological category of male or female, as defined by physical differences in genetic composition and in reproductive anatomy and function.

Sexual Harassment Unwanted treatment related to sexual behaviors or appearance.

Sexual Orientation: The direction of their emotional and erotic attraction toward members of the opposite sex, the same sex, or both sexes.

Sexual Selection: The evolution of characteristics because of the mating advantage they give organisms.

Shadow: The side of a personality that a person does not consciously display in public.

Shadowing: a task in which the individual is asked to repeat an auditory message as it is presented.

Shared Environment: Determinants that are indicated when the correlation coefficients for identical and fraternal twins are greater than zero and also very similar. These correlations indicate that both twins are having experiences in the family that make them alike.

Short-term Memory (STM): the place where small amounts of information can be temporarily kept for more than a few seconds but usually for less than one minute.

Sibling Contrast Effect: Parents often exaggerate the true magnitude of differences between their children.

Signal Detection Analysis: a technique used to determine the ability of the perceiver to separate true signals from background noise.

Silent Language: the notion that cultural rules of social time are seldomly made explicit, but rather just exist. Described by Edward Hall.

Simulation: the process of representing the other person's mental state.

Single-Blind Experiment: the research participants are blind to condition.

Situation Model: a mental representation of an event, object, or situation constructed at the time of comprehending a linguistic description.

Situational Identity: Culture can change and adapt, and people can have multiple cultural identifies, dependent on their social context.

Six Senses: seeing, hearing, smelling, touching, tasting, and monitoring the body's positions.

Skinner Box: Used to measure responses of organisms (most often rats and pigeons) and their orderly interactions with the environment.

Sleep Apnea: a sleep disorder characterized by pauses in breathing that last at least 10 seconds during sleep.

Sleep Spindles: theta waves interspersed with bursts of rapid brain activity that occurs during stage N2 sleep.

Sleep Terrors: a disruptive sleep disorder, most frequently experienced in childhood, that may involve loud screams and intense panic.

Sleeper Effect: attitude change that occurs over time when we forget the source of information.

Slow Wave Sleep: also known as stage N3. The deepest level of sleep, characterized by an increased proportion of very slow delta waves.

Social and Cultural Functions of Emotion: The role that emotions play in the maintenance of social order within a society.

Social and Emotional Learning (SEL): the real-world application of emotional intelligence in an educational setting and/or classroom that involves curricula that teach the process of integrating thinking, feeling, and behaving in order to become aware of the self and of others, make responsible decisions, and manage one's own behaviors and those of others.

Social Approach to Reducing Disorders: An approach that focuses on changing the social environment in which individuals live to reduce the underlying causes of disorder.

Social Attribution: When we make educated guesses about the efforts or motives of others.

Social Brain Hypothesis: the hypothesis that the human brain has evolved, so that humans can maintain larger ingroups.

Social Clock: The culturally preferred "right time" for major life events, such as moving out of the childhood house, getting married, and having children.

Social Cognition: The way we think about the social world and how we perceive others.

Social Comparison: Comparing the self to others.

Social Component: The influences on disorder due to social and cultural factors such as socioeconomic status, homelessness, abuse, and discrimination.

Social Constructivist: Assert that, despite a common evolutionary heritage, different groups of humans evolved to adapt to their distinctive environments.

Social Dominance Orientation (SDO): Describes a belief that group hierarchies are inevitable in all societies and are even a good idea to maintain order and stability.

Social Identity Theory: The tendency to favor one's own in-group over another's outgroup, and as a result, outgroup disliking stems from this in-group liking.

Social Identity: The part of the self-concept that is derived from one's group memberships.

Social Influence: Refers to how outside influences might sway people to act or feel a certain way.

Social Integration: The number of social roles that a person has as well as a lack of isolation.

Social Learning Theory: The theory that people can learn new responses and behaviors by observing the behavior of others. Argues that gender roles are learned through reinforcement, punishment, and modeling.

