PRINCIPLES OF PSYCHOLOGY FOR LIFE 1E



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Principles of Psychology for Life

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This text was compiled on 09/08/2026

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UNIT I: INTRODUCING PSYCHOLOGY

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1.1: Why value psychology?

Ongoing problems

- Misinformation spreads farther, faster, and more broadly than accurate reporting — false news stories are 70% more likely to be shared and reach audiences six times faster than true stories (Vosoughi et al., 2018).
- Political polarization has strained relationships across communities and families — research tracking millions of smartphone users found that politically divided families shortened their Thanksgiving visits and were less likely to travel to see one another at all (Chen & Rohla, 2018).
- Social media platforms, engineered using variable-ratio reinforcement schedules and dopamine-driven feedback loops, compete for users' attention around the clock (Sharpe & Spooner, 2025).
- Rates of anxiety, depression, and suicidal ideation among adolescents and young adults have increased significantly over the past decade, with trends particularly pronounced among those ages 18–25 (Twenge et al., 2019).
- Loneliness has become so pervasive that the U.S. Surgeon General declared it a public health epidemic, with approximately half of American adults reporting experiencing loneliness even before the COVID-19 pandemic (U.S. Department of Health and Human Services, 2023).

> **These are not solely political or technological problems. They are *psychological* problems — rooted in how we think, feel, perceive, and relate to one another. And that means psychological science can help find solutions.**

Psychology can help us identify solutions

Why do intelligent, well-intentioned people fall for misinformation? Research on cognitive biases and heuristics suggests that susceptibility to false claims is driven more by a failure to engage in analytical thinking than by partisan motivation — and that simply prompting people to consider accuracy before sharing can reduce the spread of misinformation (Pennycook & Rand, 2019). Why is it difficult to motivate action on climate change, even among those who express concern? Studies on risk perception, social norms, and motivation reveal that how people perceive the actions of others — and whether norms appear to be shifting — powerfully shapes their willingness to act (van der Linden, 2015; Sparkman & Walton, 2017). Why does scrolling social media at midnight feel so difficult to stop? Neuroscience and behavioral psychology have identified the mechanisms — dopamine signaling, variable reinforcement, and habit formation — that make these platforms uniquely compelling (Sharpe & Spooner, 2025). And why do so many people struggle with their mental health in silence? Stigma remains one of the most significant barriers to seeking treatment, diminishing self-esteem and discouraging participation in care even when effective treatments are available (Corrigan, 2004).

As shown, psychology is not only an academic discipline, but it can offer practical solutions. These strategies can also apply at the invividual level, helping you navigate your relationships, your education, your career, and your own well-being.

> This textbook is designed to help you learn not only about insights from psychological science, but importantly how you can use these insights to study more effectively, think more critically, collaborate with others, and care for yourself.

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1.2: What is psychology?

Learning Objectives

- Define psychology
- Understand challenges of using scientific method in psychology

The word psychology originates from the Greek roots *psyche* (soul, breath, or spirit) and *logia* (the study of), to literally mean the study of the soul or mind. Today psychology refers to the scientific study of the mind and behavior. Importantly, the field of psychology as it is known today, is considered a scientific field.

Science relies on an the scientific method, which is a form of empiricism, for acquiring knowledge. This means that scientific knowledge is based on measurement and observation, including experimentation. This differs from other disciplines, like philosophy, than can use methods based exclusively on logic. As a result, scientists can only study things that can be observed and measured (i.e., matter and energy) and cannot make claims about morality or values. This is one reason why our scientific understanding of the mind is so challenging, because thoughts and feelings cannot be directly observed and measured.

> Now that you know that psychology relies on scientific methods, and that it is difficult to study thoughts and feelings with these methods, you can better understand the history of psychology and how it has evolved.

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1.3: The beginning of psychology

Learning Objectives

1. List some of the most important questions that concern psychologists.
2. Explain how psychology changed from a philosophical to a scientific discipline.

Big questions in psychology

Although psychology has changed dramatically over its history, some of the big questions that psychologists address have remained constant. Below are some of the big themes that have been explored in psychology.

- *Nature versus nurture.* Are genes or environment most influential in determining the behavior of individuals and in accounting for differences among people? Most scientists now agree that both genes and environment play crucial roles in most human behaviors, 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. But importantly, we will also see that nature and nurture interact in complex ways, such as through epigenetics, when your behaviors and your environment can affect how your genes function.
- *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 behaviors 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 behaviors and freely choose to disobey the law. But as you will learn, psychological research shows that our environments can influence us as well.
- *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, 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.
- *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 behaviors 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 behavior 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 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. For example, 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 (in Latin a *tabula rasa*) and that knowledge is primarily acquired through learning and experience.



Figure 1.3.1: The earliest psychologists were the Greek philosophers Plato (left) and Aristotle. Plato believed that much knowledge was innate, whereas Aristotle thought that each child was born as an and that knowledge was primarily acquired through learning and experience. Image Editor – Plato and Aristotle – CC BY 2.0

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 favor 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.

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1.4: HISTORY OF PSYCHOLOGY

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1.4.1: Introduction to the History of Psychology

Psychology is a relatively young science with its experimental roots in the nineteenth century.

In these sections we will review the history of psychology with a focus on the major approaches (or schools) of psychological inquiry and the important questions that psychologists ask. As a preview, the schools of psychology that we will review are summarized in the Table below.

Table 1.4.1.1*: Important Approaches (Schools) of Psychology*

School of psychology	Description	Important contributors
Structuralism	Uses the method of introspection to identify the basic elements or 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 behavior	Sigmund Freud, Carl Jung, Alfred Adler, Erik Erickson
Behaviorism	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 behavior 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 behavior	Fritz Heider, Leon Festinger, Stanley Schachter



Figure 1.4.1.4: Female Psychologists. Although most of the earliest psychologists were men, women are increasingly contributing to psychology. The first female president of the American Psychological Association was Mary Whiton Calkins (1861–1930). Calkins made significant contributions to the study of memory and the self-concept. Mahzarin Banaji (left), Marilynn Brewer (not pictured), and Linda Bartoshuk (right) are all recent presidents of the American Psychological Society. Heinrich-Böll-Stiftung – Keynote: Mahzarin R. Banaji – CC BY-SA 2.0; NIDCD Inside Newsletter – no copyright.

As you read through the history of psychology, consider how changes in the field of psychology were not random. **Each new school was a response** to weaknesses or challenges of the previous school of early psychology.

Understanding the histoical shifts in psychology, can help you understand the current state of psychology today.

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1.4.2: Wundt And Structuralism

Wilhelm Wundt (1832–1920) was a German scientist who was the first person to be referred to as a psychologist. His famous book entitled *Principles of Physiological Psychology* was published in 1873. Wundt viewed psychology as a scien- tific study of conscious experience, and he believed that the goal of psychology was to identify components of conscious- ness and how those components combined to result in our conscious experience. Wundt used **introspection** (he called it "internal perception"), a process by which someone exam- ines their own conscious experience as objectively as possible, making the human mind like any other aspect of nature that a scientist observed. Wundt's version of introspection used only very specific experimental conditions in which an external stimulus was designed to produce a scientifically observable (repeatable) experience of the mind (Danziger, 1980). The first stringent requirement was the use of "trained" or prac- ticed observers, who could immediately observe and report a reaction. The second requirement was the use of repeatable stimuli that always produced the same experience in the sub- ject and allowed the subject to expect and thus be fully atten- tive to the inner reaction. These experimental requirements were put in place to eliminate "interpretation" in the report- ing of internal experiences and to counter the argument that there is no way to know that an individual is observing their mind or consciousness accurately, since it cannot be seen by any other person. This attempt to understand the structure or characteristics of the mind was known as **structuralism**. Wundt established his psychology laboratory at the Univer- sity at Leipzig in 1879 (Figure 1.4.2.1). In this laboratory, Wundt and his students conducted experiments on, for example, reaction times. A subject, sometimes in a room isolated from the scientist, would receive a stimulus such as a light, image, or sound. The subject's reaction to the stimulus would be to push a button, and an apparatus would record the time to reaction. Wundt could measure reaction time to one-thou- sandth of a second (Nicolas & Ferrand, 1999).

However, despite his efforts to train individuals in the process of introspection, this process remained highly subjec- tive, and there was very little agreement between individuals. As a result, structuralism fell out of favor with the passing of Wundt's student, Edward Titchener, in 1927 (Gordon, 1995).



(a) (b)

Figure 1.4.2.1: (a) Wilhelm Wundt is credited as one of the founders of psychology. He created the first laboratory for psychological research. (b) This photo (c. 1908) shows him seated, surrounded by fellow researchers and equipment in his laboratory in Germany. [(a) "Wilhelm Wundt. Photogravure by Synnberg Photo-gravure Co., 1898"/Wellcome Images is licensed under CC BY 4.0; (b) "Leipzig'te içgözlem denemeleri"/Wikimedia Commons is in the public domain.]

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1.4.3: James And Functionalism

William James (1842–1910) was the first American psychologist who espoused a different perspective on how psychology should operate (Figure 1.4.3.1). James was introduced to Darwin's theory of evolution by natural selection and accepted it as an explanation of an organism's characteristics. Key to that theory is the idea that natural selection leads to organisms that are adapted to their environment, including their behavior. Adaptation means that a trait of an organism has a function for the survival and reproduction of the individual, because it has been naturally selected. As James saw it, psychology's purpose was to study the function of behavior in the world, and as such, his perspective was known as **functionalism**. Functionalism focused on how mental activities helped an organism fit into its environment. Functionalism has a second, more subtle meaning in that functionalists were more interested in the operation of the whole mind rather than of its individual parts, which were the focus of structuralism. Like Wundt, James believed that introspection could serve as one means by which someone might study mental activities, but James also relied on more objective measures, including the use of various recording devices, and examinations of concrete products of mental activities and of anatomy and physiology (Gordon, 1995).



Figure 1.4.3.1:William James, shown here in a self-portrait, was the first American psychologist. ["William James self-portrait"/Wikimedia Commons is in the public domain.]

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1.4.4: Freud And Psychoanalytic Theory

Perhaps one of the most influential and well-known figures in psychology's history was Sigmund Freud (Figure 1.4.4.1). Freud (1856–1939) was an Austrian neurologist who was fascinated by patients suffering from "hysteria" and neurosis. Hysteria was an ancient diagnosis for disorders, primarily of women with a wide variety of symptoms, including physi- cal symptoms and emotional disturbances, none of which had an apparent physical cause. Freud theorized that many of his patients' problems arose from the unconscious mind. In Freud's view, the unconscious mind was a repository of feelings and urges of which we have no awareness. Gaining access to the unconscious, then, was crucial to the successful resolution of the patient's problems. According to Freud, the unconscious mind could be accessed through dream analysis, by examinations of the first words that came to people's minds, and through seemingly innocent slips of the tongue. **Psychoanalytic theory** focuses on the role of a person's unconscious, as well as early childhood experiences, and this particular perspective dominated clinical psychology for several decades (Thorne & Henley, 2005).

Freud's ideas were influential, and you will learn more about them when you study lifespan development, person- ality, and therapy. For instance, many therapists believe strongly in the unconscious and the impact of early child- hood experiences on the rest of a person's life. The method of psychoanalysis, which involves the patient talking about their experiences and selves, while not invented by Freud, was certainly popularized by him and is still used today. Many of Freud's other ideas, however, are controversial. Drew Westen (1998) argues that many of the criticisms of Freud's ideas are mis- placed, in that they attack his older ideas without taking into account later writings. Westen also argues that critics fail to consider the success of the broad ideas that Freud introduced or developed, such as the importance of childhood experi- ences in adult motivations, the role of unconscious versus conscious motivations in driving our behavior, the fact that motivations can cause conflicts that affect behavior, the effects of mental representations of ourselves and others in guiding our interactions, and the development of personality over time. Westen identifies subsequent research support for all of these ideas.

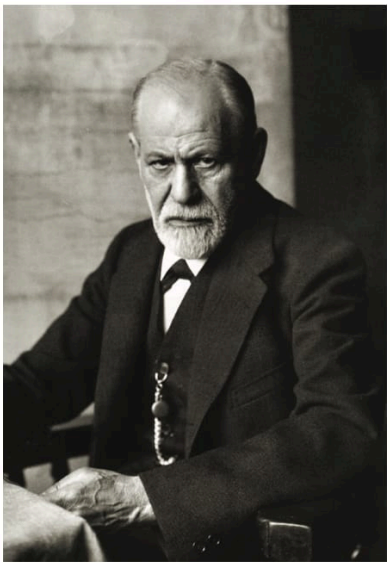


Figure 1.4.4.1: Sigmund Freud was a highly influential figure in the history of psychology. One of his many books, *A General Introduction to Psychoanalysis*, shared his ideas about psychoanalytical therapy; it was originally published in 1917. ["Sigmund Freud 1926" by Ferdinand Schmutzer/ Wikimedia Commons is in the public domain.]

More modern iterations of Freud's clinical approach have been empirically demonstrated to be effective (Knekt et al., 2008; Shedler, 2010). Some current practices in psychother- apy involve examining unconscious aspects of the self and relationships, often through the relationship between the therapist and the client.

Freud's historical significance and contributions to clinical practice merit his inclusion in a discussion of the histori- cal movements within psychology.

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1.4.5: Wertheimer, Koffka, Kohler, Aad Gestalt Psychology

Max Wertheimer (1880–1943), Kurt Koffka (1886–1941), and Wolfgang Kohler (1887–1967) were three German psy- chologists who immigrated to the United States in the early twentieth century to escape Nazi Germany. These men are credited with introducing psychologists in the United States to various Gestalt principles. The word Gestalt roughly trans- lates to “whole;” a major emphasis of Gestalt psychology deals with the fact that although a sensory experience can be bro- ken down into individual parts, how those parts relate to each other as a whole is often what the individual responds to in perception. For example, a song may be made up of individ- ual notes played by different instruments, but the real nature of the song is perceived in the combinations of these notes as they form the melody, rhythm, and harmony. In many ways, this particular perspective would have directly contradicted Wundt’s ideas of structuralism (Thorne & Henley, 2005).

Unfortunately, in moving to the United States, these men were forced to abandon much of their work and were unable to continue to conduct research on a large scale. These fac- tors along with the rise of behaviorism (described next) in the United States prevented principles of Gestalt psychology from being as influential in the United States as they had been in their native Germany (Thorne & Henley, 2005). Despite these issues, several Gestalt principles are still very influential today. Considering the human individual as a whole rather than as a sum of individually measured parts became an important foundation in humanistic theory late in the cen- tury. The ideas of Gestalt have continued to influence research on sensation and perception.

Structuralism, Freud, and the Gestalt psychologists were all concerned in one way or another with describing and understanding inner experience. But other researchers had concerns that inner experience could be a legitimate sub- ject of scientific inquiry and chose instead to exclusively study behavior, the objectively observable outcome of mental processes.

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1.4.6: Pavlov, Watson, Skinner, And Behaviorism

Early work in the field of behavior was conducted by the Russian physiologist Ivan Pavlov (1849–1936). Pavlov studied a form of learning behavior called a conditioned reflex, in which an animal or human produced a reflex (unconscious) response to a stimulus and, over time, was conditioned to produce the response to a different stimulus that the experimenter associated with the original stimulus. The reflex Pavlov worked with was salivation in response to the presence of food. The salivation reflex could be elicited using a second stimulus, such as a specific sound, that was presented in association with the initial food stimulus several times. Once the response to the second stimulus was "learned," the food stimulus could be omitted. Pavlov's "classical conditioning" is only one form of learning behavior studied by behaviorists.

John B. Watson (1878–1958) was an influential American psychologist whose most famous work occurred during the early twentieth century at Johns Hopkins University (Figure 1.4.6.1). While Wundt and James were concerned with under- standing conscious experience, Watson thought that the study of consciousness was flawed. Because he believed that objective analysis of the mind was impossible, Watson preferred to focus directly on observable behavior and try to bring that behavior under control. Watson was a major proponent of shifting the focus of psychology from the mind to behavior, and this approach of observing and controlling behavior came to be known as **behaviorism**. A major object of study by behaviorists was learned behavior and its interaction with inborn qualities of the organism. Behaviorism commonly used animals in experiments under the assumption that what was learned using animal models could, to some degree, be applied to human behavior. Indeed, Tolman (1938) stated, "I believe that everything important in psychology (except . . . such matters as involve society and words) can be investigated in essence through the continued experimental and theoretical analysis of the determiners of rat behavior at a choice-point in a maze."



Figure 1.4.6.1: John B. Watson is known as the father of behaviorism within psychology. ["John Broadus Watson at Johns Hopkins c. 1908-1921"/Wikimedia Commons is in the public domain.]

Behaviorism dominated experimental psychology for several decades, and its influence can still be felt today (Thorne & Henley, 2005). Behaviorism is largely responsible for establishing psychology as a scientific discipline through its objective methods and especially experimentation. In addition, it is used in behavioral and cognitive-behavioral therapy. Behavior modification is commonly used in classroom settings. Behaviorism has also led to research on environmental influences on human behavior.

B. F. Skinner (1904–1990) was an American psychologist (Figure 1.4.6.2). Like Watson, Skinner was a behaviorist, and he concentrated on how behavior was affected by its con- sequences. Therefore, Skinner spoke of reinforcement and punishment as major factors in driving behavior. As a part of his research, Skinner developed a chamber that allowed the careful study of the principles of modifying behavior through reinforcement and punishment. This device, known as an operant conditioning chamber (or more familiarly, a Skinner box), has remained a crucial resource for researchers studying behavior (Thorne & Henley, 2005). The Skinner box is a chamber that isolates the subject from the external environment and has a behavior indicator such as a lever or a button. When the animal pushes the button or lever, the box is able to deliver a positive reinforcement of the behavior

(such as food) or a punishment (such as a noise) or a token conditioner (such as a light) that is correlated with either the positive reinforcement or punishment.

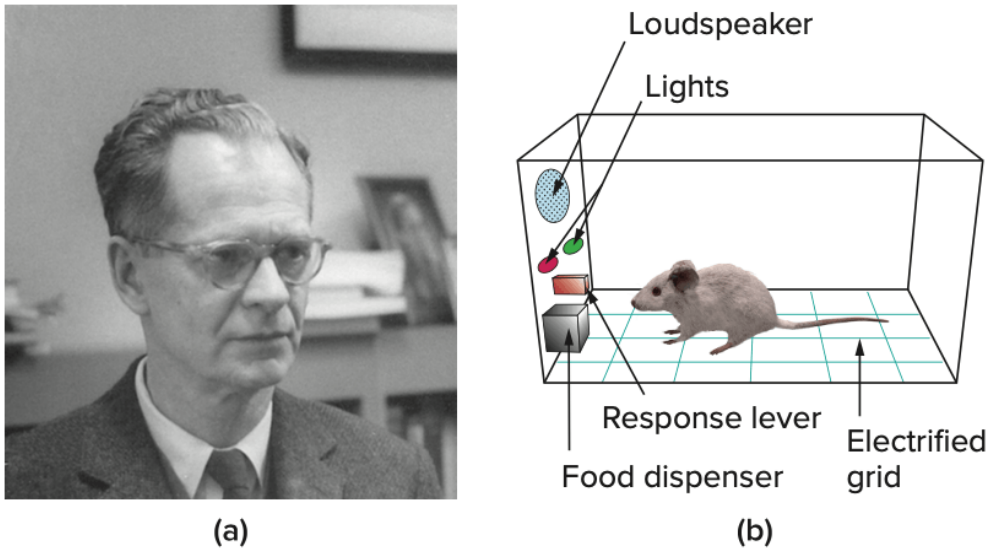


Figure 1.4.6.1: (a) B. F. Skinner is famous for his research on operant conditioning. (b) Modified versions of the operant conditioning chamber, or Skinner box, are still widely used in research settings today. [(a) "B.F. Skinner at Harvard circa 1950" by Silly rabbit/Wikimedia Commons is licensed under CC BY 3.0; (b) "Skinner Box" by Judy Schmitt is licensed under CC BY-NC-SA 4.0.]

Skinner's focus on positive and negative reinforcement of learned behaviors had a lasting influence in psychology that has waned somewhat since the growth of research in cognitive psychology. Despite this, conditioned learning is still used in human behavioral modification. Skinner's two widely read and controversial popular science books about the value of operant conditioning for creating happier lives remain as thought-provoking arguments for his approach (Greengrass, 2004).

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1.4.7: Maslow, Rogers, And Humanism

During the early twentieth century, American psychology was dominated by behaviorism and psychoanalysis. How- ever, some psychologists were uncomfortable with what they viewed as limited perspectives being so influential to the field. They objected to the pessimism and determinism (all actions driven by the unconscious) of Freud. They also disiked the reductionism, or simplifying nature, of behaviorism. Behaviorism is also deterministic at its core, because it sees human behavior as entirely determined by a combination of genetics and environment. Some psychologists began to form their own ideas that emphasized personal control, intentionality, and a true predisposition for "good" as important for our self-concept and our behavior. Thus, humanism emerged. **Humanism** is a perspective within psychology that emphasizes the potential for good that is innate to all humans. Two of the most well-known proponents of humanistic psychology are Abraham Maslow and Carl Rogers (O'Hara, n.d.).

Abraham Maslow (1908–1970) was an American psychologist who is best known for proposing a hierarchy of human needs in motivating behavior (Figure 1.4.7.1). Although this concept will be discussed in more detail in a later chapter, a brief overview will be provided here. Maslow asserted that so long as basic needs necessary for survival were met (e.g., food, water, shelter), higher-level needs (e.g., social needs) would begin to motivate behavior. According to Maslow, the highest-level needs relate to self-actualization, a process by which we achieve our full potential. Obviously, the focus on the positive aspects of human nature that are characteristic of the humanistic perspective is evident (Thorne & Henley, 2005). Humanistic psychologists rejected, on principle, the research approach based on reductionist experimentation in the tradition of the physical and biological sciences, because it missed the "whole" human being. Beginning with Maslow and Rogers, there was an insistence on a humanistic research program. This program has been largely qualitative (not measurement-based), but there exist a number of quantitative research strains within humanistic psychology, including research on happiness, self-concept, meditation, and the out- comes of humanistic psychotherapy (Friedman, 2008).