Social Models: authorities that are the targets for observation and who model behaviors.

Social Networks: networks of social relationships among individuals through which information can travel.

Social Norms: the ways of thinking, feeling, or behaving that are shared by group members and perceived by them as appropriate.

Social Phobia: Extreme shyness around people or discomfort in social situations.

Social Psychology: A branch of psychological science mainly concerned with understanding how the presence of others affects our thoughts, feelings, and behaviors.

Social Referencing: The process whereby infants seek out information from others to clarify a situation and then use that information to act.

Social Support: Receiving support from your social network that can include emotional help, tangible help, or advice.

Social Time: cultural rules that are simply picked up in regards to being early or late, to wait or to rush, and the concept of past, present, and future.

Social-Cultural Psychology: a school of psychology that studies how social situations and culture influence thinking and behaviour.

Sociocultural Theory: Posits that cognitive development is not isolated entirely within the child but occurs at least in part through social interactions.

Socioeconomic: Differential exposure to stressful experiences can produce gender, racial-ethnic, marital status, and social class inequalities in physical and mental health.

Sociopolitical: Stressors proliferate over the life course and across generations, widening health gaps between advantaged and disadvantaged group members.

Soma: A cell body that contains the nucleus of the cell and keeps the cell alive.

Somatic Nervous System (SNS): The division of the peripheral nervous system that controls the external aspects of the body, including the skeletal muscles, skin, and sense organs. The somatic nervous system consists primarily of motor nerves responsible for sending brain signals for muscle contraction.

Somatosensory Cortex: An area just behind and parallel to the motor cortex at the back of the frontal lobe, receives information from the skin's sensory receptors and the movements of different body parts.

Somnambulism (Sleepwalking): a sleep disorder characterized by a person leaving the bed and moving around while still asleep.

Source Monitoring: the ability to accurately identify the source of a memory.

Spacing Effect: the fact that learning is better when the same amount of study is spread out over periods of time than it is when it occurs closer together or at the same time.

Specific Intelligence(s): a measure of specific skills in narrow domains.

Spinal Cord: The long, thin, tubular bundle of nerves and supporting cells that extends down from the brain. It is the central throughway of information for the body.

Spontaneous Recovery: recovery of an extinguished response that occurs with the passage of time after extinction. Can occur after extinction in either classical or instrumental conditioning.

Spreading Activation: When problem solvers disengage from the problem-solving task, they expose themselves to more information that can inform the problem-solving process.

Spurious Relationship: a relationship between two variables in which a common-causal variable produces and "explains away" the relationship.

Stage Theory of Cognitive Development: children pass through a series of cognitive stages as they grow, each of which must be mastered in succession before movement to the next cognitive stage can occur.

Standard Deviation (s): the most commonly used measure of dispersion. Distributions with larger standard deviations have more spread.

Standard Scale: Surveys that ask all participants to use the same scale to respond to questions.

Standardization: involves giving a test to a large number of people at different ages and computing the average score on the test at each age level.

Stanford-Binet Test: a measure of general intelligence made up of a wide variety of tasks including vocabulary, memory for pictures, naming of familiar objects, repeating sentences, and following commands.

State-Dependent Learning: superior retrieval of memories when the individual is in the same physiological or psychological state as during encoding.

Statistical Conclusion Validity: the extent to which we can be certain that the researcher has drawn accurate conclusions about the statistical significance of the research.

Statistical Significance: the confidence with which scientists can conclude that data are not due to chance or random error.

Stereotype Content Model: Includes four kinds of stereotypes that form from perceptions of competence and warmth.

Stereotype Threat: performance decrements that are caused by the knowledge of cultural stereotypes.

Stereotypes: Our general beliefs about a group of people and, once activated, they may guide our judgments outside of conscious awareness.

Stereotyping: A way of using information shortcuts about a group to effectively navigate social situations or make decisions.

Stigma: A disgrace or defect that indicates that person belongs to a culturally devalued social group.

Stigmatized Groups: A social or ethnic group that disapproved by the majority of society.

Stimulant: a class of drugs (psychoactives) that speed up the body's physiological and mental processes. Operates by blocking the reuptake of dopamine, norepinephrine, and serotonin in the synapses of the CNS.

Stimulus Control: when an operant behavior is controlled by a stimulus that precedes it.

Stimulus: Describes stress as a significant life event or change that demands response, adjustment, or adaptation.

Storage: the stage in the learning/memory process that bridges encoding and retrieval; the persistence of memory over time.

Story: Every person has a personal story.

Strange Situation: A measure of attachment in young children in which the child's behaviours are assessed in a situation in which the caregiver and a stranger move in and out of the environment.

Stress Coping: Determining whether a person believes he or she has the resources to respond effectively to the challenges of a stressor or change.

Stress-Related Growth: A dispositional response to stress that enables the individual to see opportunities for growth as opposed to threat or debilitation.

Stress: The physiological responses that occur when an organism fails to respond appropriately to emotional or physical threats.

Structuralism: A school of psychology whose goal was to identify the basic elements or structures of psychological experience.

Subliminal Perception: the ability to process information for meaning when the individual is not consciously aware of that information.

Subliminal Stimuli: events that occur below the absolute threshold and of which we are not conscious.

Subtle Biases: Unexamined and sometimes unconscious biases that have real consequences.

Suprachiasmatic Nucleus: a region in the brain above the thalamus that receives signals from ganglion cells in the retina and is the body's primary circadian pacemaker.

Surface Structure of the Idea: how an idea is expressed in any one language.

Surveys: a measure administered through either an interview or a written questionnaire to get a picture of the beliefs or behaviors or a sample of people of interest

Symbol: Implies something that is vague and partially unknown or hidden and never precisely defined.

Sympathetic Division or Sympathetic Nervous System: A division of the autonomic nervous system that is involved in preparing the body for behavior, particularly in response to stress, by activating the organs and the glands in the endocrine system. Controls the fight-or-flight response.

Synapses: Junction areas where the terminal buttons at the end of the axon of one neuron nearly, but do not quite, touch the dendrites of another neuron.

Synchrony: two people displaying the same behaviors or having the same internal states (typically because of mutual mimicry).

Synesthesia: an experience in which one sensation creates experiences in another.

Syntax: rules by which words are strung together to form sentences.

System 1: our intuitive decision-making system, which is typically fast, automatic, effortless, implicit, and emotional.

System 2: our more deliberative decision-making system, which is slower, conscious, effortful, explicit, and logical.

Systematic Desensitization: A behavioural treatment that combines imagining or experiencing the feared object or situation with relaxation exercises.

T

Tardive Dyskinesia: Permanent neurological damage from taking antipsychotic drugs that causes uncontrollable muscle movements, usually in the mouth area.

Taste Aversion Conditioning (Learning): the phenomenon in which a taste is paired with sickness, and this causes the organism to reject—and dislike—that taste in the future.

Taste Buds: receptors covering the tongue that are designed to sense chemicals in the mouth.

Temperament: The innate personality characteristics of an infant.

Temporal Lobe: A portion of the brain, also known as the auditory cortex, Located in front of the occipital lobe between the ears. It is involved in the interpretation of the sounds and language we hear.

Temporal Perspective: the perspective an individual takes about time. For example, some individuals may focus on the past, while others focus on the future.

Temporally Graded Retrograde Amnesia: inability to retrieve memories from just prior to the onset of amnesia with intact memory for more remote events.

Tend-and-Befriend Response: A behavioral reaction to stress that involves activities designed to create social networks that provide protection from threats.

Teratogens: Substances that can harm the fetus.