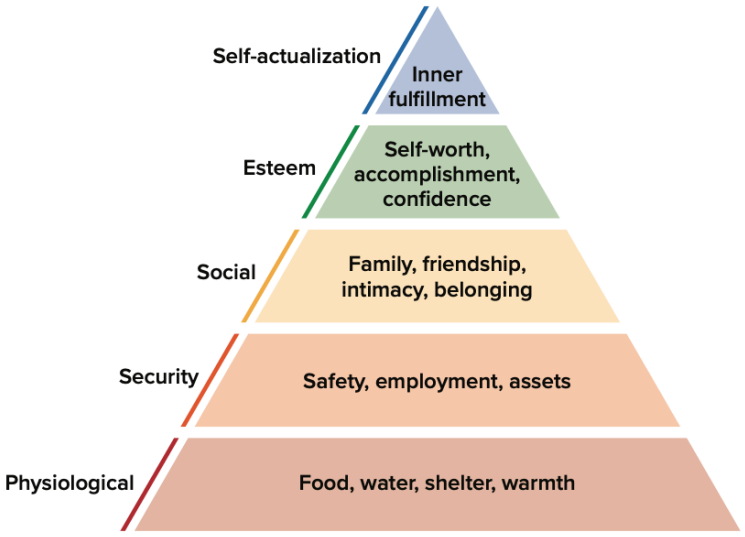


Figure 1.4.7.1: Maslow's hierarchy of needs. [This work, "Maslow's Hierarchy of Needs 2020," is licensed under CC BY-SA 4.0 by Judy Schmitt. It is a derivative of "Maslow's hierarchy of needs" by J. Finkelstein/Wikimedia Commons, which is licensed under CC BY-SA 3.0.]

Carl Rogers (1902–1987) was also an American psychologist who, like Maslow, emphasized the potential for good that exists within all people (Figure 1.4.7.2. Rogers used a therapeutic technique known as client-centered therapy in helping his clients deal with problematic issues that resulted in their seeking psychotherapy. Unlike a psychoanalytic approach in which the therapist plays an important role in interpreting what conscious behavior reveals about the unconscious mind, client-centered therapy involves the patient taking a lead role in the therapy session. Rogers believed that a therapist needed to display three features to maximize the effectiveness of this particular approach: unconditional positive regard, genuine- ness, and empathy. Unconditional positive regard refers to the fact that the therapist accepts their client for who they are, no matter what he or she might say. Provided these factors, Rogers believed that people were more than capable of dealing with and working through their own issues (Thorne & Henley, 2005).

Humanism has been influential to psychology as a whole. Both Maslow and Rogers are well-known names among students of

psychology (you will read more about both men later in this text), and their ideas have influenced many scholars. Furthermore, Rogers' client-centered approach to therapy is still commonly used in psychotherapeutic settings today (O'Hara, n.d.)

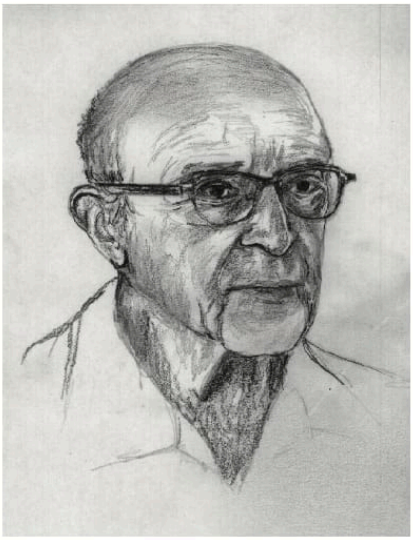


Figure 1.4.7.2: Carl Rogers, shown in this portrait, developed a client-centered therapy method that has been influential in clinical settings. ["Carl Ransom Rogers" by Didius/ Wikimedia Commons is licensed under CC BY 2.5.]

LINK TO LEARNING

View a brief video of Carl Rogers describing his therapeutic approach.

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1.4.8: The Cognitive Revolution

Behaviorism's emphasis on objectivity and focus on external behavior had pulled psychologists' attention away from the mind for a prolonged period of time. The early work of the humanistic psychologists redirected attention to the individual human as a whole, and as a conscious and self-aware being. By the 1950s, new disciplinary perspectives in linguistics, neuroscience, and computer science were emerging, and these areas revived interest in the mind as a focus of scientific inquiry. This particular perspective has come to be known as the cognitive revolution (Miller, 2003). By 1967, Ulric Neisser published the first textbook entitled *Cognitive Psychology*, which served as a core text in cognitive psychology courses around the country (Thorne & Henley, 2005).

Although no one person is entirely responsible for starting the cognitive revolution, Noam Chomsky was very influential in the early days of this movement (Figure 1.4.8.1). Chomsky (1928–), an American linguist, was dissatisfied with the influence that behaviorism had had on psychology. He believed that psychology's focus on behavior was short-sighted and that the field had to re-incorporate mental functioning into its purview if it were to offer any meaningful contributions to understanding behavior (Miller, 2003).

European psychology had never really been as influenced by behaviorism as had American psychology; and thus, the cognitive revolution helped reestablish lines of communication between European psychologists and their American counterparts. Furthermore, psychologists began to cooperate with scientists in other fields, like anthropology, linguistics, computer science, and neuroscience, among others. This interdisciplinary approach often was referred to as the cognitive sciences, and the influence and prominence of this particular perspective resonates in modern-day psychology (Miller, 2003).



Figure 1.4.8.1: Noam Chomsky was very influential in beginning the cognitive revolution. In 2010, this mural honoring him was put up in Philadelphia, Pennsylvania. ["Noam Chomsky mural" by Robert Moran/Flickr is licensed under CC BY 2.0.]

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1.4.9: Multicultural Psychology

Culture has important impacts on individuals and social psychology, yet the effects of culture on psychology are under-studied. There is a risk that psychological theories and data derived from white, American settings could be assumed to apply to individuals and social groups from other cultures and this is unlikely to be true (Betancourt & López, 1993). One weakness in the field of cross-cultural psychology is that in looking for differences in psychological attributes across cultures, there remains a need to go beyond simple descriptive statistics (Betancourt & López, 1993). In this sense, it has remained a descriptive science, rather than one seeking to determine cause and effect. For example, a study of characteristics of individuals seeking treatment for a binge eating disorder in Hispanic American, African American, and Caucasian American individuals found significant differences between groups (Franko et al., 2012). The study concluded that results from studying any one of the groups could not be extended to the other groups, and yet potential causes of the differences were not measured.

This history of multicultural psychology in the United States is a long one. The role of African American psychologists in researching the cultural differences between African American individual and social psychology is but one example. In 1920, Cecil Sumner was the first African American to receive a PhD in psychology in the United States. Sumner established a psychology degree program at Howard University, leading to the education of a new generation of African American psychologists (Black et al., 2004). Much of the work of early African American psychologists (and a general focus of much work in first half of the twentieth century in psychology in the United States) was dedicated to testing and intelligence testing in particular (Black et al., 2004). That emphasis has continued, particularly because of the importance of testing in determining opportunities for children, but other areas of exploration in African American psychology research include learning style, sense of community and belonging, and spiritualism (Black et al., 2004).

The American Psychological Association has several ethnically based organizations for professional psychologists that facilitate interactions among members. Since psychologists belonging to specific ethnic groups or cultures have the most interest in studying the psychology of their communities, these organizations provide an opportunity for the growth of research on the impact of culture on individual and social psychology.

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1.5: Psychology as a Science

Learning Objectives

1. Explain why using our intuition about everyday behavior is insufficient for a complete understanding of the causes of behavior.
2. 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 behavior, whereas *psychologist-practitioners*, such as clinical, counseling, 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 behavior 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 behavior (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 behavior. 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 behavior 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 behavior (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 behavior. 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 labeled with made-up Japanese names (e.g., "Mataku" or "Somuta"), and two were labeled 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 needs 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*, or the tendency to think that we could have predicted something that has already occurred that we probably would not have been able to predict.

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*.



Figure 1.5.2: Psychologists use a variety of techniques to measure and understand human behavior. Tim Sheerman-Chase – "Volunteer Duty" Psychology Testing – CC BY 2.0. CAFNR – CC BY-NC 2.0

Although scientific research is an important method of studying human behavior, 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 the United States 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 1.5.1, 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 capital punishment on the crime rate in the United States may also be determinable. This factual information can and should be made available to help people formulate their values about abortion and capital punishment, 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 U.S. government has recently supported and provided funding for research on HIV, AIDS, and terrorism, while denying funding for research using human stem cells.

Table 1.5.1 Examples of Values and Facts in Scientific Research

Personal value	Scientific fact
Welfare payments should be reduced for unmarried parents.	The U.S. government paid more than $21 billion in unemployment insurance in 2010.
Handguns should be outlawed.	There were more than 30,000 deaths caused by handguns in the United States in 2009.
Blue is my favorite color.	More than 35% of college students indicate that blue is their favorite color.
It is important to quit smoking.	Smoking increases the incidence of cancer and heart disease.

Stangor, C. (2011). *Research methods for the behavioral sciences* (4th ed.). Mountain View, CA: Cengage.

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 later, on the basis of further research, turn out 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 behavior 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 behavior*. 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 Figure 1.5.3. 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 the United States, Canada, 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 behavior.

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.

Figure 1.5.3: Levels of Explanation

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 behavior 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 behavior, 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 behavior is that almost all behavior 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 behaviors, 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 behavior 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 behavior.

Key Takeaways

- Psychology is the scientific study of mind and behavior.
- 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 behaviors.
- 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 behavior 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 behavior?

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1.6: Subfields 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. 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 1.6.1 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.apa.org/careers/psyccareers/.

Table 1.6.1: Some Career Paths in Psychology

Psychology field	Description	Career opportunities
Biopsychology and neuroscience	This field examines the physiological bases of behavior in animals and humans by studying the functioning of different brain areas and the effects of hormones and neurotransmitters on behavior.	Most biopsychologists work in research settings—for instance, at universities, for the federal government, and in private research labs.
Clinical and counseling 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 in 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 behavior of judges, attorneys, 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, behavior, 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 behavior. 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.

Psychology field	Description	Career opportunities
School and educational psychology	This field studies how people learn in school, the effectiveness of school programs, and the psychology of teaching.	School psychologists work in elementary 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 behavior, leadership, attitudes, and person 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 behavior. 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.

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1.7: Skills and Careers

Often, students take their first psychology course because they are interested in helping others and want to learn more about themselves and why they act the way they do. Sometimes, students take a psychology course because it either satisfies a general education requirement or is required for a program of study such as nursing or pre-med. Many of these students develop such an interest in the area that they go on to declare psychology as their major. As a result, psychology is one of the most popular majors on college campuses across the United States (Johnson & Lubin, 2011). A number of well-known individuals were psychology majors. Just a few famous names on this list are Facebook's creator Mark Zuckerberg, television personality and political satirist Jon Stewart, actress Natalie Portman, and filmmaker Wes Craven (Halonen, 2011). About 6 percent of all bachelor degrees granted in the United States are in the discipline of psychology (U.S. Department of Education, 2016).

An education in psychology is valuable for a number of reasons. Psychology students hone critical thinking skills and are trained in the use of the scientific method. Critical thinking is the active application of a set of skills to information for the understanding and evaluation of that information. The evaluation of information—assessing its reliability and usefulness— is an important skill in a world full of competing "facts," many of which are designed to be misleading. For example, critical thinking involves maintaining an attitude of skepticism, recognizing internal biases, making use of logical thinking, asking appropriate questions, and making observations. Psychology students also can develop better communication skills during the course of their undergraduate coursework (American Psychological Association, 2011). Together, these factors increase students' scientific literacy and prepare students to critically evaluate the various sources of information they encounter.

In addition to these broad-based skills, psychology students come to understand the complex factors that shape one's behavior. They appreciate the interaction of our biology, our environment, and our experiences in determining who we are and how we will behave. They learn about basic principles that guide how we think and behave, and they come to recognize the tremendous diversity that exists across individuals and across cultural boundaries (American Psychological Association, 2011).

Skills you can develop in psychology courses

Video instructions

Watch the video in the player below for 5 minute clipped version. If you are interested in learning more, you can watch in youtube to access the whole video.

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Survey instructions

Take the Employable Skills Survey (choose option to "Take the Survey Once") and write down your results: https://employableskills.com/

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UNIT II: HOW TO LEARN EFFECTIVELY

Chapter 2: Memory

2.1: Introducing memory

2.2: Types and stages of memory

2.3: Memory as a process

2.4: Biggest Myth in Education

2.5: Memory Tips for Learning

Chapter 3: Forgetting and Misremembering

3.1: Forgetting

3.2: Misremembering

Chapter 4: Intelligence and Motivation

4.1: What does it mean to be intelligent?

4.2: Defining intelligence and creativity

4.3: Measuring intelligence

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Chapter 5: Goals and Habits

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5.2: Forming habits

Chapter 6: Conditioning

6.1: Learning

6.2: Classical conditioning

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6.4: Observational learning (modeling)

6.5: Conditioning in everyday life

6.6: Optional videos

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CHAPTER 2: MEMORY

2.1: Introducing memory
2.2: Types and stages of memory
2.3: Memory as a process
2.4: Biggest Myth in Education
2.5: Memory Tips for Learning

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2.1: Introducing memory

We may be top-notch learners, but if we don't have a way to store what we've learned, what good is the knowledge we've gained?

Take a few minutes to imagine what your day might be like if you could not remember anything you had learned. You would have to figure out how to get dressed. What clothing should you wear, and how do buttons and zippers work? You would need someone to teach you how to brush your teeth and tie your shoes. Who would you ask for help with these tasks, since you wouldn't recognize the faces of these people in your house? Wait . . . is this even your house? Uh oh, your stomach begins to rumble and you feel hungry. You'd like something to eat, but you don't know where the food is kept or even how to prepare it. Oh dear, this is getting confusing. Maybe it would be best just go back to bed. A bed . . . what is a bed?

We have an amazing capacity for memory, but how, exactly, do we process and store information? Are there different kinds of memory, and if so, what characterizes the different types? How, exactly, do we retrieve our memories? And why do we forget? This chapter will explore these questions as we learn about memory.

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2.2: Types and stages of memory

Learning Objectives

1. Compare and contrast explicit and implicit memory, identifying the features that define each.
2. Explain the function and duration of eidetic and echoic memories.
3. Summarize the capacities of short-term memory and explain how working memory is used to process information in it.

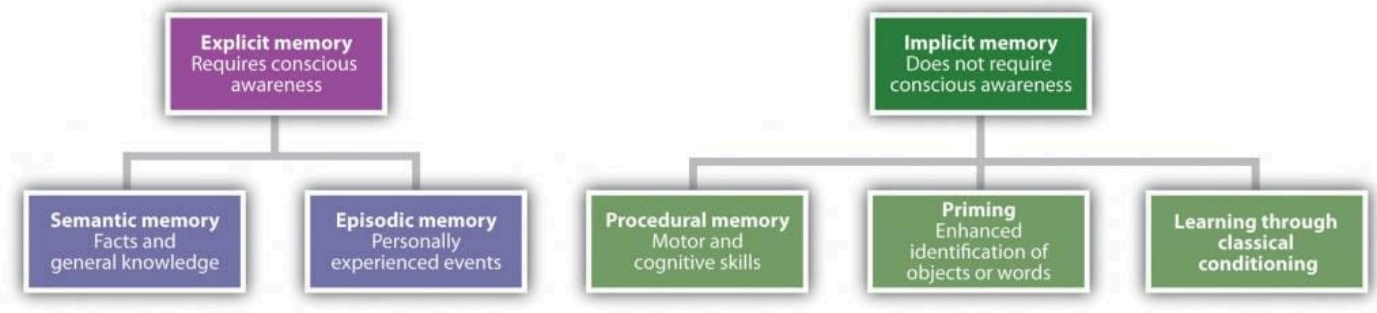
As you can see in Table 2.2.1, psychologists conceptualize memory in terms of *types*, in terms of *stages*, and in terms of *processes*. In this section we will consider the two types of memory, *explicit memory* and *implicit memory*, and then the three major memory stages: *sensory*, *short-term*, 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 2.2.1: 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 2.2.2, 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

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 behavior. Implicit memory refers to *the influence of experience on behavior, even if the individual is not aware of those influences*. As you can see in Figure 2.2.2, 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 behavior 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 behavior (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 behaviors, for instance, on word fragment tests.

Our everyday behaviors 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 behaviors may occur without our being aware of them.

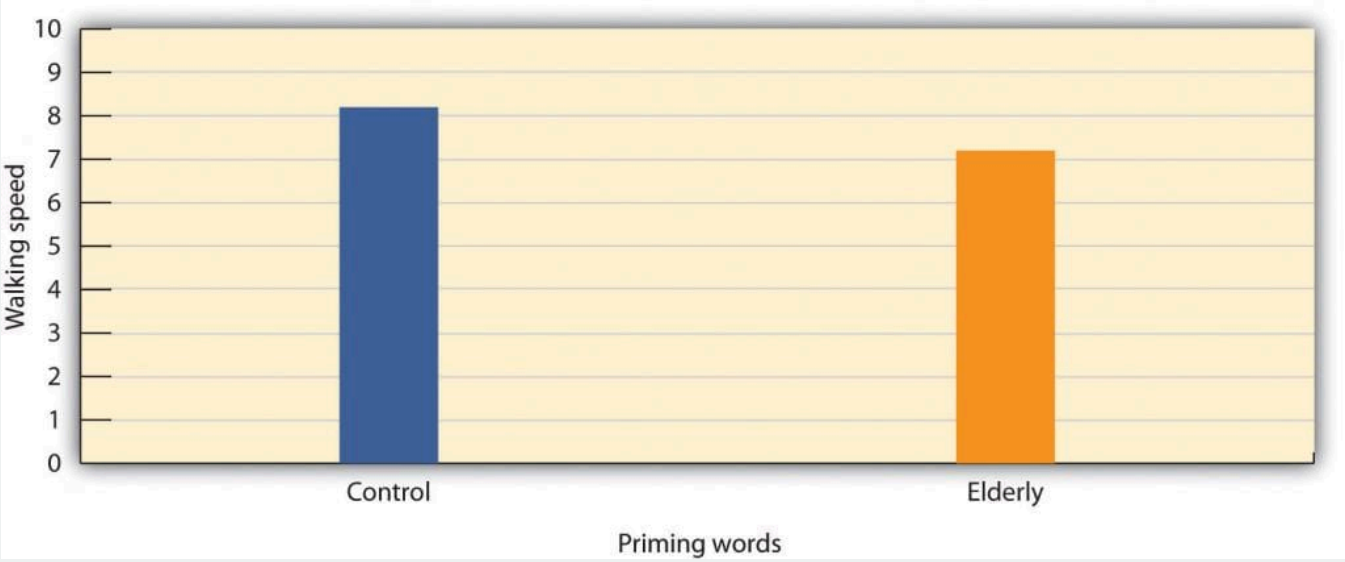
Research Focus: Priming Outside Awareness Influences Behavior

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 college 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 Florida 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’ behavior—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 2.2.3, participants who had made sentences using words related to elderly stereotypes took on the behaviors of the elderly—they walked significantly more slowly as they left the experimental room.



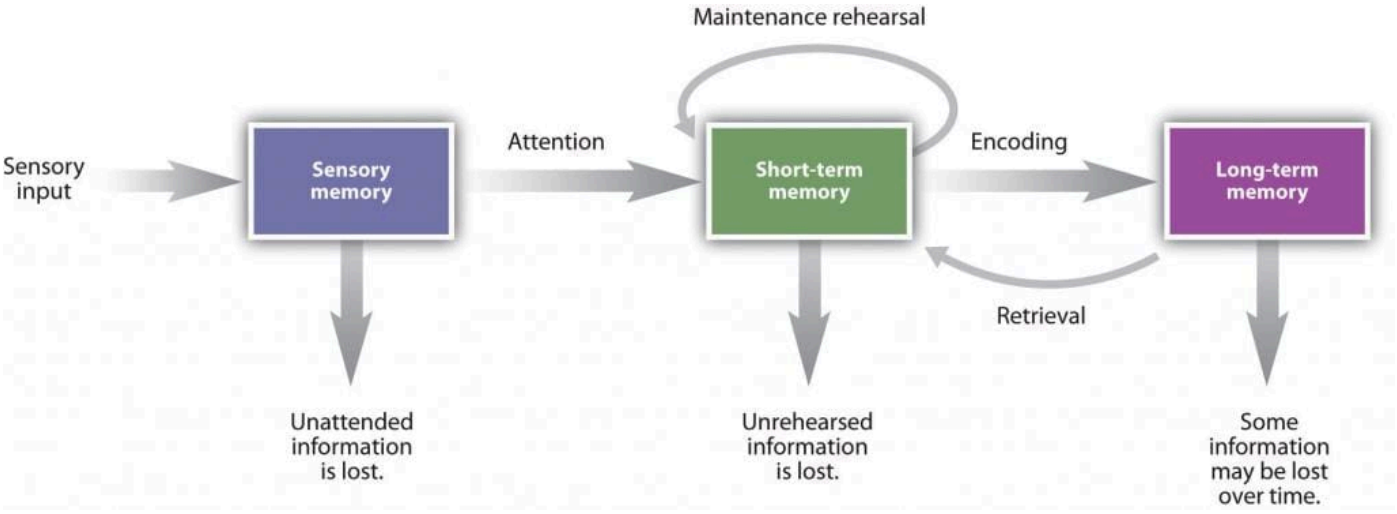
Figure

Results From Bargh, Chen, and Burrows, 1996. Bargh, Chen, and Burrows (1996) found that priming words associated with the elderly made people walk more slowly. Adapted from Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. Journal of Personality & Social Psychology, 71, 230–244.

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 behavior 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 behavior.

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 (Figure 2.2.4), 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

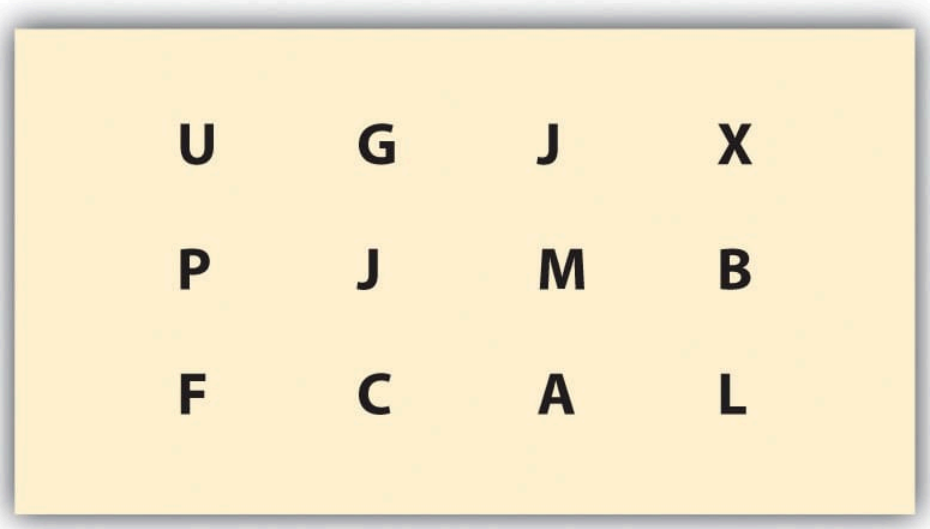
Memory Duration. Memory can characterized in terms of stages—the length of time that information remains available to us. Adapted from Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. Spence (Ed.),

The psychology of learning and motivation
(Vol. 2). Oxford, England: Academic Press.

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 2.2.5. 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

Measuring Iconic Memory. Sperling (1960) 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. Adapted from Sperling, G. (1960). The information available in brief visual presentation.

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(11), 1–29.

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 4 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”

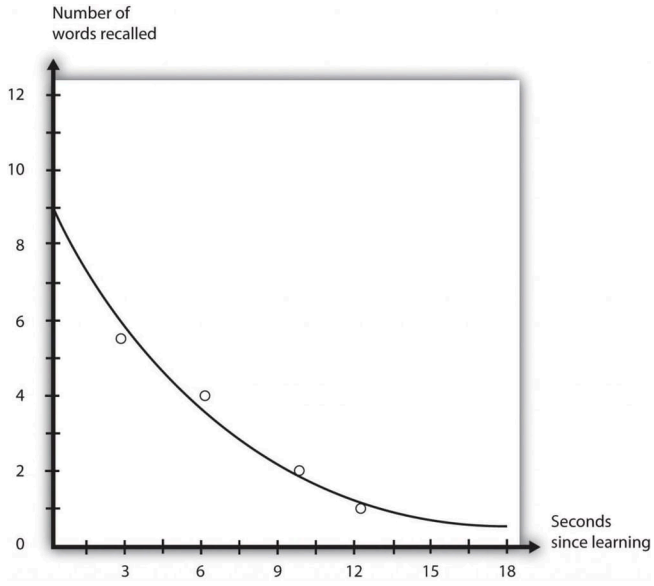
Is 6 × 2 – 1 = 8? (Answer YES OR NO) Then remember “U”

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 (Figure 2.2.6), such that by 18 seconds it was virtually gone.



Figure

STM Decay. Peterson and Peterson (1959) found that information that was not rehearsed decayed quickly from memory. Adapted from Peterson, L., & Peterson, M. J. (1959). Short-term retention of individual verbal items.
Journal of Experimental Psychology, 58
(3), 193–198.

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 a something that we want to remember (e.g., a person's name, e-mail 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

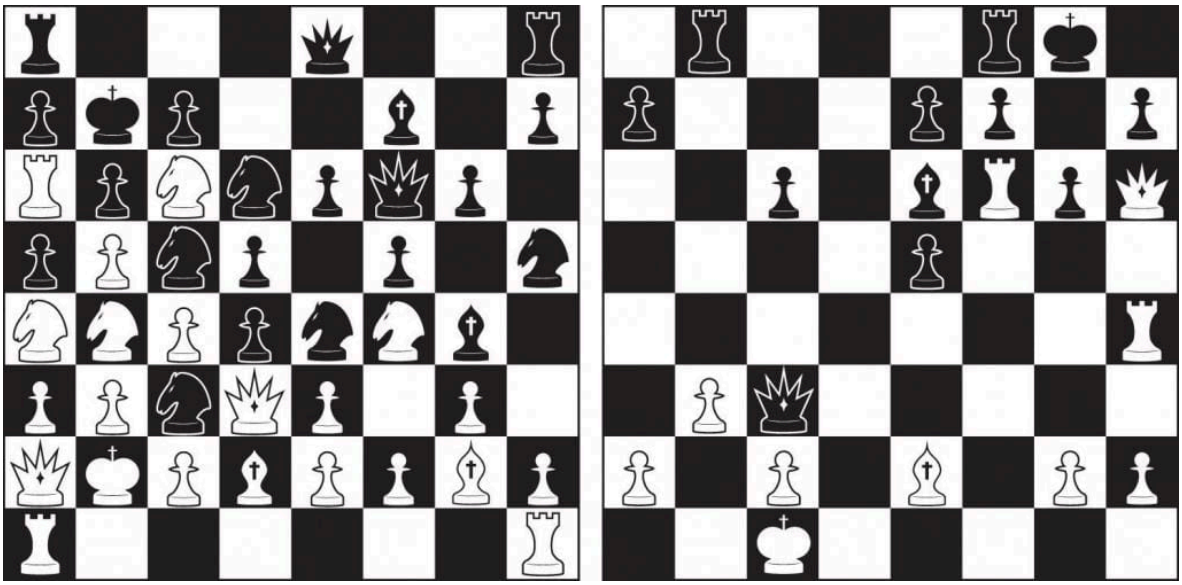
You probably won't do that well because the number of letters is more than the magic number of seven.

Now try again with this one:

MTVCNNABCFOX

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 (Figure 2.2.7). 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

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 assures 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 behavior, 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?

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2.3: Memory as a process

Learning Objectives

1. Label and review the principles of encoding, storage, and retrieval.
2. Summarize the types of amnesia and their effects on memory.
3. 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 (Table 2.3.1). In this section we will consider this question in terms of the types of processing that we do on 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 2.3.1: 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

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 2.3.2, 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 U.S. participants they tested could identify the right one. We see pennies a lot, but we don't bother to encode their features.



Figure 2.3.2 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 2.3.3, 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).

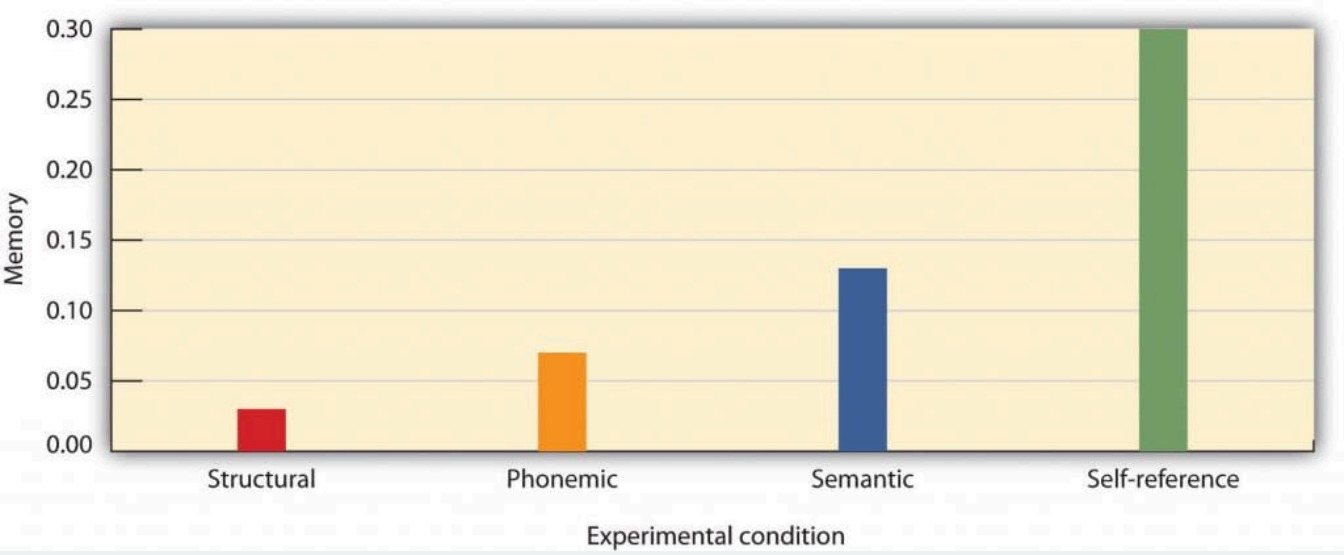


Figure 2.3.3: Self-Reference Effect Results. Participants recalled the same words significantly better when they were processed in relation to the self than when they were processed in other ways. Adapted from Rogers, T. B., Kuiper, N. A., & Kirker, W. S. (1977). Self-reference and the encoding of personal information. *Journal of Personality & Social Psychology, 35*(9), 677–688.

Storage

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 practiced 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 2.3.4). 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.

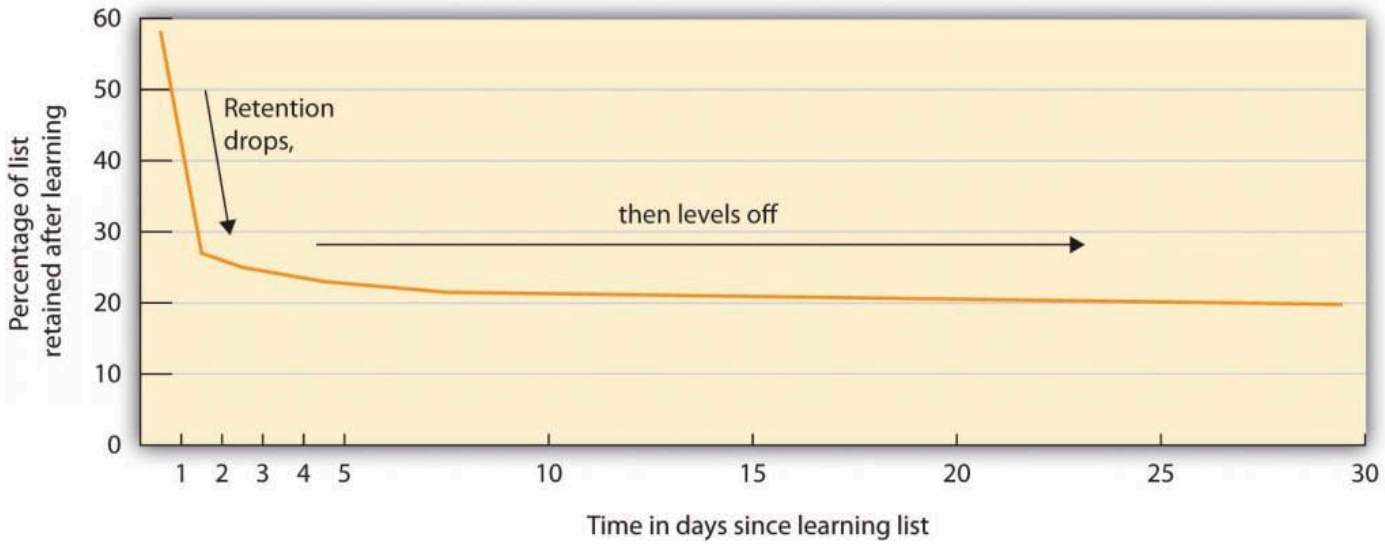


Figure 2.3.4: Ebbinghaus Forgetting Curve. Hermann Ebbinghaus found that memory for information drops off rapidly at first but then levels off after time.

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 2.3.5). 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.

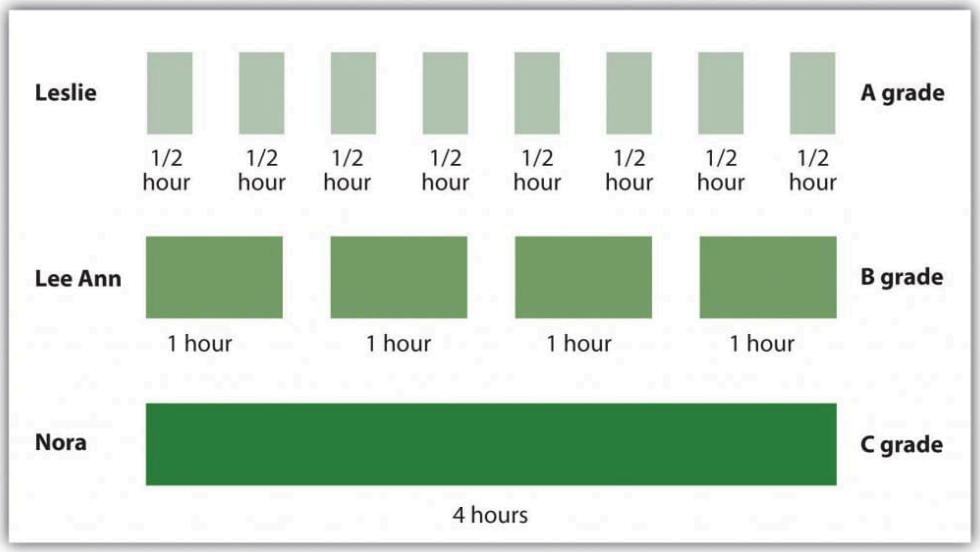


Figure 2.3.5: Effects of Massed Versus Distributed Practice on Learning. The spacing effect refers to the fact that memory is better when it is *distributed* rather than *massed*. Leslie, Lee Ann, and Nora all studied for four hours total, but the students who spread out their learning into smaller study 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've 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 states listed in the sidebar below, and ask him to name the capital city of each state. 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.

States and Capital Cities

Try this demonstration of the tip-of-the-tongue phenomenon with a classmate. Instructions are in the text.

Georgia	(Atlanta)
Maryland	(Annapolis)
California	(Sacramento)
Louisiana	(Baton Rouge)
Florida	(Tallahassee)
Colorado	(Denver)
New Jersey	(Trenton)
Arizona	(Phoenix)
Nebraska	(Lincoln)
Kentucky	(Frankfort)

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 2.3.6, 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.

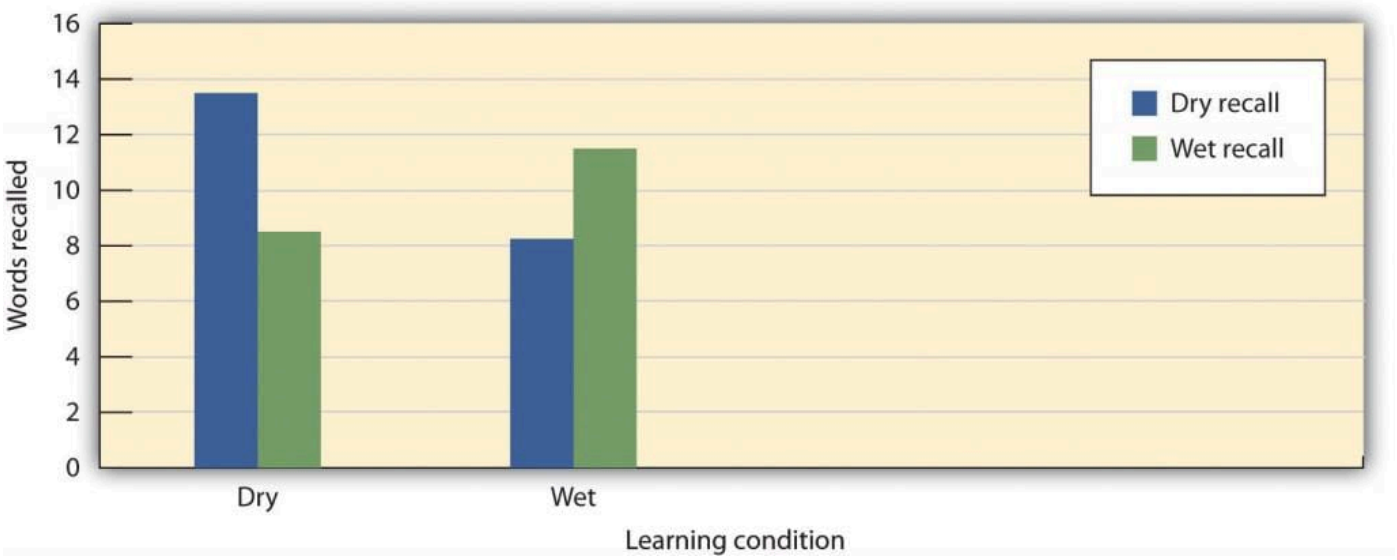


Figure 2.3.6: Results From Godden and Baddeley, 1975. Godden and Baddeley (1975) tested the memory of scuba divers to learn and retrieve information in different contexts and found strong evidence for context-dependent learning. Adapted from Godden, D. R., & Baddeley, A. D. (1975). Context-dependent memory in two natural environments: On land and underwater. *British Journal of Psychology,* 66(3), 325–331.

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 2.3.7. 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*.

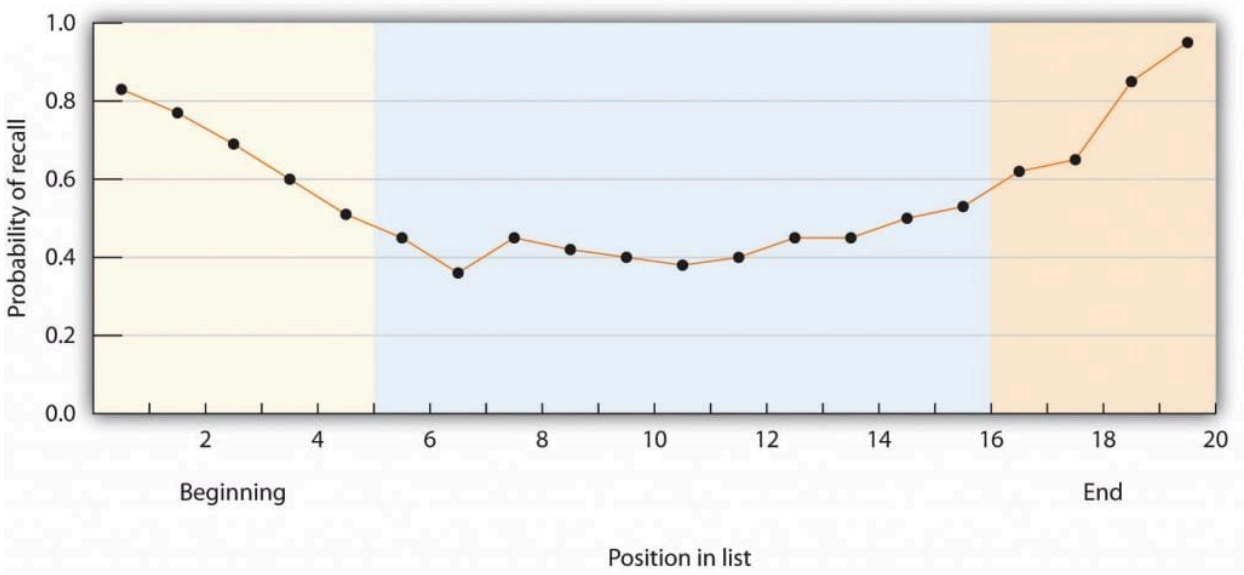


Figure 2.3.7: The Serial Position Curve. The serial position curve is the result of both primacy effects and recency effects.

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.

The Biology of Memory: Required brain structures

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 2.3.8). 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.

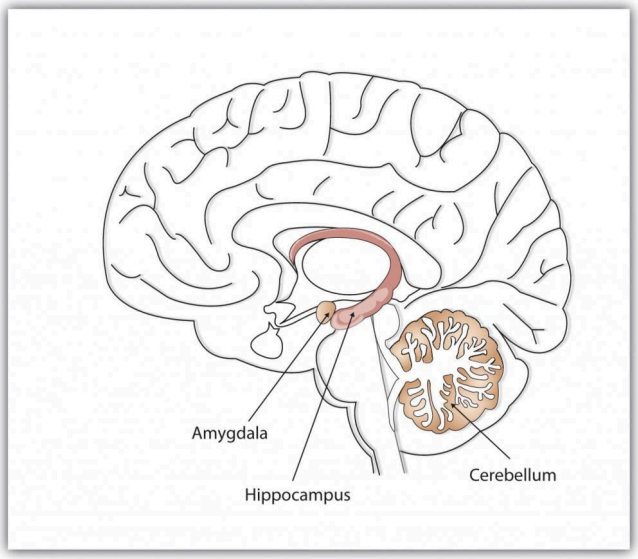


Figure 2.3.8 Schematic Image of Brain With Hippocampus, Amygdala, and Cerebellum Highlighted. Different brain structures help us remember different types of information. The hippocampus is particularly important in explicit memories, the cerebellum is particularly important in implicit memories, and 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).

Although some brain structures are particularly important in memory, this does not mean that all memories are stored in one place. The American 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.

Video instructions

How important is the hippocampus for memory? Which types of memories rely on a hippocampus?

Watch the full video below to learn about Henry Molaison and what happened to his memory when his hippocampus was removed.

YouTube Video

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Key Takeaways

- Information is better remembered when it is meaningfully elaborated.
- Hermann Ebbinghaus made important contributions to the study of learning, including modeling 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.

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.

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2.4: Biggest Myth in Education

Video Instructions

Have you ever heard of "learning styles"?

Watch the video below to learn more and pay attention to what research shows about learning styles.

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2.5: Memory Tips for Learning

Learning Objectives

- Recognize and apply memory-enhancing strategies
- Recognize and apply effective study techniques

Most of us suffer from memory failures of one kind or another, and most of us would like to improve our memories so that we don't forget where we put the car keys or, more importantly, the material we need to know for an exam. In this section, we'll look at some ways to help you remember better, and at some strategies for more effective studying.