Tertiary Prevention: Treatment, such as psychotherapy or biomedical therapy, that focuses on people who are already diagnosed with disorder.

Testes: Male sex glands that secrete a number of hormones, the most important of which is testosterone.

Testosterone: Male sex hormone secreted by the testes. Regulates body changes associated with sexual development, including enlargement of the penis, deepening of the voice, growth of facial and pubic hair, and the increase in muscle growth and strength.

Thalamus: An egg-shaped structure above the brain stem that applies more filtering to the sensory information that is coming up from the spinal cord and through the reticular formation, and relays some of these remaining signals to the higher brain levels.

The Big Five (Five-Factor Model): The most widely accepted system that describes five major personality traits.

Theory of Intelligence (Three Part or Triarchic): proposes that people may display more or less analytical intelligence, creative intelligence, and practical intelligence. Proposed by Robert Sternberg.

Theory of Mind: The human capacity to understand minds, a capacity that is made up of a collection of concepts (e.g., agent, intentionality) and processes (e.g., goal detection, imitation, empathy, perspective taking). The ability to take another person's viewpoint.

Theory of Natural Selection: an idea coined by Charles Darwin that proposed that the physical characteristics of animals and humans evolved because they were useful or functional.

Theory: an integrated set of principles that explains and predicts many, but not all, observed relationships within a given domain of inquiry.

Therapeutic Alliance: A relationship between the client and the therapist that is facilitated when the therapist is genuine, when the therapist treats the client with unconditional positive regard, and when the therapist develops empathy with the client.

Thinking Function: Logical; sees cause and effect relations; cool, distant, frank, and questioning.

Third Force: Humanistic psychology.

Threat-Simulation Theory: Dreams are seen as an ancient biological defense mechanism since they simulate potentially threatening events.

Three Stages of Moral Thinking: Three stages that children pass through as they develop intellectually.

Thriving: Growth and strength that arise in the face of adversity.

Thyroid Gland: The area responsible for determining how quickly the body uses energy and hormones (in conjunction with the parathyroid gland), and affects metabolism, among other things.

Tinnitus: a ringing or a buzzing sensation that typically occurs after being exposed to loud sounds that likely damaged the cilia within the cochlea.

Tip-of-the-Tongue Phenomenon: we are certain that we know something that we are trying to recall but cannot quite come up with it.

Tolerance: an increase in the dose of a drug that is required to produce the same effect.

Toxic Inhalants: a substance that is easily accessible as the vapours of glue, gasoline, propane, hairspray, and spray paint, and are inhaled to create a change in consciousness. Often frequently abused as depressants.

Traits of Good Theories: 1) **General:** they summarize many different outcomes. 2) **Parsimonious:** they provide the simplest possible account of outcomes. 3) **Falsifiable:** the variables of interest can be adequately measured and the relationships between

the variables that are predicted by the theory can be shown, through research, to be incorrect.

Trance States: a state of consciousness characterized by the experience of "out-of-body possession," or an acute dissociation between one's self and the current, physical environment surrounding them.

Transactional Theory of Stress and Coping (TTSC): Describes stress as a product of a transaction between a person and his or her complex environment.

Transcranial Magnetic Stimulation (TMS): A procedure in which magnetic pulses are applied to the brain of a living person with the goal of temporarily and safely deactivating a small brain region. TMS is used to temporarily and safely deactivate a small brain region, with the goal of testing the causal effects of the deactivation on behavior.

Transduction: the conversion of stimuli detected by receptor cells to electrical impulses that are then transported to the brain.

Transfer-Appropriate Processing: a principle that states that memory performance is superior when a test taps the same cognitive processes as the original encoding activity.

Transference: The unconscious redirection of the feelings experienced in an important personal relationship toward the therapist.

Trichromatic Colour Theory: the belief that the colour we see depends on the mix of the signals from the three types of cones.

Tricyclic Antidepressants: The original antidepressants that work by increasing the amount of serotonin, norepinephrine, and dopamine at the synapses.