Memory-Enhancing Strategies

What are some everyday ways we can improve our memory, including recall? To help make sure information goes from short-term memory to long-term memory, you can use **memory-enhancing strategies**. One strategy is rehearsal, or the conscious repetition of information to be remembered (Craik & Watkins, 1973). Think about how you learned your multiplication tables as a child. You may recall that 6 x 6 = 36, 6 x 7 = 42, and 6 x 8 = 48. Memorizing these facts is rehearsal.

Another strategy is **chunking**: you organize information into manageable bits or chunks (Bodie, Powers, & Fitch-Hauser, 2006). Chunking is useful when trying to remember information like dates and phone numbers. Instead of trying to remember 5205550467, you remember the number as 520-555-0467. So, if you met an interesting person at a party and you wanted to remember his phone number, you would naturally chunk it, and you could repeat the number over and over, which is the rehearsal strategy.

Optional: Link to Learning

Try this fun activity that employs a memory-enchancing strategy to learn more.

You could also enhance memory by using **elaborative rehearsal**: a technique in which you think about the meaning of new information and its relation to knowledge already stored in your memory (Tigner, 1999). Elaborative rehearsal involves both linking the information to knowledge already stored and repeating the information. For example, in this case, you could remember that 520 is an area code for Arizona and the person you met is from Arizona. This would help you better remember the 520 prefix. If the information is retained, it goes into long-term memory.

Mnemonic devices are memory aids that help us organize information for encoding (Figure 8.18). They are especially useful when we want to recall larger bits of information such as steps, stages, phases, and parts of a system (Bellezza, 1981). Brian needs to learn the order of the planets in the solar system, but he's having a hard time remembering the correct order. His friend Kelly suggests a mnemonic device that can help him remember. Kelly tells Brian to simply remember the name Mr. VEM J. SUN, and he can easily recall the correct order of the planets: **M**ercury, **V**enus, **E**arth, **M**ars, **J**upiter, **S**aturn, **U**ranus, and **N**eptune. You might use a mnemonic device to help you remember someone's name, a mathematical formula, or the order of mathematical operations.

A photograph shows a person's two hands clenched into fists so the knuckles show. The knuckles are labeled with the months and the number of days in each month, with the knuckle protrusions corresponding to the months with 31 days, and the indentations between knuckles corresponding to February and the months with 30 days.

Figure 8.18 This is a knuckle mnemonic to help you remember the number of days in each month. Months with 31 days are represented by the protruding knuckles and shorter months fall in the spots between knuckles. (credit: modification of work by Cory Zanker)

If you have ever watched the television show *Modern Family*, you might have seen Phil Dunphy explain how he remembers names:

> The other day I met this guy named Carl. Now, I might forget that name, but he was wearing a Grateful Dead t-shirt. What's a band like the Grateful Dead? Phish. Where do fish live? The ocean. What else lives in the ocean? Coral. Hello, Co-arl. (Wrubel & Spiller, 2010)

It seems the more vivid or unusual the mnemonic, the easier it is to remember. The key to using any mnemonic successfully is to find a strategy that works for you.

Optional: Link to Learning

Joshua Foer is a science writer who "accidentally" won the U.S. Memory Championships. Watch his TEDTalk, titled "Feats of Memory Anyone Can Do," in which he explains a mnemonic device called the memory palace to learn more.

Some other strategies that are used to improve memory include expressive writing and saying words aloud. Expressive writing helps boost your short-term memory, particularly if you write about a traumatic experience in your life. Masao Yogo and Shuji Fujihara (2008) had participants write for 20-minute intervals several times per month. The participants were instructed to write about a traumatic experience, their best possible future selves, or a trivial topic. The researchers found that this simple writing task increased short-term memory capacity after five weeks, but only for the participants who wrote about traumatic experiences. Psychologists can't explain why this writing task works, but it does.

What if you want to remember items you need to pick up at the store? Simply say them out loud to yourself. A series of studies (MacLeod, Gopie, Hourihan, Neary, & Ozubko, 2010) found that saying a word out loud improves your memory for the word because it increases the word's distinctiveness. Feel silly, saying random grocery items aloud? This technique works equally well if you just mouth the words. Using these techniques increased participants' memory for the words by more than 10%. These techniques can also be used to help you study.

How to Study Effectively

Based on the information presented in this chapter, here are some strategies and suggestions to help you hone your study techniques (Figure 8.19). The key with any of these strategies is to figure out what works best for you.



Figure 8.19 Memory techniques can be useful when studying for class. (credit: Barry Pousman)

- **Use elaborative rehearsal**: In a famous article, Fergus Craik and Robert Lockhart (1972) discussed their belief that information we process more deeply goes into long-term memory. Their theory is called **levels of processing**. If we want to remember a piece of information, we should think about it more deeply and link it to other information and memories to make it more meaningful. For example, if we are trying to remember that the hippocampus is involved with memory processing, we might envision a hippopotamus with excellent memory and then we could better remember the hippocampus.
- **Apply the self-reference effect**: As you go through the process of elaborative rehearsal, it would be even more beneficial to make the material you are trying to memorize personally meaningful to you. In other words, make use of the self-reference effect. Write notes in your own words. Write definitions from the text, and then rewrite them in your own words. Relate the material to something you have already learned for another class, or think how you can apply the concepts to your own life.

When you do this, you are building a web of retrieval cues that will help you access the material when you want to remember it.

- **Use distributed practice**: Study across time in short durations rather than trying to cram it all in at once. Memory consolidation takes time, and studying across time allows time for memories to consolidate. In addition, cramming can cause the links between concepts to become so active that you get stuck in a link, and it prevents you from accessing the rest of the information that you learned.
- **Rehearse, rehearse, rehearse**: Review the material over time, in spaced and organized study sessions. Organize and study your notes, and take practice quizzes/exams. Link the new information to other information you already know well.
- **Study efficiently**: Students are great highlighters, but highlighting is not very efficient because students spend too much time studying the things they already learned. Instead of highlighting, use index cards. Write the question on one side and the answer on the other side. When you study, separate your cards into those you got right and those you got wrong. Study the ones you got wrong and keep sorting. Eventually, all your cards will be in the pile you answered correctly.
- **Be aware of interference**: To reduce the likelihood of interference, study during a quiet time without interruptions or distractions (like television or music).
- **Keep moving**: Of course you already know that exercise is good for your body, but did you also know it's also good for your mind? Research suggests that regular aerobic exercise (anything that gets your heart rate elevated) is beneficial for memory (van Praag, 2008). Aerobic exercise promotes neurogenesis: the growth of new brain cells in the hippocampus, an area of the brain known to play a role in memory and learning.
- **Get enough sleep**: While you are sleeping, your brain is still at work. During sleep the brain organizes and consolidates information to be stored in long-term memory (Abel & Bäuml, 2013).
- **Make use of mnemonic devices**: As you learned earlier in this chapter, mnemonic devices often help us to remember and recall information. There are different types of mnemonic devices, such as the acronym. An acronym is a word formed by the first letter of each of the words you want to remember. For example, even if you live near one, you might have difficulty recalling the names of all five Great Lakes. What if I told you to think of the word Homes? HOMES is an acronym that represents Huron, Ontario, Michigan, Erie, and Superior: the five Great Lakes. Another type of mnemonic device is an acrostic: you make a phrase of all the first letters of the words. For example, if you are taking a math test and you are having difficulty remembering *the order of operations*, recalling the following sentence will help you: "Please Excuse My Dear Aunt Sally," because the order of mathematical operations is Parentheses, Exponents, Multiplication, Division, Addition, Subtraction. There also are jingles, which are rhyming tunes that contain key words related to the concept, such as *i before e, except after c*.

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3.1: Forgetting

Learning Objectives

- Compare and contrast the two types of amnesia
- Discuss encoding failure
- Compare and contrast the two types of interference

You may pride yourself on your amazing ability to remember the birthdates and ages of all of your friends and family members, or you may be able recall vivid details of your 5th birthday party at Chuck E. Cheese's. However, all of us have at times felt frustrated, and even embarrassed, when our memories have failed us. There are several reasons why this happens.

Amnesia

Amnesia is the loss of long-term memory that occurs as the result of disease, physical trauma, or psychological trauma. Endel Tulving (2002) and his colleagues at the University of Toronto studied K. C. for years. K. C. suffered a traumatic head injury in a motorcycle accident and then had severe amnesia. Tulving writes,

> the outstanding fact about K.C.'s mental make-up is his utter inability to remember any events, circumstances, or situations from his own life. His episodic amnesia covers his whole life, from birth to the present. The only exception is the experiences that, at any time, he has had in the last minute or two. (Tulving, 2002, p. 14)

Anterograde Amnesia

There are two common types of amnesia: anterograde amnesia and retrograde amnesia. Anterograde amnesia is commonly caused by brain trauma, such as a blow to the head. With **anterograde amnesia**, you cannot create new memories o remember new information, although you can remember information and events that happened prior to your injury. The hippocampus is usually affected (McLeod, 2011). This suggests that damage to the brain has resulted in the inability to transfer information from short-term to long-term memory; that is, the inability to consolidate memories.

Many people with this form of amnesia are unable to form new episodic or semantic memories, but are still able to form new procedural memories (Bayley & Squire, 2002). This was true of H. M., which was discussed earlier. The brain damage caused by his surgery resulted in anterograde amnesia. H. M. would read the same magazine over and over, having no memory of ever reading it—it was always new to him. He also could not remember people he had met after his surgery. If you were introduced to H. M. and then you left the room for a few minutes, he would not know you upon your return and would introduce himself to you again. However, when presented the same puzzle several days in a row, although he did not remember having seen the puzzle before, his speed at solving it became faster each day (because of relearning) (Corkin, 1965, 1968).

Retrograde amnesia is loss of memory for events that occurred prior to the trauma. People with retrograde amnesia cannot remember some or even all of their past. They have difficulty remembering episodic memories. What if you woke up in the hospital one day and there were people surrounding your bed claiming to be your spouse, your children, and your parents? The trouble is you don't recognize any of them. You were in a car accident, suffered a head injury, and now have retrograde amnesia. You don't remember anything about your life prior to waking up in the hospital. This may sound like the stuff of Hollywood movies, and Hollywood has been fascinated with the amnesia plot for nearly a century, going all the way back to the film *Garden of Lies* from 1915 to more recent movies such as the Jason Bourne spy thrillers. However, for real-life sufferers of retrograde amnesia, like former NFL football player Scott Bolzan, the story is not a Hollywood movie. Bolzan fell, hit his head, and deleted 46 years of his life in an instant. He is now living with one of the most extreme cases of retrograde amnesia on record.

Optional: Link to Learning

View the video story about Scott Bolzan's amnesia and his attempts to get his life back to learn more.

Forgetting

"I've a grand memory for forgetting," quipped Robert Louis Stevenson. **Forgetting** refers to loss of information from long-term memory. We all forget things, like a loved one's birthday, someone's name, or where we put our car keys. As you've come to see, memory is fragile, and forgetting can be frustrating and even embarrassing. But why do we forget? To answer this question, we will look at several perspectives on forgetting.

Encoding Failure

Sometimes memory loss happens before the actual memory process begins, which is encoding failure. We can't remember something if we never stored it in our memory in the first place. This would be like trying to find a book on your e-reader that you never actually purchased and downloaded. Often, in order to remember something, we must pay attention to the details and actively work to process the information (effortful encoding). Lots of times we don't do this. For instance, think of how many times in your life you've seen a penny. Can you accurately recall what the front of a U.S. penny looks like? When researchers Raymond Nickerson and Marilyn Adams (1979) asked this question, they found that most Americans don't know which one it is. The reason is most likely encoding failure. Most of us never encode the details of the penny. We only encode enough information to be able to distinguish it from other coins. If we don't encode the information, then it's not in our long-term memory, so we will not be able to remember it.

Are you constantly losing your cell phone? Have you ever driven back home to make sure you turned off the stove? Have you ever walked into a room for something, but forgotten what it was? You probably answered yes to at least one, if not all, of these examples—but don't worry, you are not alone. We are all prone to committing the memory error known as **absentmindedness**, which describes lapses in memory caused by breaks in attention or our focus being somewhere else.

Cynthia, a psychologist, recalls a time when she recently committed the memory error of absentmindedness.

> When I was completing court-ordered psychological evaluations, each time I went to the court, I was issued a temporary identification card with a magnetic strip which would open otherwise locked doors. As you can imagine, in a courtroom, this identification is valuable and important and no one wanted it to be lost or be picked up by a criminal. At the end of the day, I would hand in my temporary identification. One day, when I was almost done with an evaluation, my daughter's day care called and said she was sick and needed to be picked up. It was flu season, I didn't know how sick she was, and I was concerned. I finished up the evaluation in the next ten minutes, packed up my briefcase, and rushed to drive to my daughter's day care. After I picked up my daughter, I could not remember if I had handed back my identification or if I had left it sitting out on a table. I immediately called the court to check. It turned out that I had handed back my identification. Why could I not remember that? (personal communication, September 5, 2013)

When have you experienced absentmindedness?

"I just streamed this movie called *Oblivion*, and it had that famous actor in it. Oh, what's his name? He's been in all of those movies, like *The Shawshank Redemption* and *The Dark Knight* trilogy. I think he's even won an Oscar. Oh gosh, I can picture his face in my mind, and hear his distinctive voice, but I just can't think of his name! This is going to bug me until I can remember it!" This particular error can be so frustrating because you have the information right on the tip of your tongue. Have you ever experienced this? If so, you've committed the error known as **blocking**: you can't access stored information (3.1.1



Figure 3.1.1 Blocking is also known as tip-of-the-tongue (TOT) phenomenon. The memory is right there, but you can't seem to recall it, just like not being able to remember the name of that very famous actor, Morgan Freeman. (credit: modification of work by D. Miller)

Decay

Psychologist Daniel Schacter (2001), a well-known memory researcher, offers seven ways our memories fail us. He calls them the seven sins of memory and categorizes them into three groups: forgetting, distortion, and intrusion.

In 1885, German psychologist Hermann Ebbinghaus analyzed the process of memorization. First, he memorized lists of nonsense syllables. Then he measured how much he learned (retained) when he attempted to relearn each list. He tested himself over different periods of time from 20 minutes later to 30 days later. The result is his famous forgetting curve. Due to storage decay, an average person will lose 50% of the memorized information after 20 minutes and 70% of the information after 24 hours (Ebbinghaus, 1885/1964). Your memory for new information decays quickly and then eventually levels out.

Memory Errors

Memories can also be affected by **bias**, which is the final distortion error. Schacter (2001) says that your feelings and view of the world can actually distort your memory of past events. There are several types of bias:

- Stereotypical bias involves racial and gender biases. For example, when Asian American and European American research participants were presented with a list of names, they more frequently incorrectly remembered typical African American names such as Jamal and Tyrone to be associated with the occupation basketball player, and they more frequently incorrectly remembered typical White names such as Greg and Howard to be associated with the occupation of politician (Payne, Jacoby, & Lambert, 2004).
- Egocentric bias involves enhancing our memories of the past (Payne et al., 2004). Did you really score the winning goal in that big soccer match, or did you just assist?
- Hindsight bias happens when we think an outcome was inevitable after the fact. This is the "I knew it all along" phenomenon. The reconstructive nature of memory contributes to hindsight bias (Carli, 1999). We remember untrue events that seem to confirm that we knew the outcome all along.

Have you ever had a song play over and over in your head? How about a memory of a traumatic event, something you really do not want to think about? When you keep remembering something, to the point where you can't "get it out of your head" and it interferes with your ability to concentrate on other things, it is called **persistence**. It's Schacter's seventh and last memory error. It's actually a failure of our memory system because we involuntarily recall unwanted memories, particularly unpleasant ones (Figurre 3.1.2). For instance, you witness a horrific car accident on the way to work one morning, and you can't concentrate on work because you keep remembering the scene.



Figure 3.1.2 Many veterans of military conflicts involuntarily recall unwanted, unpleasant memories. (credit: Department of Defense photo by U.S. Air Force Tech. Sgt. Michael R. Holzworth)

Interference

Sometimes information is stored in our memory, but for some reason it is inaccessible. This is known as interference, and there are two types: proactive interference and retroactive interference. Have you ever gotten a new phone number or moved to a new address, but right after you tell people the old (and wrong) phone number or address? When the new year starts, do you find you accidentally write the previous year? These are examples of **proactive interference**: when old information hinders the recall of newly learned information. **Retroactive interference** happens when information learned more recently hinders the recall of older information.

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CHAPTER 3: FORGETTING AND MISREMEMBERING

3.1: Forgetting
3.2: Misremembering

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3.2: Misremembering

Learning Objectives

- Discuss the unreliability of eyewitness testimony
- Discuss the various memory errors

Memory Construction and Reconstruction

The formulation of new memories is sometimes called **construction**, and the process of bringing up old memories is called **reconstruction**. Yet as we retrieve our memories, we also tend to alter and modify them. A memory pulled from long-term storage into short-term memory is flexible. New events can be added and we can change what we think we remember about past events, resulting in inaccuracies and distortions. People may not intend to distort facts, but it can happen in the process of retrieving old memories and combining them with new memories (Roediger & DeSoto, 2015).

Optional: Video

To hear about research on memory errors, you can watch this TED talk video below by memory expert, Dr. Elizabeth Loftus.

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Suggestibility

When someone witnesses a crime, that person's memory of the details of the crime is very important in catching the suspect. Because memory is so fragile, witnesses can be easily (and often accidentally) misled due to the problem of suggestibility. **Suggestibility** describes the effects of misinformation from external sources that leads to the creation of false memories. In the fall of 2002, a sniper in the DC area shot people at a gas station, leaving Home Depot, and walking down the street. These attacks went on in a variety of places for over three weeks and resulted in the deaths of ten people. During this time, as you can imagine, people were terrified to leave their homes, go shopping, or even walk through their neighborhoods. Police officers and the FBI worked frantically to solve the crimes, and a tip hotline was set up. Law enforcement received over 140,000 tips, which resulted in approximately 35,000 possible suspects (Newseum, n.d.).

Most of the tips were dead ends, until a white van was spotted at the site of one of the shootings. The police chief went on national television with a picture of the white van. After the news conference, several other eyewitnesses called to say that they too had seen a white van fleeing from the scene of the shooting. At the time, there were more than 70,000 white vans in the area. Police officers, as well as the general public, focused almost exclusively on white vans because they believed the eyewitnesses. Other tips were ignored. When the suspects were finally caught, they were driving a blue sedan.

As illustrated by this example, we are vulnerable to the power of suggestion, simply based on something we see on the news. Or we can claim to remember something that in fact is only a suggestion someone made. It is the suggestion that is the cause of the false memory.

Eyewitness Misidentification

Even though memory and the process of reconstruction can be fragile, police officers, prosecutors, and the courts often rely on

eyewitness identification and testimony in the prosecution of criminals. However, faulty eyewitness identification and testimony can lead to wrongful convictions.

How does this happen? In 1984, Jennifer Thompson, then a 22-year-old college student in North Carolina, was brutally raped at knifepoint. As she was being raped, she tried to memorize every detail of her rapist's face and physical characteristics, vowing that if she survived, she would help get him convicted. After the police were contacted, a composite sketch was made of the suspect, and Jennifer was shown six photos. She chose two, one of which was of Ronald Cotton. After looking at the photos for 4–5 minutes, she said, "Yeah. This is the one," and then she added, "I think this is the guy." When questioned about this by the detective who asked, "You're sure? Positive?" She said that it was him. Then she asked the detective if she did OK, and he reinforced her choice by telling her she did great. These kinds of unintended cues and suggestions by police officers can lead witnesses to identify the wrong suspect. The district attorney was concerned about her lack of certainty the first time, so she viewed a lineup of seven men. She said she was trying to decide between numbers 4 and 5, finally deciding that Cotton, number 5, "Looks most like him." He was 22 years old.

By the time the trial began, Jennifer Thompson had absolutely no doubt that she was raped by Ronald Cotton. She testified at the court hearing, and her testimony was compelling enough that it helped convict him. How did she go from, "I think it's the guy" and it "Looks most like him," to such certainty? Gary Wells and Deah Quinlivan (2009) assert it's suggestive police identification procedures, such as stacking lineups to make the defendant stand out, telling the witness which person to identify, and confirming witnesses choices by telling them "Good choice," or "You picked the guy."

After Cotton was convicted of the rape, he was sent to prison for life plus 50 years. After 4 years in prison, he was able to get a new trial. Jennifer Thompson once again testified against him. This time Ronald Cotton was given two life sentences. After serving 11 years in prison, DNA evidence finally demonstrated that Ronald Cotton did not commit the rape, was innocent, and had served over a decade in prison for a crime he did not commit.

Link to Learning

Watch this first video about Ronald Cotton who was falsely convicted and then watch this second video about the task of his accuser to learn more about the fallibility of memory.

Ronald Cotton's story, unfortunately, is not unique. There are also people who were convicted and placed on death row, who were later exonerated. The Innocence Project is a non-profit group that works to exonerate falsely convicted people, including those convicted by eyewitness testimony. To learn more, you can visit http://www.innocenceproject.org.

Dig Deeper

Preserving Eyewitness Memory: The Elizabeth Smart Case

Contrast the Cotton case with what happened in the Elizabeth Smart case. When Elizabeth was 14 years old and fast asleep in her bed at home, she was abducted at knifepoint. Her nine-year-old sister, Mary Katherine, was sleeping in the same bed and watched, terrified, as her beloved older sister was abducted. Mary Katherine was the sole eyewitness to this crime and was very fearful. In the coming weeks, the Salt Lake City police and the FBI proceeded with caution with Mary Katherine. They did not want to implant any false memories or mislead her in any way. They did not show her police line-ups or push her to do a composite sketch of the abductor. They knew if they corrupted her memory, Elizabeth might never be found. For several months, there was little or no progress on the case. Then, about 4 months after the kidnapping, Mary Katherine first recalled that she had heard the abductor's voice prior to that night (he had worked exactly one day as a handyman at the family's home) and then she was able to name the person whose voice it was. The family contacted the press and others recognized him—after a total of nine months, the suspect was caught and Elizabeth Smart was returned to her family.

The Misinformation Effect

Cognitive psychologist Elizabeth Loftus has conducted extensive research on memory. She has studied false memories as well as recovered memories of childhood sexual abuse. Loftus also developed the **misinformation effect paradigm**, which holds that after exposure to additional and possibly inaccurate information, a person may misremember the original event.

According to Loftus, an eyewitness's memory of an event is very flexible due to the misinformation effect. To test this theory,

Loftus and John Palmer (1974) asked 45 U.S. college students to estimate the speed of cars using different forms of questions. The participants were shown films of car accidents and were asked to play the role of the eyewitness and describe what happened. They were asked, "About how fast were the cars going when they (smashed, collided, bumped, hit, contacted) each other?" The participants estimated the speed of the cars based on the verb used.

Participants who heard the word "smashed" estimated that the cars were traveling at a much higher speed than participants who heard the word "contacted." The implied information about speed, based on the verb they heard, had an effect on the participants' memory of the accident. In a follow-up one week later, participants were asked if they saw any broken glass (none was shown in the accident pictures). Participants who had been in the "smashed" group were more than twice as likely to indicate that they did remember seeing glass. Loftus and Palmer demonstrated that a leading question encouraged them to not only remember the cars were going faster, but to also falsely remember that they saw broken glass.

Controversies over Repressed and Recovered Memories

Other researchers have described how whole events, not just words, can be falsely recalled, even when they did not happen. The idea that memories of traumatic events could be repressed has been a theme in the field of psychology, beginning with Sigmund Freud, and the controversy surrounding the idea continues today.

Recall of false autobiographical memories is called **false memory syndrome**. This syndrome has received a lot of publicity, particularly as it relates to memories of events that do not have independent witnesses—often the only witnesses to the abuse are the perpetrator and the victim (e.g., sexual abuse).

On one side of the debate are those who have recovered memories of childhood abuse years after it occurred. These researchers argue that some children's experiences have been so traumatizing and distressing that they must lock those memories away in order to lead some semblance of a normal life. They believe that repressed memories can be locked away for decades and later recalled intact through hypnosis and guided imagery techniques (Devilly, 2007).

Research suggests that having no memory of childhood sexual abuse is quite common in adults. For instance, one large-scale study conducted by John Briere and Jon Conte (1993) revealed that 59% of 450 men and women who were receiving treatment for sexual abuse that had occurred before age 18 had forgotten their experiences. Ross Cheit (2007) suggested that repressing these memories created psychological distress in adulthood. The Recovered Memory Project was created so that victims of childhood sexual abuse can recall these memories and allow the healing process to begin (Cheit, 2007; Devilly, 2007).

On the other side, Loftus has challenged the idea that individuals can repress memories of traumatic events from childhood, including sexual abuse, and then recover those memories years later through therapeutic techniques such as hypnosis, guided visualization, and age regression.

Loftus is not saying that childhood sexual abuse doesn't happen, but she does question whether or not those memories are accurate, and she is skeptical of the questioning process used to access these memories, given that even the slightest suggestion from the therapist can lead to misinformation effects. For example, researchers Stephen Ceci and Maggie Brucks (1993, 1995) asked three-year-old children to use an anatomically correct doll to show where their pediatricians had touched them during an exam. Fifty-five percent of the children pointed to the genital/anal area on the dolls, even when they had not received any form of genital exam.

Ever since Loftus published her first studies on the suggestibility of eyewitness testimony in the 1970s, social scientists, police officers, therapists, and legal practitioners have been aware of the flaws in interview practices. Consequently, steps have been taken to decrease suggestibility of witnesses. One way is to modify how witnesses are questioned. When interviewers use neutral and less leading language, children more accurately recall what happened and who was involved (Goodman, 2006; Pipe, 1996; Pipe, Lamb, Orbach, & Esplin, 2004). Another change is in how police lineups are conducted. It's recommended that a blind photo lineup be used. This way the person administering the lineup doesn't know which photo belongs to the suspect, minimizing the possibility of giving leading cues. Additionally, judges in some states now inform jurors about the possibility of misidentification. Judges can also suppress eyewitness testimony if they deem it unreliable.

Memories can also be affected by **bias**, which is the final distortion error. Schacter (2001) says that your feelings and view of the world can actually distort your memory of past events. There are several types of bias:

- Stereotypical bias involves racial and gender biases. For example, when Asian American and European American research participants were presented with a list of names, they more frequently incorrectly remembered typical African American names such as Jamal and Tyrone to be associated with the occupation basketball player, and they more frequently incorrectly

remembered typical White names such as Greg and Howard to be associated with the occupation of politician (Payne, Jacoby, & Lambert, 2004).
- Egocentric bias involves enhancing our memories of the past (Payne et al., 2004). Did you really score the winning goal in that big soccer match, or did you just assist?
- Hindsight bias happens when we think an outcome was inevitable after the fact. This is the "I knew it all along" phenomenon. The reconstructive nature of memory contributes to hindsight bias (Carli, 1999). We remember untrue events that seem to confirm that we knew the outcome all along.

Have you ever had a song play over and over in your head? How about a memory of a traumatic event, something you really do not want to think about? When you keep remembering something, to the point where you can't "get it out of your head" and it interferes with your ability to concentrate on other things, it is called **persistence**. It's Schacter's seventh and last memory error. It's actually a failure of our memory system because we involuntarily recall unwanted memories, particularly unpleasant ones. For instance, you witness a horrific car accident on the way to work one morning, and you can't concentrate on work because you keep remembering the scene.

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4.1: What does it mean to be intelligent?

Every year hundreds of grade school students converge on Washington, D.C., for the annual Scripps National Spelling Bee. The “bee” is an elite event in which children as young as 8 square off to spell words like “cymotrichous” and “appoggiatura.” Most people who watch the bee think of these kids as being “smart” and you likely agree with this description.



A participant in the Scripps National Spelling Bee. [Image: Scripps National Spelling Bee, https://goo.gl/94Hgbm, CC BY-NC 2.0, goo.gl/VnKlK8]

What makes a person intelligent? Is it heredity (two of the 2014 contestants in the bee have siblings who have previously won)(National Spelling Bee, 2014a)? Is it interest (the most frequently listed favorite subject among spelling bee competitors is math)(NSB, 2014b)? In this module we will cover these and other fascinating aspects of intelligence. By the end of the module you should be able to define intelligence and discuss some common strategies for measuring intelligence. In addition, we will examine how your *beliefs* about intelligence and your motivation can matter more for success than your IQ score.

Original author: Robert Biswas-Diener, Portland State University

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4.2: Defining intelligence and creativity

Learning Objectives

- Define intelligence
- Explain the triarchic theory of intelligence
- Identify the difference between intelligence theories
- Explain emotional intelligence
- Define creativity

What exactly is intelligence? The way that researchers have defined the concept of intelligence has been modified many times since the birth of psychology. British psychologist Charles Spearman believed intelligence consisted of one general factor, called *g*, which could be measured and compared among individuals. Spearman focused on the commonalities among various intellectual abilities and de-emphasized what made each unique. Long before modern psychology developed, however, ancient philosophers, such as Aristotle, held a similar view (Cianciolo & Sternberg, 2004).

Others psychologists believe that instead of a single factor, intelligence is a collection of distinct abilities. In the 1940s, Raymond Cattell proposed a theory of intelligence that divided general intelligence into two components: crystallized intelligence and fluid intelligence (Cattell, 1963). **Crystallized intelligence** is characterized as acquired knowledge and the ability to retrieve it. When you learn, remember, and recall information, you are using crystallized intelligence. You use crystallized intelligence all the time in your coursework by demonstrating that you have mastered the information covered in the course. **Fluid intelligence** encompasses the ability to see complex relationships and solve problems. Navigating your way home after being detoured onto an unfamiliar route because of road construction would draw upon your fluid intelligence. Fluid intelligence helps you tackle complex, abstract challenges in your daily life, whereas crystallized intelligence helps you overcome concrete, straightforward problems (Cattell, 1963).

Other theorists and psychologists believe that intelligence should be defined in more practical terms. For example, what types of behaviors help you get ahead in life? Which skills promote success? Think about this for a moment. Being able to recite all 45 presidents of the United States in order is an excellent party trick, but will knowing this make you a better person?

Robert Sternberg developed another theory of intelligence, which he titled the **triarchic theory of intelligence** because it sees intelligence as comprised of three parts (Sternberg, 1988): practical, creative, and analytical intelligence.

Practical intelligence, as proposed by Sternberg, is sometimes compared to "street smarts." Being practical means you find solutions that work in your everyday life by applying knowledge based on your experiences. This type of intelligence appears to be separate from traditional understanding of IQ; individuals who score high in practical intelligence may or may not have comparable scores in creative and analytical intelligence (Sternberg, 1988).

This story about the 2007 Virginia Tech shootings illustrates both high and low practical intelligences. During the incident, one student left her class to go get a soda in an adjacent building. She planned to return to class, but when she returned to her building after getting her soda, she saw that the door she used to leave was now chained shut from the inside. Instead of thinking about why there was a chain around the door handles, she went to her class's window and crawled back into the room. She thus potentially exposed herself to the gunman. Thankfully, she was not shot. On the other hand, a pair of students was walking on campus when they heard gunshots nearby. One friend said, "Let's go check it out and see what is going on." The other student said, "No way, we need to run away from the gunshots." They did just that. As a result, both avoided harm. The student who crawled through the window demonstrated some creative intelligence but did not use common sense. She would have low practical intelligence. The student who encouraged his friend to run away from the sound of gunshots would have much higher practical intelligence.

Analytical intelligence is closely aligned with academic problem solving and computations. Sternberg says that analytical intelligence is demonstrated by an ability to analyze, evaluate, judge, compare, and contrast. When reading a classic novel for literature class, for example, it is usually necessary to compare the motives of the main characters of the book or analyze the historical context of the story. In a science course such as anatomy, you must study the processes by which the body uses various minerals in different human systems. In developing an understanding of this topic, you are using analytical intelligence. When solving a challenging math problem, you would apply analytical intelligence to analyze different aspects of the problem and then

solve it section by section.

Creative intelligence is marked by inventing or imagining a solution to a problem or situation. Creativity in this realm can include finding a novel solution to an unexpected problem or producing a beautiful work of art or a well-developed short story. Imagine for a moment that you are camping in the woods with some friends and realize that you've forgotten your camp coffee pot. The person in your group who figures out a way to successfully brew coffee for everyone would be credited as having higher creative intelligence.

Multiple Intelligences Theory was developed by Howard Gardner, a Harvard psychologist and former student of Erik Erikson. Gardner's theory, which has been refined for more than 30 years, is a more recent development among theories of intelligence. In Gardner's theory, each person possesses at least eight intelligences. Among these eight intelligences, a person typically excels in some and falters in others (Gardner, 1983). The Table below describes each type of intelligence.

Multiple Intelligences		
Intelligence Type	**Characteristics**	**Representative Career**
Linguistic intelligence	Perceives different functions of language, different sounds and meanings of words, may easily learn multiple languages	Journalist, novelist, poet, teacher
Logical-mathematical intelligence	Capable of seeing numerical patterns, strong ability to use reason and logic	Scientist, mathematician
Musical intelligence	Understands and appreciates rhythm, pitch, and tone; may play multiple instruments or perform as a vocalist	Composer, performer
Bodily kinesthetic intelligence	High ability to control the movements of the body and use the body to perform various physical tasks	Dancer, athlete, athletic coach, yoga instructor
Spatial intelligence	Ability to perceive the relationship between objects and how they move in space	Choreographer, sculptor, architect, aviator, sailor
Interpersonal intelligence	Ability to understand and be sensitive to the various emotional states of others	Counselor, social worker, salesperson
Intrapersonal intelligence	Ability to access personal feelings and motivations, and use them to direct behavior and reach personal goals	Key component of personal success over time
Naturalist intelligence	High capacity to appreciate the natural world and interact with the species within it	Biologist, ecologist, environmentalist

Gardner's theory is relatively new and needs additional research to better establish empirical support. At the same time, his ideas challenge the traditional idea of intelligence to include a wider variety of abilities, although it has been suggested that Gardner simply relabeled what other theorists called "cognitive styles" as "intelligences" (Morgan, 1996). Furthermore, developing traditional measures of Gardner's intelligences is extremely difficult (Furnham, 2009; Gardner & Moran, 2006; Klein, 1997).

Gardner's inter- and intrapersonal intelligences are often combined into a single type: emotional intelligence. **Emotional intelligence** encompasses the ability to understand the emotions of yourself and others, show empathy, understand social relationships and cues, and regulate your own emotions and respond in culturally appropriate ways (Parker, Saklofske, & Stough, 2009). People with high emotional intelligence typically have well-developed social skills. Some researchers, including Daniel Goleman, the author of *Emotional Intelligence: Why It Can Matter More than IQ*, argue that emotional intelligence is a better predictor of success than traditional intelligence (Goleman, 1995). However, emotional intelligence has been widely debated, with researchers pointing out inconsistencies in how it is defined and described, as well as questioning results of studies on a subject that is difficulty to measure and study emperically (Locke, 2005; Mayer, Salovey, & Caruso, 2004)

The most comprehensive theory of intelligence to date is the Cattell-Horn-Carroll (CHC) theory of cognitive abilities (Schneider & McGrew, 2018). In this theory, abilities are related and arranged in a hierarchy with general abilities at the top, broad abilities in the middle, and narrow (specific) abilities at the bottom. The narrow abilities are the only ones that can be directly measured; however, they are integrated within the other abilities. At the general level is general intelligence. Next, the broad level consists of general abilities such as fluid reasoning, short-term memory, and processing speed. Finally, as the hierarchy continues, the narrow level includes specific forms of cognitive abilities. For example, short-term memory would further break down into memory span and working memory capacity.

Intelligence can also have different meanings and values in different cultures. If you live on a small island, where most people get their food by fishing from boats, it would be important to know how to fish and how to repair a boat. If you were an exceptional angler, your peers would probably consider you intelligent. If you were also skilled at repairing boats, your intelligence might be known across the whole island. Think about your own family's culture. What values are important for Latinx families? Italian families? In Irish families, hospitality and telling an entertaining story are marks of the culture. If you are a skilled storyteller, other members of Irish culture are likely to consider you intelligent.

Some cultures place a high value on working together as a collective. In these cultures, the importance of the group supersedes the importance of individual achievement. When you visit such a culture, how well you relate to the values of that culture exemplifies your **cultural intelligence**, sometimes referred to as cultural competence.

Optional: Link to Learning

Watch this video that compares different theories of intelligence to learn more.

Creativity

Creativity is the ability to generate, create, or discover new ideas, solutions, and possibilities. Very creative people often have intense knowledge about something, work on it for years, look at novel solutions, seek out the advice and help of other experts, and take risks. Although creativity is often associated with the arts, it is actually a vital form of intelligence that drives people in many disciplines to discover something new. Creativity can be found in every area of life, from the way you decorate your residence to a new way of understanding how a cell works.

Creativity is often assessed as a function of one's ability to engage in **divergent thinking**. Divergent thinking can be described as thinking "outside the box;" it allows an individual to arrive at unique, multiple solutions to a given problem. In contrast, **convergent thinking** describes the ability to provide a correct or well-established answer or solution to a problem (Cropley, 2006; Gilford, 1967)

EVERYDAY CONNECTION: Creativity

Dr. Tom Steitz, former Sterling Professor of Biochemistry and Biophysics at Yale University, spent his career looking at the structure and specific aspects of RNA molecules and how their interactions could help produce antibiotics and ward off diseases. As a result of his lifetime of work, he won the Nobel Prize in Chemistry in 2009. He wrote, "Looking back over the development and progress of my career in science, I am reminded how vitally important good mentorship is in the early stages of one's career development and constant face-to-face conversations, debate and discussions with colleagues at all stages of research. Outstanding discoveries, insights and developments do not happen in a vacuum" (Steitz, 2010, para. 39). Based on Steitz's comment, it becomes clear that someone's creativity, although an individual strength, benefits from interactions with others. Think of a time when your creativity was sparked by a conversation with a friend or classmate. How did that person influence you and what problem did you solve using creativity?

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4.3: Measuring intelligence

learning objectives

- List at least two common strategies for measuring intelligence.
- Define intelligence in simple terms.

Defining and Measuring Intelligence

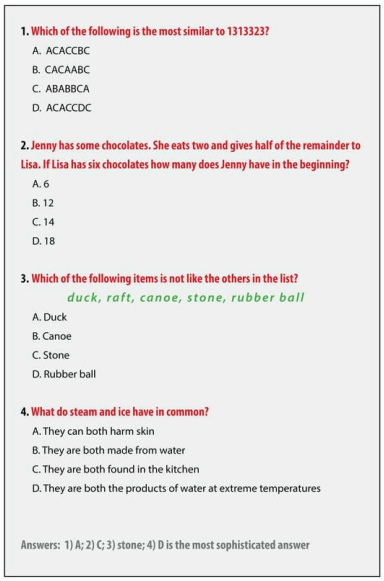
When you think of "smart people" you likely have an intuitive sense of the qualities that make them intelligent. Maybe you think they have a good memory, or that they can think quickly, or that they simply know a whole lot of information. Indeed, people who exhibit such qualities appear very intelligent. That said, it seems that intelligence must be more than simply knowing facts and being able to remember them. When we talk about intelligence we typically mean intellectual ability. This broadly encompasses the **ability to learn, remember and use new information, to solve problems and to adapt to novel situations.** An early scholar of intelligence, Charles Spearman, proposed the idea that intelligence was one thing, a "general factor" sometimes known as simply "**g**." He based this conclusion on the observation that people who perform well in one intellectual area such as verbal ability also tend to perform well in other areas such as logic and reasoning (Spearman, 1904).

A contemporary of Spearman's named Francis Galton—himself a cousin of Charles Darwin-- was among those who pioneered psychological measurement (Hunt, 2009). However, the person best known for formally pioneering the measurement of intellectual ability is Alfred Binet. Like Galton, Binet was fascinated by individual differences in intelligence. For instance, he blindfolded chess players and saw that some of them had the ability to continue playing using only their memory to keep the many positions of the pieces in mind (Binet, 1894). Binet was particularly interested in the development of intelligence, a fascination that led him to observe children carefully in the classroom setting.



Intelligence research pioneer Alfred Binet

Along with his colleague Theodore Simon, Binet created a test of children's intellectual capacity. They created individual test items that should be answerable by children of given ages. For instance, a child who is three should be able to point to her mouth and eyes, a child who is nine should be able to name the months of the year in order, and a twelve year old ought to be able to name sixty words in three minutes. Their assessment became the first "IQ test."



1. Which of the following is the most similar to 1313323?
   A. ACACCBC
   B. CACAABC
   C. ABABBCA
   D. ACACCDC

2. Jenny has some chocolates. She eats two and gives half of the remainder to Lisa. If Lisa has six chocolates how many does Jenny have in the beginning?
   A. 6
   B. 12
   C. 14
   D. 18

3. Which of the following items is not like the others in the list?
   duck, raft, canoe, stone, rubber ball
   A. Duck
   B. Canoe
   C. Stone
   D. Rubber ball

4. What do steam and ice have in common?
   A. They can both harm skin
   B. They are both made from water
   C. They are both found in the kitchen
   D. They are both the products of water at extreme temperatures

Answers: 1) A; 2) C; 3) stone; 4) D is the most sophisticated answer

Figure 4.3.1 : Examples of the types of items you might see on an intelligence test.

"IQ" or "intelligence quotient" is a name given to the score of the Binet-Simon test. The score is derived by dividing a child's mental age (the score from the test) by their chronological age to create an overall quotient. These days, the phrase "**IQ**" does not apply specifically to the Binet-Simon test and is used to generally denote intelligence or a score on any intelligence test. In the early 1900s the Binet-Simon test was adapted by a Stanford professor named Lewis Terman to create what is, perhaps, the most famous intelligence test in the world, the Stanford-Binet (Terman, 1916). The major advantage of this new test was that it was **standardized**. Based on a large sample of children Terman was able to plot the scores in a normal distribution, shaped like a "bell curve" (see Figure 4.3.2. To understand a normal distribution think about the height of people. Most people are average in height with relatively fewer being tall or short, and fewer still being extremely tall or extremely short. Terman (1916) laid out intelligence scores in exactly the same way, allowing for easy and reliable categorizations and comparisons between individuals.

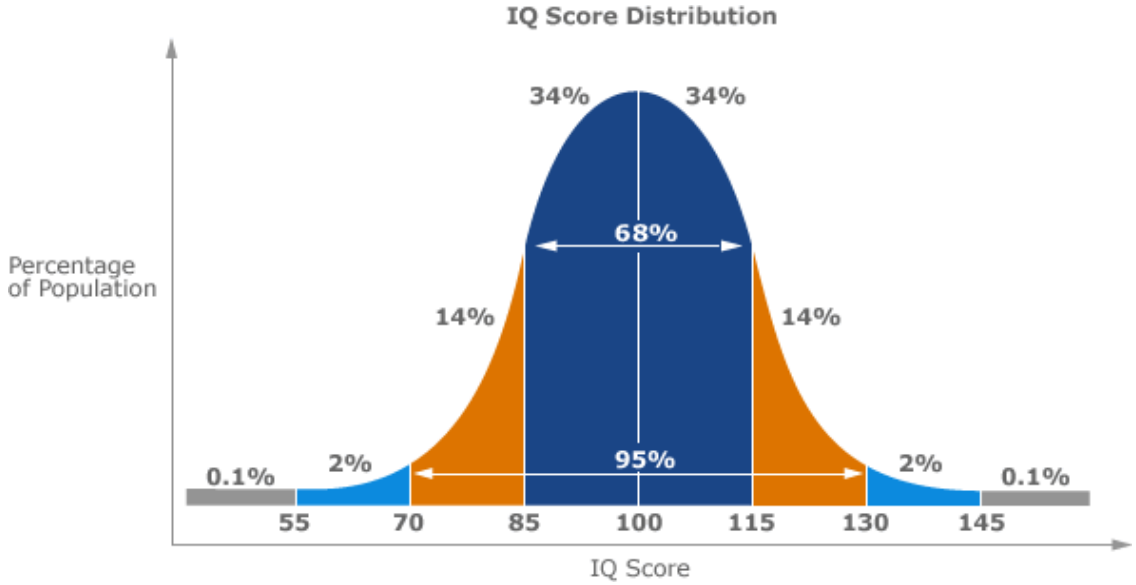


Figure 4.3.2: Bell Curve - Normal Distribution IQ

Looking at another modern intelligence test—the Wechsler Adult Intelligence Scale (WAIS)—can provide clues to a definition of intelligence itself. Motivated by several criticisms of the Stanford-Binet test, psychologist David Wechsler sought to create a superior measure of intelligence. He was critical of the way that the Stanford-Binet relied so heavily on verbal ability and was also suspicious of using a single score to capture all of intelligence. To address these issues Wechsler created a test that tapped a wide range of intellectual abilities. This understanding of intelligence—that it is made up of a pool of specific abilities—is a notable departure from Spearman's concept of general intelligence. The WAIS assesses people's ability to remember, compute, understand language, reason well, and process information quickly (Wechsler, 1955).