Twin Studies: A behavior genetic research method that involves comparison of the similarity of identical (monozygotic; MZ) and fraternal (dizygotic; DZ) twins.

Two-Factor Theory of Emotion: Asserts that the experience of emotion is determined by the intensity of the arousal we are experiencing, but that the cognitive appraisal of the situation determines what the emotion will be.

Tympanic Membrane (or Eardrum): a tightly stretched, highly sensitive membrane at the end of the auditory canal.

Type A Behavior: A pattern of behavior that includes being competitive, impatient, hostile, and time urgent, and is associated with a greater risk of heart disease.

Type B Behavior: A pattern of behavior that includes being easygoing, patient, and relaxed, and is associated with a lower risk of heart disease.

Types of Memory: there are two types of memory – explicit memory and implicit memory.

Typicality: the difference in "goodness" of category members, ranging from the most typical (the prototype) to borderline members.

U

Umbilical Cord: Links the embryo directly to the placenta and transfers all material to the fetus.

Unconditioned Response (UR): in classical conditioning, an innate response that is elicited by a stimulus before (or in the absence of) conditioning.

Unconditioned Stimulus (US): in classical conditioning, the stimulus that elicits the response before conditioning occurs.

Unconscious: Not conscious; the part of the mind that affects behavior though it is inaccessible to the conscious mind. Those things that are outside of conscious awareness, including many memories, thoughts, and urges of which we are not aware.

Universalist: Assert that emotions evolved as a response to the environments of our primordial ancestors, so they are the same across all cultures.

V

Valid: the conclusions drawn by the researcher are legitimate.

Validity: Evidence related to the interpretation and use of test scores.

Value-Free Research: When social psychologists research culture, they try to avoid making value judgments in order to approach scientific objectivity.

Variables: any attribute that can assume different values among different people or across different times or places.

Vestibular System: a set of liquid-filled areas in the inner ear that monitors the head's position and movement, maintaining the body's balance.

Vicarious Reinforcement: learning that occurs by observing the reinforcement or punishment of another person.

Virtual Reality CBT: The therapist uses computer-generated, three-dimensional, lifelike images of the feared stimulus in a systematic desensitization program.

Visible Spectrum: the range of energy the eyes can detect on the electromagnetic spectrum. For humans, this range is only 400 to 700 billionths of a meter.

Visual Accommodation: the process of changing the curvature of the lens to keep the light entering the eye focused on the retina.

Visual Attention: The brain's ability to selectively filter unattended or unwanted information from reaching awareness.

Visual Cliff: a mechanism that gives the perception of a dangerous drop-off, in which infants can be safely tested for their perception of depth.

Visual Cortex: The area located in the occipital lobe (at the very back of the brain) that processes visual information.

Visual Perspective Taking: can refer to visual perspective taking (perceiving something from another person's spatial vantage point) or more generally to effortful mental state inference (trying to infer the other person's thoughts, desires, emotions).

W

Wavelength: the distance between one wave peak and the next wave peak.

Weber's Law: the just noticeable difference of a stimulus is a constant proportion of the original intensity of the stimulus.

Wechsler Adult intelligence Scale (WAIS): the most widely used intelligence test for adults.

Wernicke's Area: an area of the brain next to the auditory cortex responsible for language comprehension.

Wish Fulfilment: the idea that dreaming allows us to act out the desires that we must repress during the day.

Withdrawal: negative experiences that accompany reducing or stopping drug use, including physical pain and other symptoms.

Word Association Test: A research technique used to study the personal unconscious that involves reading 100 words to someone and having the person respond quickly with a word of his or her own.

Working Memory: the form of memory we use to hold onto information temporarily, usually for the purposes of manipulation.

Working Memory: the processes that we use to make sense of, modify, interpret, and store information in STM.

X

Y

Z

Zygote: A fertilized ovum.

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