One interesting by-product of measuring intelligence for so many years is that we can chart changes over time. It might seem strange to you that intelligence can change over the decades but that appears to have happened over the last 80 years we have been measuring this topic. Here's how we know: IQ tests have an average score of 100. When new waves of people are asked to take older tests they tend to outperform the original sample from years ago on which the test was normed. This gain is known as the **"Flynn Effect,"** named after James Flynn, the researcher who first identified it (Flynn, 1987). Several hypotheses have been put forth to explain the Flynn Effect including better nutrition (healthier brains!), greater familiarity with testing in general, and more exposure to visual stimuli. Today, there is no perfect agreement among psychological researchers with regards to the causes of increases in average scores on intelligence tests.

Horrific misuse of IQ scores

Video Instructions

Intelligence measures have a dark history of being manipulated and used for malicious intent. Watch the full video below to build your awareness of the misuse of IQ tests.

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

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Beliefs about intelligence

It turns out that the way an individual thinks about his or her own intelligence is also important because it predicts performance. Researcher Carol Dweck has made a career out of looking at the differences between high IQ children who perform well and those who do not, so-called "under achievers." Among her most interesting findings is that it is not gender or social class that sets apart the high and low performers. Instead, it is their mindset. The children who believe that their abilities in general—and their intelligence specifically—is a fixed trait tend to underperform. By contrast, kids who believe that intelligence is changeable and evolving tend to handle failure better and perform better (Dweck, 1986). Dweck refers to this as a person's "mindset" and having a growth mindset appears to be healthier.

Group Differences in Intelligence

The research on mindset is interesting but there can also be a temptation to interpret it as suggesting that every human has an unlimited potential for intelligence and that becoming smarter is only a matter of positive thinking. There is some evidence that genetics is an important factor in the intelligence equation. For instance, a number of studies on genetics in adults have yielded the result that intelligence is largely, but not totally, inherited (Bouchard,2004). Having a healthy attitude about the nature of smarts and working hard can both definitely help intellectual performance but it also helps to have the genetic leaning toward intelligence.

Carol Dweck's research on the mindset of children also brings one of the most interesting and controversial issues surrounding intelligence research to the fore: group differences. From the very beginning of the study of intelligence researchers have wondered about differences between groups of people such as men and women. With regards to potential differences between the sexes some people have noticed that women are under-represented in certain fields. In 1976, for example, women comprised just 1% of all faculty members in engineering (Ceci, Williams & Barnett, 2009).



Women account for a disproportionately small percentage of those employed in math-intensive career fields such as engineering. [Photo: Argonne National Laboratory, https://goo.gl/ix96YP, CC BY-NC-SA 2.0, goo.gl/Toc0ZF]

Even today women make up between 3% and 15% of all faculty in math-intensive fields at the 50 top universities. This phenomenon could be explained in many ways: it might be the result of inequalities in the educational system, it might be due to differences in socialization wherein young girls are encouraged to develop other interests, it might be the result of that women are—on average—responsible for a larger portion of childcare obligations and therefore make different types of professional decisions, or it might be due to innate differences between these groups, to name just a few possibilities. The possibility of innate differences is the most controversial because many people see it as either the product of or the foundation for sexism. In today's political landscape it is easy to see that asking certain questions such as "are men smarter than women?" would be inflammatory. In a comprehensive review of research on intellectual abilities and sex Ceci and colleagues (2009) argue against the hypothesis that biological and genetic differences account for much of the sex differences in intellectual ability. Instead, they believe that a complex web of influences ranging from societal expectations to test taking strategies to individual interests account for many of the sex differences found in math and similar intellectual abilities.

A more interesting question, and perhaps a more sensitive one, might be to inquire in which ways men and women might differ in intellectual ability, if at all. That is, researchers should not seek to prove that one group or another is better but might examine the ways that they might differ and offer explanations for any differences that are found. Researchers have investigated sex differences in intellectual ability. In a review of the research literature Halpern (1997) found that women appear, on average, superior to men on measures of fine motor skill, acquired knowledge, reading comprehension, decoding non-verbal expression, and generally have higher grades in school. Men, by contrast, appear, on average, superior to women on measures of fluid reasoning related to math and science, perceptual tasks that involve moving objects, and tasks that require transformations in working memory such as mental rotations of physical spaces. Halpern also notes that men are disproportionately represented on the low end of cognitive functioning including in mental retardation, dyslexia, and attention deficit disorders (Halpern, 1997).

Other researchers have examined various explanatory hypotheses for why sex differences in intellectual ability occur. Some studies have provided mixed evidence for genetic factors while others point to evidence for social factors (Neisser, et al, 1996; Nisbett, et al., 2012). One interesting phenomenon that has received research scrutiny is the idea of **stereotype threat**. Stereotype threat is the idea that mental access to a particular stereotype can have real-world impact on a member of the stereotyped group. In one study (Spencer, Steele, & Quinn, 1999), for example, women who were informed that women tend to fare poorly on math exams just before taking a math test actually performed worse relative to a control group who did not hear the stereotype. One possible antidote to stereotype threat, at least in the case of women, is to make a self-affirmation (such as listing positive personal qualities) before the threat occurs. In one study, for instance, Martens and her colleagues (2006) had women write about personal qualities that they valued before taking a math test. The affirmation largely erased the effect of stereotype by improving math scores for women relative to a control group but similar affirmations had little effect for men (Martens, Johns, Greenberg, & Schimel, 2006).

These types of controversies compel many lay people to wonder if there might be a problem with intelligence measures. It is natural to wonder if they are somehow biased against certain groups. Psychologists typically answer such questions by pointing out that bias in the testing sense of the word is different than how people use the word in everyday speech. Common use of bias

denotes a prejudice based on group membership. Scientific bias, on the other hand, is related to the psychometric properties of the test such as validity and reliability. Validity is the idea that an assessment measures what it claims to measure and that it can predict future behaviors or performance. To this end, intelligence tests are not biased because they are fairly accurate measures and predictors. There are, however, real biases, prejudices, and inequalities in the social world that might benefit some advantaged group while hindering some disadvantaged others.

Original author: Robert Biswas-Diener, Portland State University

Vocabulary

G

Short for “general factor” and is often used to be synonymous with intelligence itself.

Intelligence

An individual’s cognitive capability. This includes the ability to acquire, process, recall and apply information.

IQ

Short for “intelligence quotient.” This is a score, typically obtained from a widely used measure of intelligence that is meant to rank a person’s intellectual ability against that of others.

Norm

Assessments are given to a representative sample of a population to determine the range of scores for that population. These “norms” are then used to place an individual who takes that assessment on a range of scores in which he or she is compared to the population at large.

Standardize

Assessments that are given in the exact same manner to all people . With regards to intelligence tests standardized scores are individual scores that are computed to be referenced against normative scores for a population (see “norm”).

Stereotype threat

The phenomenon in which people are concerned that they will conform to a stereotype or that their performance does conform to that stereotype, especially in instances in which the stereotype is brought to their conscious awareness.

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4.4: Motivation

Learning Objectives

- Define grit and its relation to performance
- Define intrinsic motivation and the 4 types of extrinsic motivation
- Explain how needs relate to motivation in Drive Theory versus Self-Determination Theory
- Understand self-efficacy and social motives

You might think that intelligence matters the most for predicting your grades in school--however, research points to other factors as mattering more. Such as your mindset, grit, and motivation.

Video Instructions

Dr. Angela Duckworth is well-known for her research on grit. Watch the short (6 minute) video below to learn about grit from her--what it is and why it matters.

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Motivation

Why do we do the things we do? What motivations underlie our behaviors? Motivation describes the energy, usually driven by wants or needs, that direct behavior toward a goal.

Drive Theory of Motivation

An early theory of motivation proposed that biological needs motivate behavior. In particular, the maintenance of homeostasis (balance, or optimal level, within a biological system) is particularly important in directing behavior. According to the **drive theory** of motivation, deviations from homeostasis create physiological needs. These needs result in psychological drive states that direct behavior to meet the need and, ultimately, bring the system back to homeostasis. In other words, drive states motivate you to engage in behavior when your physiological needs are *not* met, in order to addrress those unmet needs and return to homeostasis.

For example, if it's been a while since you ate, your blood sugar levels will drop below normal. This low blood sugar will induce a physiological need for food and a corresponding drive state (i.e., hunger) that will direct you to eat (See Figure $4.4.1$. Eating will eliminate the hunger, and, ultimately, your blood sugar levels will return to normal. Interestingly, drive theory also emphasizes the role that habits play in the type of behavioral response in which we engage. A **habit** is a pattern of behavior in which we regularly engage. Once we have engaged in a behavior that successfully reduces a drive, we are more likely to engage in that behavior whenever faced with that drive in the future (Graham & Weiner, 1996).



Figure 4.4.1. Hunger and subsequent eating are the result of complex physiological processes that maintain homeostasis. (credit "left": modification of work by "Gracie and Viv"/Flickr; credit "center": modification of work by Steven Depolo; credit "right": modification of work by Monica Renata)

Self-determination theory: Intrinsic to Extrinsic Motivation

Self-determination theory is robust theory of motivation that focuses on our psychological needs. According to this theory, we all share 3 psychological needs: autonomy, competence, and relatedness. **Autonomy** is the need to feel a sense of ownership of one's actions, to act on one's own free will (not coerced or manipulated). **Competence** is the need to feel a sense of mastery, a sense that one can grow and develop new skills. **Relatedness** is the need to feel a sense of belonging and connection.

When these 3 needs are supported, a person's well-being and intrinsic motivation flourishes. **Intrinsic motivation** is doing a task for pure enjoyment. A person who is intrinsically motivated will engage in behavior, not for some goal or reward at the end, but because the task itself is the reward. Think about your hobbies or what you might choose to do on a vacation or when you have spare time. You are likely intrinsically motivated to engage in those tasks.

All other motivation is considered extrinsic motivation. There are 4 types of extrinsic motivation, which vary in degrees of how internalized, or autonomous, that motivation is. On the far opposite end of intrinsic motivation (the motivation without personal autonomy) is **external regulation.** A person who is externally regulated is driven by outside rewards or punishments. Imagine a person getting mugged at knife point. They would likely be motivated to give their attacker their money to avoid getting harmed. This is an example of external regulation. Or imagine a person who works hard because they want to earn a large end-of-year bonus. This is also an example of being externally regulated. Next is **introjected regulation**, when a person is driven by internalizing pressures from other people and works to avoid feeling guilty and anxious. Imagine a person tidying their house because they feel like they should, or ought to, keep their house clean. Or a student who feels guilty about not studying over the weekend. These are example of experiencing introjected regulation.

As extrinsic motivation becomes more autonomous, we get **identified regulation**, being driven by personally-valued goals. A person might not enjoy doing a task (i.e., they are not intrinsically motivated), but they do a task because it aligns with a goal that they personally hold. For example, a person might exercise daily not because they enjoy exercising, but because they have a goal to improve their health. Lastly, the most internalized and autonomous form of extrinsic motivation, and the closest to intrinsic motivation, is **integrated regulation.** When a person who is integrated regulated, they engage in tasks because those tasks align with their identity and core values. A person might volunteer at a dog shelter because they deeply care about animals and want to help. They might not do the work because the work itself is fun, nor because it is meeting some goal they have, but they do the work because it matters to them personally.

Think about why you are currently in college. Are you here because you enjoy learning (intrinsic motivation), you care about being an well-rounded and education individual (integrated regulation), or because you are pursuing a degree for your own reasons (identified regulation)? If so, then you are more autonomously motivated. However, if you are here because you want to get a college degree because you feel like you should, you feel pressure from your parents to do so, or because you want to get a degree to make yourself more marketable for a high-paying career, then your motivation is more extrinsic in nature.

When intrinsic motivation diminishes

In reality, our motivations are often a mix of both intrinsic and extrinsic factors, but the nature of the mix of these factors might change over time (often in ways that seem counter-intuitive). There is an old adage: “Choose a job that you love, and you will never

have to work a day in your life," meaning that if you enjoy your occupation, work doesn't seem like . . . well, work. Some research suggests that this isn't necessarily the case (Daniel & Esser, 1980; Deci, 1972; Deci, Koestner, & Ryan, 1999). According to this research, receiving some sort of extrinsic reinforcement (i.e., getting paid) for engaging in behaviors that we enjoy leads to those behaviors being thought of as work no longer providing that same enjoyment. As a result, we might spend less time engaging in these reclassified behaviors in the absence of any extrinsic reinforcement. For example, Odessa loves baking, so in her free time, she bakes for fun. Oftentimes, after stocking shelves at her grocery store job, she often whips up pastries in the evenings because she enjoys baking. When a coworker in the store's bakery department leaves his job, Odessa applies for his position and gets transferred to the bakery department. Although she enjoys what she does in her new job, after a few months, she no longer has much desire to concoct tasty treats in her free time. Baking has become work in a way that changes her motivation to do it (See figure 10.3). What Odessa has experienced is called the **overjustification effect**—intrinsic motivation is diminished when extrinsic motivation is given. This can lead to extinguishing the intrinsic motivation and creating a dependence on extrinsic rewards for continued performance (Deci et al., 1999).

Other studies suggest that intrinsic motivation may not be so vulnerable to the effects of extrinsic reinforcements, and in fact, reinforcements such as verbal praise might actually increase intrinsic motivation (Arnold, 1976; Cameron & Pierce, 1994). In that case, Odessa's motivation to bake in her free time might remain high if, for example, customers regularly compliment her baking or cake decorating skills.

These apparent discrepancies in the researchers' findings may be understood by considering several factors. For one, physical reinforcement (such as money) and verbal reinforcement (such as praise) may affect an individual in very different ways. In fact, tangible rewards (i.e., money) tend to have more negative effects on intrinsic motivation than do intangible rewards (i.e., praise). Furthermore, the expectation of the extrinsic motivator by an individual is crucial: If the person expects to receive an extrinsic reward, then intrinsic motivation for the task tends to be reduced. If, however, there is no such expectation, and the extrinsic motivation is presented as a surprise, then intrinsic motivation for the task tends to persist (Deci et al., 1999).

Facilitating the conditions for Intrinsic Motivation

In educational settings, students are more likely to experience intrinsic motivation to learn when they feel a sense of belonging and respect in the classroom. This internalization can be enhanced if the evaluative aspects of the classroom are de-emphasized and if students feel that they exercise some control over the learning environment. Furthermore, providing students with activities that are challenging, yet doable, along with a rationale for engaging in various learning activities can enhance intrinsic motivation for those tasks (Niemiec & Ryan, 2009). Consider Hakim, a first-year law student with two courses this semester: Family Law and Criminal Law. The Family Law professor has a rather intimidating classroom: He likes to put students on the spot with tough questions, which often leaves students feeling belittled or embarrassed. Grades are based exclusively on quizzes and exams, and the instructor posts results of each test on the classroom door. In contrast, the Criminal Law professor facilitates classroom discussions and respectful debates in small groups. The majority of the course grade is not exam-based, but centers on a student-designed research project on a crime issue of the student's choice. Research suggests that Hakim will be less intrinsically motivated in his Family Law course, where students are intimidated in the classroom setting, and there is an emphasis on teacher-driven evaluations. Hakim is likely to experience a higher level of intrinsic motivation in his Criminal Law course, where the class setting encourages inclusive collaboration and a respect for ideas, and where students have more influence over their learning activities.

Self-efficacy: Believing in Yourself

Self-efficacy is an individual's belief in her own capability to complete a task, which may include a previous successful completion of the exact task or a similar task. Albert Bandura (1994) theorized that an individual's sense of self-efficacy plays a pivotal role in motivating behavior. Bandura argues that motivation derives from expectations that we have about the consequences of our behaviors, and ultimately, it is the appreciation of our capacity to engage in a given behavior that will determine what we do and the future goals that we set for ourselves. For example, if you have a sincere belief in your ability to achieve at the highest level, you are more likely to take on challenging tasks and to not let setbacks dissuade you from seeing the task through to the end.

Social Motives

A number of theorists have focused their research on understanding social motives (McAdams & Constantian, 1983; McClelland & Liberman, 1949; Murray et al., 1938). Among the motives they describe are needs for achievement, affiliation, and intimacy. It is the need for achievement that drives accomplishment and performance. The need for affiliation encourages positive interactions

with others, and the need for intimacy causes us to seek deep, meaningful relationships. Henry Murray et al. (1938) categorized these needs into domains. For example, the need for achievement and recognition falls under the domain of ambition. Dominance and aggression were recognized as needs under the domain of human power, and play was a recognized need in the domain of interpersonal affection.

Maslow's Hierarchy of Needs

Abraham Maslow (1943) proposed a **hierarchy of needs,** or an particular order of need priority, that spans the spectrum of motives ranging from the biological to the individual to the social (see Figure 4.4.2. At the base of the pyramid are all of the physiological needs that are necessary for survival. These are followed by basic needs for security and safety, the need to be loved and to have a sense of belonging, and the need to have self-worth and confidence. The top tier of the pyramid is self-actualization, which is a need that essentially equates to achieving one's full potential, and it can only be realized when needs lower on the pyramid have been met. To Maslow and humanistic theorists, self-actualization reflects the humanistic emphasis on positive aspects of human nature. Maslow suggested that this is an ongoing, life-long process and that only a small percentage of people actually achieve a self-actualized state (Francis & Kritsonis, 2006; Maslow, 1943).

According to Maslow (1943), one must satisfy lower-level needs before addressing those needs that occur higher in the pyramid. However, this idea lacks strong research support.

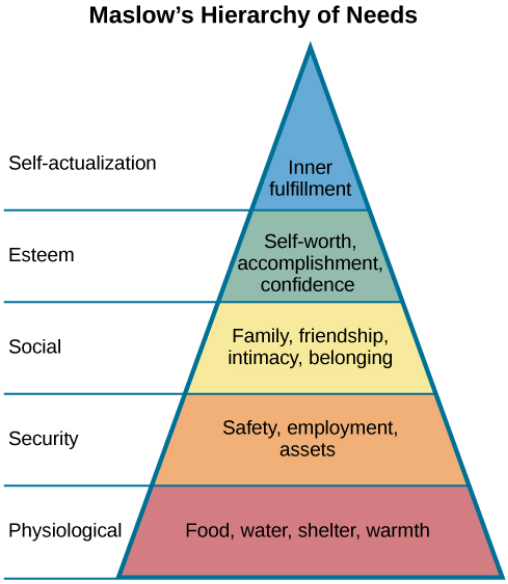


Figure \({4{.}4{.}4}\eatSpaces{2} \endSpaces}\.Maslow's hierarchy of needs is illustrated here, however this idea lacks strong empirical support.

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5.1: Goals

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.

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.



Goals are fundamental guides for human behavior. Some are biological in origin, some are cultural in nature and some are unique to the individual. [Image: Thoroughly Reviewed, https://goo.gl/Dczz2I, CC BY 2.0, goo.gl/BRvSA7]

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



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. [Image: Leo Reynolds, https://goo.gl/TXhu3C, CC BY-NC-SA 2.0, goo.gl/Toc0ZF]

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).

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

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.

Is 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.

However, how to interpret this famous marshmallow study is controversial.

Video Instructions

Watch the full video below to understand why original interpretations of the marshmallow study have been updated. How are the results now explained and what does this teach us about self-control?

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

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Is Self-Control a Limited Resource?

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. However, the idea of ego-depletion has not been replicated.

Video Instructions

Does the idea of ego-depletion hold up? Watch the video below to learn about the original and subsequent research testing the idea that self-control is a limited resource.

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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.

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CHAPTER 4: INTELLIGENCE AND MOTIVATION

4.1: What does it mean to be intelligent?
4.2: Defining intelligence and creativity
4.3: Measuring intelligence
4.4: Motivation

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CHAPTER 5: GOALS AND HABITS

5.1: Goals
5.2: Forming habits

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5.2: Forming habits

Video Instructions

Watch the video below to learn from James Clear, author of the book *Atomic Habits: An Easy & Proven Way to Build Good Habits & Break Bad Ones*.

Pay attention to the following:

1. What does James mean by "system" and how can you change it to help you reach your goals?
2. What increases motivation and excitement for reaching your goals?

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6.1: Learning

Learning Objectives

- Explain how learned behaviors are different from instincts and reflexes
- Define learning
- Recognize and define three basic forms of learning—classical conditioning, operant conditioning, and observational learning

Birds build nests and migrate as winter approaches. Infants suckle at their mother's breast. Dogs shake water off wet fur. Salmon swim upstream to spawn, and spiders spin intricate webs. What do these seemingly unrelated behaviors have in common? They all are *unlearned* behaviors. Both instincts and reflexes are innate (unlearned) behaviors that organisms are born with. **Reflexes** are a motor or neural reaction to a specific stimulus in the environment. They tend to be simpler than instincts, involve the activity of specific body parts and systems (e.g., the knee-jerk reflex and the contraction of the pupil in bright light), and involve more primitive centers of the central nervous system (e.g., the spinal cord and the medulla). In contrast, **instincts** are innate behaviors that are triggered by a broader range of events, such as maturation and the change of seasons. They are more complex patterns of behavior, involve movement of the organism as a whole (e.g., sexual activity and migration), and involve higher brain centers.

Both reflexes and instincts help an organism adapt to its environment and do not have to be learned. For example, every healthy human baby has a sucking reflex, present at birth. Babies are born knowing how to suck on a nipple, whether artificial (from a bottle) or human. Nobody teaches the baby to suck, just as no one teaches a sea turtle hatchling to move toward the ocean. Learning, like reflexes and instincts, allows an organism to adapt to its environment. But unlike instincts and reflexes, learned behaviors involve change and experience: **learning** is a relatively permanent change in behavior or knowledge that results from experience. In contrast to the innate behaviors discussed above, learning involves acquiring knowledge and skills through experience. Looking back at our surfing scenario, Julian will have to spend much more time training with his surfboard before he learns how to ride the waves like his father.

Learning to surf, as well as any complex learning process (e.g., learning about the discipline of psychology), involves a complex interaction of conscious and unconscious processes. Learning has traditionally been studied in terms of its simplest components—the associations our minds automatically make between events. Our minds have a natural tendency to connect events that occur closely together or in sequence. **Associative learning** occurs when an organism makes connections between stimuli or events that occur together in the environment. You will see that associative learning is central to all three basic learning processes discussed in this chapter; classical conditioning tends to involve unconscious processes, operant conditioning tends to involve conscious processes, and observational learning adds social and cognitive layers to all the basic associative processes, both conscious and unconscious. These learning processes will be discussed in detail later in the chapter, but it is helpful to have a brief overview of each as you begin to explore how learning is understood from a psychological perspective.

In classical conditioning, also known as Pavlovian conditioning, organisms learn to associate events—or stimuli—that repeatedly happen together. We experience this process throughout our daily lives. For example, you might see a flash of lightning in the sky during a storm and then hear a loud boom of thunder. The sound of the thunder naturally makes you jump (loud noises have that effect by reflex). Because lightning reliably predicts the impending boom of thunder, you may associate the two and jump when you see lightning. Psychological researchers study this associative process by focusing on what can be seen and measured—behaviors. Researchers ask if one stimulus triggers a reflex, can we train a different stimulus to trigger that same reflex? In operant conditioning, organisms learn, again, to associate events—a behavior and its consequence (reinforcement or punishment). A pleasant consequence encourages more of that behavior in the future, whereas a punishment deters the behavior. Imagine you are teaching your dog, Hodor, to sit. You tell Hodor to sit, and give him a treat when he does. After repeated experiences, Hodor begins to associate the act of sitting with receiving a treat. He learns that the consequence of sitting is that he gets a doggie biscuit (Figure 6.2). Conversely, if the dog is punished when exhibiting a behavior, it becomes conditioned to avoid that behavior (e.g., receiving a small shock when crossing the boundary of an invisible electric fence).



Figure **6.2** In operant conditioning, a response is associated with a consequence. This dog has learned that certain behaviors result in receiving a treat. (credit: Crystal Rolfe)

Observational learning extends the effective range of both classical and operant conditioning. In contrast to classical and operant conditioning, in which learning occurs only through direct experience, observational learning is the process of watching others and then imitating what they do. A lot of learning among humans and other animals comes from observational learning. To get an idea of the extra effective range that observational learning brings, consider Ben and his son Julian from the introduction. How might observation help Julian learn to surf, as opposed to learning by trial and error alone? By watching his father, he can imitate the moves that bring success and avoid the moves that lead to failure. Can you think of something you have learned how to do after watching someone else?

All of the approaches covered in this chapter are part of a particular tradition in psychology, called behaviorism, which we discuss in the next section. However, these approaches do not represent the entire study of learning. Separate traditions of learning have taken shape within different fields of psychology, such as memory and cognition, so you will find that other chapters will round out your understanding of the topic. Over time these traditions tend to converge. For example, in this chapter you will see how cognition has come to play a larger role in behaviorism, whose more extreme adherents once insisted that behaviors are triggered by the environment with no intervening thought.

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6.2: Classical conditioning

Learning Objectives

- Explain how classical conditioning occurs
- Summarize the processes of acquisition, extinction, spontaneous recovery, generalization, and discrimination

Does the name Ivan Pavlov ring a bell? Even if you are new to the study of psychology, chances are that you have heard of Pavlov and his famous dogs.

Pavlov (1849–1936), a Russian scientist, performed extensive research on dogs and is best known for his experiments in classical conditioning (Figure 6.2.1). As we discussed briefly in the previous section, **classical conditioning** is a process by which we learn to associate stimuli and, consequently, to anticipate events.

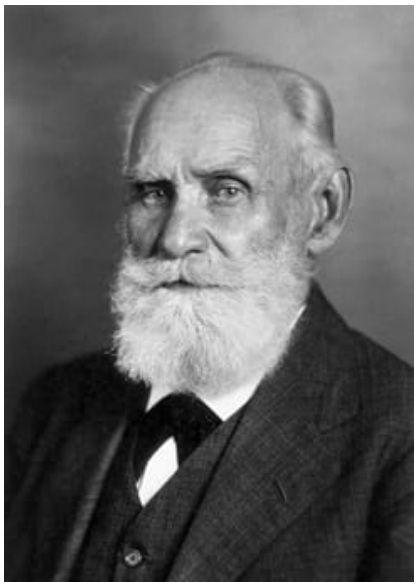


Figure 6.2.1 Ivan Pavlov's research on the digestive system of dogs unexpectedly led to his discovery of the learning process now known as classical conditioning.

Pavlov came to his conclusions about how learning occurs completely by accident. Pavlov was a physiologist, not a psychologist. Physiologists study the life processes of organisms, from the molecular level to the level of cells, organ systems, and entire organisms. Pavlov's area of interest was the digestive system (Hunt, 2007). In his studies with dogs, Pavlov measured the amount of saliva produced in response to various foods. Over time, Pavlov (1927) observed that the dogs began to salivate not only at the taste of food, but also at the sight of food, at the sight of an empty food bowl, and even at the sound of the laboratory assistants' footsteps. Salivating to food in the mouth is reflexive, so no learning is involved. However, dogs don't naturally salivate at the sight of an empty bowl or the sound of footsteps.

These unusual responses intrigued Pavlov, and he wondered what accounted for what he called the dogs' "psychic secretions" (Pavlov, 1927). To explore this phenomenon in an objective manner, Pavlov designed a series of carefully controlled experiments to see which stimuli would cause the dogs to salivate. He was able to train the dogs to salivate in response to stimuli that clearly had nothing to do with food, such as the sound of a bell, a light, and a touch on the leg. Through his experiments, Pavlov realized that an organism has two types of responses to its environment: (1) unconditioned (unlearned) responses, or reflexes, and (2) conditioned (learned) responses.

In Pavlov's experiments, the dogs salivated each time meat powder was presented to them. The meat powder in this situation was an **unconditioned stimulus (UCS)**: a stimulus that elicits a reflexive response in an organism. The dogs' salivation was an **unconditioned response (UCR)**: a natural (unlearned) reaction to a given stimulus. Before conditioning, think of the dogs' stimulus and response like this:

Meat powder (UCS) → Salivation (UCR)Meat powder (UCS) → Salivation (UCR)

In classical conditioning, a neutral stimulus is presented immediately before an unconditioned stimulus. Pavlov would sound a tone (like ringing a bell) and then give the dogs the meat powder (6.2.2. The tone was the **neutral stimulus (NS)**, which is a stimulus that does not naturally elicit a response. Prior to conditioning, the dogs did not salivate when they just heard the tone because the tone had no association for the dogs.

Tone (NS) + Meat Powder (UCS) → Salivation (UCR)Tone (NS) + Meat Powder (UCS) → Salivation (UCR)

When Pavlov paired the tone with the meat powder over and over again, the previously neutral stimulus (the tone) also began to elicit salivation from the dogs. Thus, the neutral stimulus became the **conditioned stimulus (CS)**, which is a stimulus that elicits a response after repeatedly being paired with an unconditioned stimulus. Eventually, the dogs began to salivate to the tone alone, just as they previously had salivated at the sound of the assistants' footsteps. The behavior caused by the conditioned stimulus is called the **conditioned response (CR)**. In the case of Pavlov's dogs, they had learned to associate the tone (CS) with being fed, and they began to salivate (CR) in anticipation of food.

Tone (CS) → Salivation (CR)

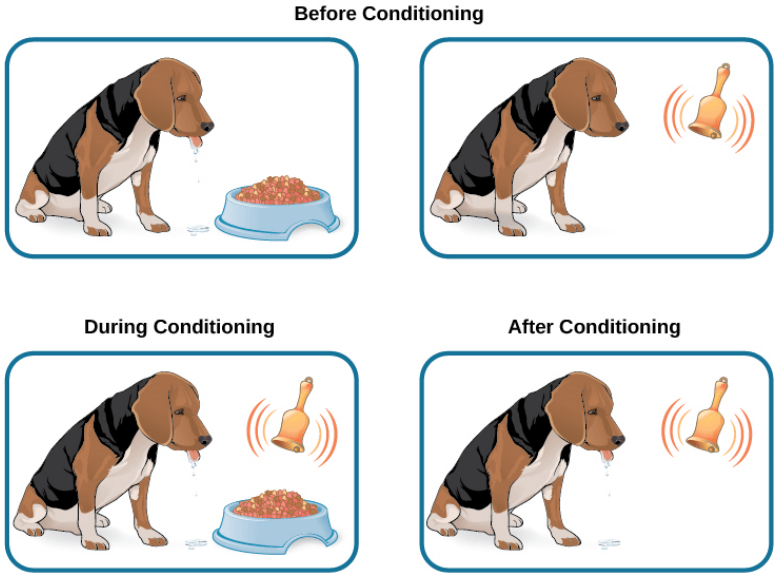


Figure 6.2.2. Before conditioning, an unconditioned stimulus (food) produces an unconditioned response (salivation), and a neutral stimulus (bell) does not produce a response. During conditioning, the unconditioned stimulus (food) is presented repeatedly just after the presentation of the neutral stimulus (bell). After conditioning, the neutral stimulus alone produces a conditioned response (salivation), thus becoming a conditioned stimulus.

Optional: Link to Learning

You can view this video about Pavlov and his dogs if you want to learn more.

Real World Application of Classical Conditioning

How does classical conditioning work in the real world? Consider the case of Moisha, who was diagnosed with cancer. When she received her first chemotherapy treatment, she vomited shortly after the chemicals were injected. In fact, every trip to the doctor for chemotherapy treatment shortly after the drugs were injected, she vomited. Moisha's treatment was a success and her cancer went into remission. Now, when she visits her oncologist's office every 6 months for a check-up, she becomes nauseous. In this case, the chemotherapy drugs are the unconditioned stimulus (UCS), vomiting is the unconditioned response (UCR), the doctor's office is the conditioned stimulus (CS) after being paired with the UCS, and nausea is the conditioned response (CR). Let's assume that the chemotherapy drugs that Moisha takes are given through a syringe injection. After entering the doctor's office, Moisha sees a syringe, and then gets her medication. In addition to the doctor's office, Moisha will learn to associate the syringe will the medication and will respond to syringes with nausea. This is an example of higher-order (or second-order) conditioning, when the conditioned stimulus (the doctor's office) serves

to condition another stimulus (the syringe). It is hard to achieve anything above second-order conditioning. For example, if someone rang a bell every time Moisha received a syringe injection of chemotherapy drugs in the doctor's office, Moisha likely will never get sick in response to the bell.

Consider another example of classical conditioning. Let's say you have a cat named Tiger, who is quite spoiled. You keep her food in a separate cabinet, and you also have a special electric can opener that you use only to open cans of cat food. For every meal, Tiger hears the distinctive sound of the electric can opener ("zzhzhz") and then gets her food. Tiger quickly learns that when she hears "zzhzhz" she is about to get fed. What do you think Tiger does when she hears the electric can opener? She will likely get excited and run to where you are preparing her food. This is an example of classical conditioning. In this case, what are the UCS, CS, UCR, and CR?

What if the cabinet holding Tiger's food becomes squeaky? In that case, Tiger hears "squeak" (the cabinet), "zzhzhz" (the electric can opener), and then she gets her food. Tiger will learn to get excited when she hears the "squeak" of the cabinet. Pairing a new neutral stimulus ("squeak") with the conditioned stimulus ("zzhzhz") is called **higher-order conditioning**, or **second-order conditioning**. This means you are using the conditioned stimulus of the can opener to condition another stimulus: the squeaky cabinet (Figure 6.2.3). It is hard to achieve anything above second-order conditioning. For example, if you ring a bell, open the cabinet ("squeak"), use the can opener ("zzhzhz"), and then feed Tiger, Tiger will likely never get excited when hearing the bell alone.

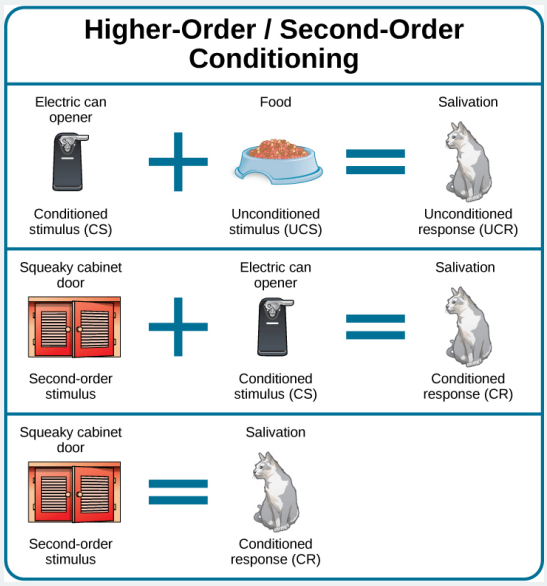


Figure 6.2.3. In higher-order conditioning, an established conditioned stimulus is paired with a new neutral stimulus (the second-order stimulus), so that eventually the new stimulus also elicits the conditioned response, without the initial conditioned stimulus being presented.

EVERYDAY CONNECTION: Classical Conditioning at Stingray City

Kate and her spouse recently vacationed in the Cayman Islands, and booked a boat tour to Stingray City, where they could feed and swim with the southern stingrays. The boat captain explained how the normally solitary stingrays have become accustomed to interacting with humans. About 40 years ago, fishermen began to clean fish and conch (unconditioned stimulus) at a particular sandbar near a barrier reef, and large numbers of stingrays would swim in to eat (unconditioned response) what the fishermen threw into the water; this continued for years. By the late 1980s, word of the large group of stingrays spread among scuba divers, who then started feeding them by hand. Over time, the southern stingrays in the area were classically conditioned much like Pavlov's dogs. When they hear the sound of a boat engine (neutral stimulus that becomes a conditioned stimulus), they know that they will get to eat (conditioned response).

As soon as they reached Stingray City, over two dozen stingrays surrounded their tour boat. The couple slipped into the water with bags of squid, the stingrays' favorite treat. The swarm of stingrays bumped and rubbed up against their legs like hungry cats (6.2.4). Kate was able to feed, pet, and even kiss (for luck) these amazing creatures. Then all the squid was gone, and so were the stingrays.



Figure 6.2.4. Kate holds a southern stingray at Stingray City in the Cayman Islands. These stingrays have been classically conditioned to associate the sound of a boat motor with food provided by tourists. (credit: Kathryn Dumper)

Classical conditioning also applies to humans, even babies. For example, Sara buys formula in blue canisters for her six-month-old daughter, Angelina. Whenever Sara takes out a formula container, Angelina gets excited, tries to reach toward the food, and most likely salivates. Why does Angelina get excited when she sees the formula canister? What are the UCS, CS, UCR, and CR here?

So far, all of the examples have involved food, but classical conditioning extends beyond the basic need to be fed. Consider our earlier example of a dog whose owners install an invisible electric dog fence. A small electrical shock (unconditioned stimulus) elicits discomfort (unconditioned response). When the unconditioned stimulus (shock) is paired with a neutral stimulus (the edge of a yard), the dog associates the discomfort (unconditioned response) with the edge of the yard (conditioned stimulus) and stays within the set boundaries. In this example, the edge of the yard elicits fear and anxiety in the dog. Fear and anxiety are the conditioned response.

Optional: Link to Learning

You can watch this video clip from the television show, *The Office*, for a humorous look at conditioning in which Jim conditions Dwight to expect a breath mint every time Jim's computer makes a specific sound.

General Processes in Classical Conditioning

Now that you know how classical conditioning works and have seen several examples, let's take a look at some of the general processes involved. In classical conditioning, the initial period of learning is known as **acquisition**, when an organism learns to connect a neutral stimulus and an unconditioned stimulus. During acquisition, the neutral stimulus begins to elicit the conditioned response, and eventually the neutral stimulus becomes a conditioned stimulus capable of eliciting the conditioned response by itself. Timing is important for conditioning to occur. Typically, there should only be a brief interval between presentation of the conditioned stimulus and the unconditioned stimulus. Depending on what is being conditioned, sometimes this interval is as little as five seconds (Chance, 2009). However, with other types of conditioning, the interval can be up to several hours.

Taste aversion is a type of conditioning in which an interval of several hours may pass between the conditioned stimulus (something ingested) and the unconditioned stimulus (nausea or illness). Here's how it works. Between classes, you and a friend grab a quick lunch from a food cart on campus. You share a dish of chicken curry and head off to your next class. A few hours later, you feel nauseous and become ill. Although your friend is fine and you determine that you have intestinal flu (the food is not the culprit), you've developed a taste aversion; the next time you are at a restaurant and someone orders curry, you immediately feel ill. While the chicken dish is not what made you sick, you are experiencing taste aversion: you've been conditioned to be averse to a food after a single, bad experience.

How does this occur—conditioning based on a single instance and involving an extended time lapse between the event and the negative stimulus? Research into taste aversion suggests that this response may be an evolutionary adaptation designed to help organisms quickly learn to avoid harmful foods (Garcia & Rusiniak, 1980; Garcia & Koelling, 1966). Not only may this contribute

to species survival via natural selection, but it may also help us develop strategies for challenges such as helping cancer patients through the nausea induced by certain treatments (Holmes, 1993; Jacobsen et al., 1993; Hutton, Baracos, & Wismer, 2007; Skolin et al., 2006). Garcia and Koelling (1966) showed not only that taste aversions could be conditioned, but also that there were biological constraints to learning. In their study, separate groups of rats were conditioned to associate either a flavor with illness, or lights and sounds with illness. Results showed that all rats exposed to flavor-illness pairings learned to avoid the flavor, but none of the rats exposed to lights and sounds with illness learned to avoid lights or sounds. This added evidence to the idea that classical conditioning could contribute to species survival by helping organisms learn to avoid stimuli that posed real dangers to health and welfare.

Robert Rescorla demonstrated how powerfully an organism can learn to predict the UCS from the CS. Take, for example, the following two situations. Ari's dad always has dinner on the table every day at 6:00. Soraya's mom switches it up so that some days they eat dinner at 6:00, some days they eat at 5:00, and other days they eat at 7:00. For Ari, 6:00 reliably and consistently predicts dinner, so Ari will likely start feeling hungry every day right before 6:00, even if he's had a late snack. Soraya, on the other hand, will be less likely to associate 6:00 with dinner, since 6:00 does not always predict that dinner is coming. Rescorla, along with his colleague at Yale University, Alan Wagner, developed a mathematical formula that could be used to calculate the probability that an association would be learned given the ability of a conditioned stimulus to predict the occurrence of an unconditioned stimulus and other factors; today this is known as the Rescorla-Wagner model (Rescorla & Wagner, 1972)

Once we have established the connection between the unconditioned stimulus and the conditioned stimulus, how do we break that connection and get the dog, cat, or child to stop responding? In Tiger's case, imagine what would happen if you stopped using the electric can opener for her food and began to use it only for human food. Now, Tiger would hear the can opener, but she would not get food. In classical conditioning terms, you would be giving the conditioned stimulus, but not the unconditioned stimulus. Pavlov explored this scenario in his experiments with dogs: sounding the tone without giving the dogs the meat powder. Soon the dogs stopped responding to the tone. **Extinction** is the decrease in the conditioned response when the unconditioned stimulus is no longer presented with the conditioned stimulus. When presented with the conditioned stimulus alone, the dog, cat, or other organism would show a weaker and weaker response, and finally no response. In classical conditioning terms, there is a gradual weakening and disappearance of the conditioned response.

What happens when learning is not used for a while—when what was learned lies dormant? As we just discussed, Pavlov found that when he repeatedly presented the bell (conditioned stimulus) without the meat powder (unconditioned stimulus), extinction occurred; the dogs stopped salivating to the bell. However, after a couple of hours of resting from this extinction training, the dogs again began to salivate when Pavlov rang the bell. What do you think would happen with Tiger's behavior if your electric can opener broke, and you did not use it for several months? When you finally got it fixed and started using it to open Tiger's food again, Tiger would remember the association between the can opener and her food—she would get excited and run to the kitchen when she heard the sound. The behavior of Pavlov's dogs and Tiger illustrates a concept Pavlov called **spontaneous recovery**: the return of a previously extinguished conditioned response following a rest period (6.2.5).

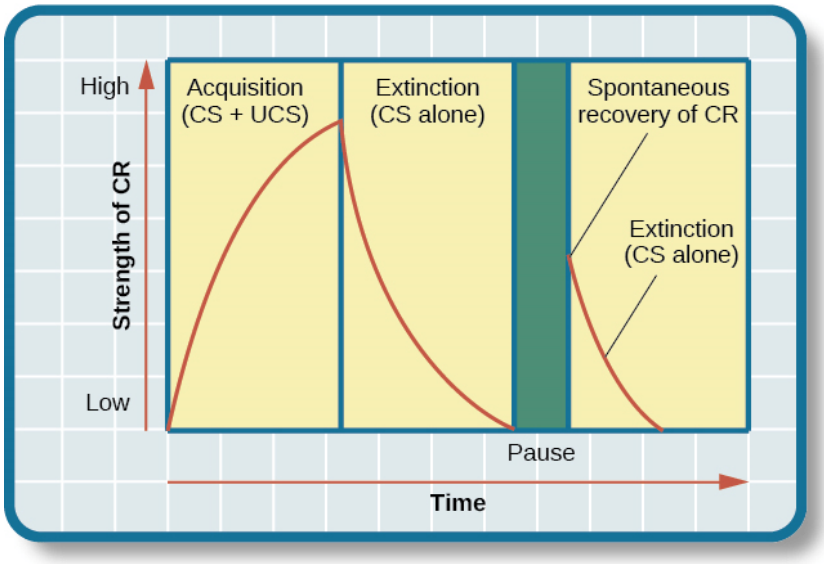


Figure 6.2.5. This is the curve of acquisition, extinction, and spontaneous recovery. The rising curve shows the conditioned response quickly getting stronger through the repeated pairing of the conditioned stimulus and the unconditioned stimulus (acquisition). Then the curve decreases, which shows how the conditioned response weakens when only the conditioned stimulus is presented (extinction). After a break or pause from conditioning, the conditioned response reappears (spontaneous recovery).

Of course, these processes also apply in humans. For example, let's say that every day when you walk to campus, an ice cream truck passes your route. Day after day, you hear the truck's music (neutral stimulus), so you finally stop and purchase a chocolate ice cream bar. You take a bite (unconditioned stimulus) and then your mouth waters (unconditioned response). This initial period of learning is known as acquisition, when you begin to connect the neutral stimulus (the sound of the truck) and the unconditioned stimulus (the taste of the chocolate ice cream in your mouth). During acquisition, the conditioned response gets stronger and stronger through repeated pairings of the conditioned stimulus and unconditioned stimulus. Several days (and ice cream bars) later, you notice that your mouth begins to water (conditioned response) as soon as you hear the truck's musical jingle—even before you bite into the ice cream bar. Then one day you head down the street. You hear the truck's music (conditioned stimulus), and your mouth waters (conditioned response). However, when you get to the truck, you discover that they are all out of ice cream. You leave disappointed. The next few days you pass by the truck and hear the music, but don't stop to get an ice cream bar because you're running late for class. You begin to salivate less and less when you hear the music, until by the end of the week, your mouth no longer waters when you hear the tune. This illustrates extinction. The conditioned response weakens when only the conditioned stimulus (the sound of the truck) is presented, without being followed by the unconditioned stimulus (chocolate ice cream in the mouth). Then the weekend comes. You don't have to go to class, so you don't pass the truck. Monday morning arrives and you take your usual route to campus. You round the corner and hear the truck again. What do you think happens? Your mouth begins to water again. Why? After a break from conditioning, the conditioned response reappears, which indicates spontaneous recovery.

Acquisition and extinction involve the strengthening and weakening, respectively, of a learned association. Two other learning processes—stimulus discrimination and stimulus generalization—are involved in determining which stimuli will trigger learned responses. Animals (including humans) need to distinguish between stimuli—for example, between sounds that predict a threatening event and sounds that do not—so that they can respond appropriately (such as running away if the sound is threatening). When an organism learns to respond differently to various stimuli that are similar, it is called **stimulus discrimination**. In classical conditioning terms, the organism demonstrates the conditioned response only to the conditioned stimulus. Pavlov's dogs discriminated between the basic tone that sounded before they were fed and other tones (e.g., the doorbell), because the other sounds did not predict the arrival of food. Similarly, Tiger, the cat, discriminated between the sound of the can opener and the sound of the electric mixer. When the electric mixer is going, Tiger is not about to be fed, so she does not come running to the kitchen looking for food. In our other example, Moisha, the cancer patient, discriminated between oncologists and other types of doctors. She learned not to feel ill when visiting doctors for other types of appointments, such as her annual physical.

On the other hand, when an organism demonstrates the conditioned response to stimuli that are similar to the condition stimulus, it is called **stimulus generalization**, the opposite of stimulus discrimination. The more similar a stimulus is to the condition stimulus, the more likely the organism is to give the conditioned response. For instance, if the electric mixer sounds very similar to the electric can opener, Tiger may come running after hearing its sound. But if you do not feed her following the electric

mixer sound, and you continue to feed her consistently after the electric can opener sound, she will quickly learn to discriminate between the two sounds (provided they are sufficiently dissimilar that she can tell them apart). In our other example, Moisha continued to feel ill whenever visiting other oncologists or other doctors in the same building as her oncologist.

Behaviorism

John B. Watson, shown in Figure 6.2.6, is considered the founder of behaviorism. Behaviorism is a school of thought that arose during the first part of the 20th century, which incorporates elements of Pavlov's classical conditioning (Hunt, 2007). In stark contrast with Freud, who considered the reasons for behavior to be hidden in the unconscious, Watson championed the idea that all behavior can be studied as a simple stimulus-response reaction, without regard for internal processes. Watson argued that in order for psychology to become a legitimate science, it must shift its concern away from internal mental processes because mental processes cannot be seen or measured. Instead, he asserted that psychology must focus on outward observable behavior that can be measured.



Figure 6.2.6. John B. Watson used the principles of classical conditioning in the study of human emotion.

Watson's ideas were influenced by Pavlov's work. According to Watson, human behavior, just like animal behavior, is primarily the result of conditioned responses. Whereas Pavlov's work with dogs involved the conditioning of reflexes, Watson believed the same principles could be extended to the conditioning of human emotions (Watson, 1919). Thus began Watson's work with his graduate student Rosalie Rayner and a baby called Little Albert. Through their experiments with Little Albert, Watson and Rayner (1920) demonstrated how fears can be conditioned.

In 1920, Watson was the chair of the psychology department at Johns Hopkins University. Through his position at the university he came to meet Little Albert's mother, Arvilla Merritte, who worked at a campus hospital (DeAngelis, 2010). Watson offered her a dollar to allow her son to be the subject of his experiments in classical conditioning. Through these experiments, Little Albert was exposed to and conditioned to fear certain things. Initially he was presented with various neutral stimuli, including a rabbit, a dog, a monkey, masks, cotton wool, and a white rat. He was not afraid of any of these things. Then Watson, with the help of Rayner, conditioned Little Albert to associate these stimuli with an emotion—fear. For example, Watson handed Little Albert the white rat, and Little Albert enjoyed playing with it. Then Watson made a loud sound, by striking a hammer against a metal bar hanging behind Little Albert's head, each time Little Albert touched the rat. Little Albert was frightened by the sound—demonstrating a reflexive fear of sudden loud noises—and began to cry. Watson repeatedly paired the loud sound with the white rat. Soon Little Albert became frightened by the white rat alone. In this case, what are the UCS, CS, UCR, and CR? Days later, Little Albert demonstrated stimulus generalization—he became afraid of other furry things: a rabbit, a furry coat, and even a Santa Claus mask (Figure 6.2.7). Watson had succeeded in conditioning a fear response in Little Albert, thus demonstrating that emotions could become conditioned responses. It had been Watson's intention to produce a phobia—a persistent, excessive fear of a specific object or situation— through conditioning alone, thus countering Freud's view that phobias are caused by deep, hidden conflicts in the mind. However, there is no evidence that Little Albert experienced phobias in later years. Little Albert's mother moved away, ending the experiment. While Watson's research provided new insight into conditioning, it would be considered unethical by today's standards.

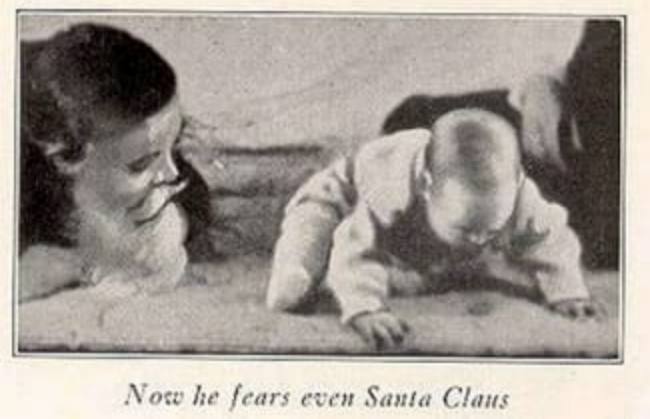


Figure 6.2.7. Through stimulus generalization, Little Albert came to fear furry things, including Watson in a Santa Claus mask

Everyday Connection

Advertising and Associative Learning

Advertising executives are pros at applying the principles of associative learning. Think about the car commercials you have seen on television. Many of them feature an attractive model. By associating the model with the car being advertised, you come to see the car as being desirable (Cialdini, 2008). You may be asking yourself, does this advertising technique actually work? According to Cialdini (2008), men who viewed a car commercial that included an attractive model later rated the car as being faster, more appealing, and better designed than did men who viewed an advertisement for the same car minus the model.

Have you ever noticed how quickly advertisers cancel contracts with a famous athlete following a scandal? As far as the advertiser is concerned, that athlete is no longer associated with positive feelings; therefore, the athlete cannot be used as an unconditioned stimulus to condition the public to associate positive feelings (the unconditioned response) with their product (the conditioned stimulus).

Now that you are aware of how associative learning works, see if you can find examples of these types of advertisements on television, in magazines, or on the Internet.

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6.3: Operant conditioning

Learning Objectives

- Define operant conditioning
- Explain the difference between reinforcement and punishment
- Distinguish between reinforcement schedules

The previous section of this chapter focused on the type of associative learning known as classical conditioning. Remember that in classical conditioning, something in the environment triggers a reflex automatically, and researchers train the organism to react to a different stimulus. Now we turn to the second type of associative learning, **operant conditioning**. In operant conditioning, organisms learn to associate a behavior and its consequence (Table 6.1). A pleasant consequence makes that behavior more likely to be repeated in the future. For example, Spirit, a dolphin at the National Aquarium in Baltimore, does a flip in the air when her trainer blows a whistle. The consequence is that she gets a fish.

Classical and Operant Conditioning Compared

	Classical Conditioning	Operant Conditioning
Conditioning approach	An unconditioned stimulus (such as food) is paired with a neutral stimulus (such as a bell). The neutral stimulus eventually becomes the conditioned stimulus, which brings about the conditioned response (salivation).	The target behavior is followed by reinforcement or punishment to either strengthen or weaken it, so that the learner is more likely to exhibit the desired behavior in the future.
Stimulus timing	The stimulus occurs immediately before the response.	The stimulus (either reinforcement or punishment) occurs soon after the response.

Table 6.1

Psychologist B. F. Skinner saw that classical conditioning is limited to existing behaviors that are reflexively elicited, and it doesn't account for new behaviors such as riding a bike. He proposed a theory about how such behaviors come about. Skinner believed that behavior is motivated by the consequences we receive for the behavior: the reinforcements and punishments. His idea that learning is the result of consequences is based on the law of effect, which was first proposed by psychologist Edward Thorndike. According to the **law of effect**, behaviors that are followed by consequences that are satisfying to the organism are more likely to be repeated, and behaviors that are followed by unpleasant consequences are less likely to be repeated (Thorndike, 1911). Essentially, if an organism does something that brings about a desired result, the organism is more likely to do it again. If an organism does something that does not bring about a desired result, the organism is less likely to do it again. An example of the law of effect is in employment. One of the reasons (and often the main reason) we show up for work is because we get paid to do so. If we stop getting paid, we will likely stop showing up—even if we love our job.

Working with Thorndike's law of effect as his foundation, Skinner began conducting scientific experiments on animals (mainly rats and pigeons) to determine how organisms learn through operant conditioning (Skinner, 1938). He placed these animals inside an operant conditioning chamber, which has come to be known as a "Skinner box" (Figure 6.10). A Skinner box contains a lever (for rats) or disk (for pigeons) that the animal can press or peck for a food reward via the dispenser. Speakers and lights can be associated with certain behaviors. A recorder counts the number of responses made by the animal.

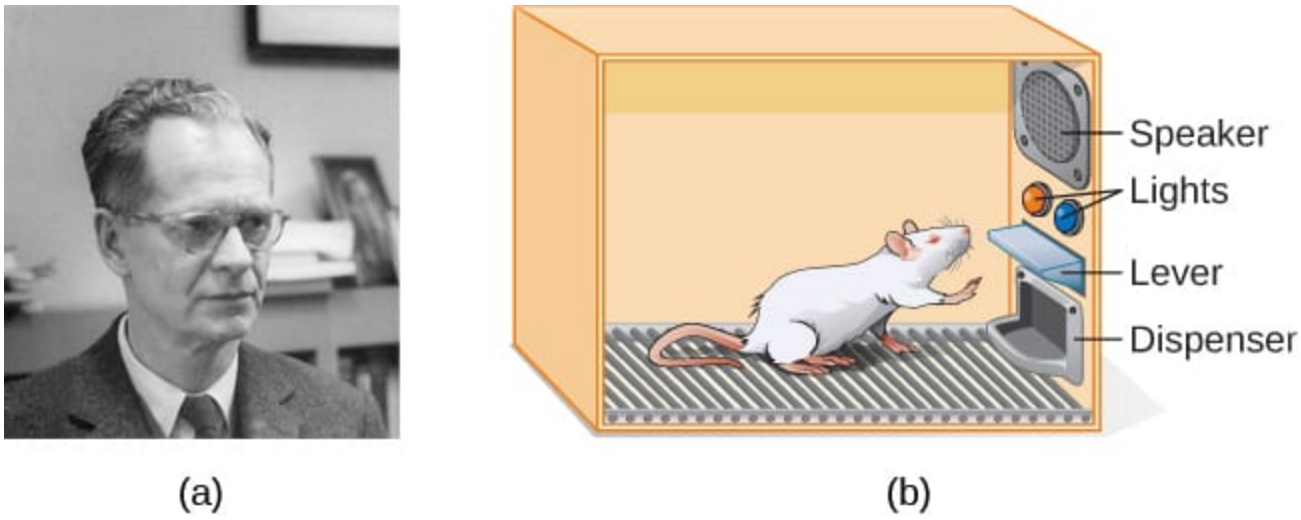


Figure 6.10 (a) B. F. Skinner developed operant conditioning for systematic study of how behaviors are strengthened or weakened according to their consequences. (b) In a Skinner box, a rat presses a lever in an operant conditioning chamber to receive a food reward. (credit a: modification of work by "Silly rabbit"/Wikimedia Commons)

Optional: Link to Learning

You can watch this brief video to see Skinner's interview and a demonstration of operant conditioning of pigeons to learn more.

In discussing operant conditioning, we use several everyday words—positive, negative, reinforcement, and punishment—in a specialized manner. In operant conditioning, positive and negative do not mean good and bad. Instead, *positive* means you are adding something, and *negative* means you are taking something away. *Reinforcement* means you are increasing a behavior, and *punishment* means you are decreasing a behavior. Reinforcement can be positive or negative, and punishment can also be positive or negative. All reinforcers (positive or negative) *increase* the likelihood of a behavioral response. All punishers (positive or negative) *decrease* the likelihood of a behavioral response. Now let's combine these four terms: positive reinforcement, negative reinforcement, positive punishment, and negative punishment (Table 6.2).

Positive and Negative Reinforcement and Punishment

	Reinforcement	Punishment
Positive	Something is *added* to *increase* the likelihood of a behavior.	Something is *added* to *decrease* the likelihood of a behavior.
Negative	Something is *removed* to *increase* the likelihood of a behavior.	Something is *removed* to *decrease* the likelihood of a behavior.

Table 6.2

Reinforcement

The most effective way to teach a person or animal a new behavior is with positive reinforcement. In **positive reinforcement**, a desirable stimulus is added to increase a behavior.

For example, you tell your five-year-old son, Jerome, that if he cleans his room, he will get a toy. Jerome quickly cleans his room because he wants a new art set. Let's pause for a moment. Some people might say, "Why should I reward my child for doing what is expected?" But in fact we are constantly and consistently rewarded in our lives. Our paychecks are rewards, as are high grades and acceptance into our preferred school. Being praised for doing a good job and for passing a driver's test is also a reward. Positive reinforcement as a learning tool is extremely effective. It has been found that one of the most effective ways to increase achievement in school districts with below-average reading scores was to pay the children to read. Specifically, second-grade students in Dallas were paid $2 each time they read a book and passed a short quiz about the book. The result was a significant

increase in reading comprehension (Fryer, 2010). What do you think about this program? If Skinner were alive today, he would probably think this was a great idea. He was a strong proponent of using operant conditioning principles to influence students' behavior at school. In fact, in addition to the Skinner box, he also invented what he called a teaching machine that was designed to reward small steps in learning (Skinner, 1961)—an early forerunner of computer-assisted learning. His teaching machine tested students' knowledge as they worked through various school subjects. If students answered questions correctly, they received immediate positive reinforcement and could continue; if they answered incorrectly, they did not receive any reinforcement. The idea was that students would spend additional time studying the material to increase their chance of being reinforced the next time (Skinner, 1961).

In **negative reinforcement**, an undesirable stimulus is removed to increase a behavior. For example, car manufacturers use the principles of negative reinforcement in their seatbelt systems, which go "beep, beep, beep" until you fasten your seatbelt. The annoying sound stops when you exhibit the desired behavior, increasing the likelihood that you will buckle up in the future. Negative reinforcement is also used frequently in horse training. Riders apply pressure—by pulling the reins or squeezing their legs—and then remove the pressure when the horse performs the desired behavior, such as turning or speeding up. The pressure is the negative stimulus that the horse wants to remove.

Punishment

Many people confuse negative reinforcement with punishment in operant conditioning, but they are two very different mechanisms. Remember that reinforcement, even when it is negative, always increases a behavior. In contrast, **punishment** always decreases a behavior. In **positive punishment**, you add an undesirable stimulus to decrease a behavior. An example of positive punishment is scolding a student to get the student to stop texting in class. In this case, a stimulus (the reprimand) is added in order to decrease the behavior (texting in class). In **negative punishment**, you remove a pleasant stimulus to decrease behavior. For example, when a child misbehaves, a parent can take away a favorite toy. In this case, a stimulus (the toy) is removed in order to decrease the behavior.

Punishment, especially when it is immediate, is one way to decrease undesirable behavior. For example, imagine your four-year-old son, Brandon, hit his younger brother. You have Brandon write 100 times "I will not hit my brother" (positive punishment). Chances are he won't repeat this behavior. While strategies like this are common today, in the past children were often subject to physical punishment, such as spanking. It's important to be aware of some of the drawbacks in using physical punishment on children. First, punishment may teach fear. Brandon may become fearful of the street, but he also may become fearful of the person who delivered the punishment—you, his parent. Similarly, children who are punished by teachers may come to fear the teacher and try to avoid school (Gershoff et al., 2010). Consequently, most schools in the United States have banned corporal punishment. Second, punishment may cause children to become more aggressive and prone to antisocial behavior and delinquency (Gershoff, 2002). They see their parents resort to spanking when they become angry and frustrated, so, in turn, they may act out this same behavior when they become angry and frustrated. For example, because you spank Brenda when you are angry with her for her misbehavior, she might start hitting her friends when they won't share their toys.

While positive punishment can be effective in some cases, Skinner suggested that the use of punishment should be weighed against the possible negative effects. Today's psychologists and parenting experts favor reinforcement over punishment—they recommend that you catch your child doing something good and reward her for it.

Shaping

In his operant conditioning experiments, Skinner often used an approach called shaping. Instead of rewarding only the target behavior, in **shaping**, we reward successive approximations of a target behavior. Why is shaping needed? Remember that in order for reinforcement to work, the organism must first display the behavior. Shaping is needed because it is extremely unlikely that an organism will display anything but the simplest of behaviors spontaneously. In shaping, behaviors are broken down into many small, achievable steps. The specific steps used in the process are the following:

1. Reinforce any response that resembles the desired behavior.
2. Then reinforce the response that more closely resembles the desired behavior. You will no longer reinforce the previously reinforced response.
3. Next, begin to reinforce the response that even more closely resembles the desired behavior.
4. Continue to reinforce closer and closer approximations of the desired behavior.
5. Finally, only reinforce the desired behavior.

Shaping is often used in teaching a complex behavior or chain of behaviors. Skinner used shaping to teach pigeons not only such relatively simple behaviors as pecking a disk in a Skinner box, but also many unusual and entertaining behaviors, such as turning in circles, walking in figure eights, and even playing ping pong; the technique is commonly used by animal trainers today. An important part of shaping is stimulus discrimination. Recall Pavlov's dogs—he trained them to respond to the tone of a bell, and not to similar tones or sounds. This discrimination is also important in operant conditioning and in shaping behavior.

Optional: Link to Learning

You can watch this brief video of Skinner's pigeons playing ping pong to learn more.

It's easy to see how shaping is effective in teaching behaviors to animals, but how does shaping work with humans? Let's consider parents whose goal is to have their child learn to clean his room. They use shaping to help him master steps toward the goal. Instead of performing the entire task, they set up these steps and reinforce each step. First, he cleans up one toy. Second, he cleans up five toys. Third, he chooses whether to pick up ten toys or put his books and clothes away. Fourth, he cleans up everything except two toys. Finally, he cleans his entire room.

Primary and Secondary Reinforcers

Rewards such as stickers, praise, money, toys, and more can be used to reinforce learning. Let's go back to Skinner's rats again. How did the rats learn to press the lever in the Skinner box? They were rewarded with food each time they pressed the lever. For animals, food would be an obvious reinforcer.

What would be a good reinforcer for humans? For your child Chris, it was the promise of a toy when they cleaned their room. How about Sydney, the soccer player? If you gave Sydney a piece of candy every time Sydney scored a goal, you would be using a **primary reinforcer**. Primary reinforcers are reinforcers that have innate reinforcing qualities. These kinds of reinforcers are not learned. Water, food, sleep, shelter, sex, and touch, among others, are primary reinforcers. Pleasure is also a primary reinforcer. Organisms do not lose their drive for these things. For most people, jumping in a cool lake on a very hot day would be reinforcing and the cool lake would be innately reinforcing—the water would cool the person off (a physical need), as well as provide pleasure.

A **secondary reinforcer** has no inherent value and only has reinforcing qualities when linked with a primary reinforcer. Praise, linked to affection, is one example of a secondary reinforcer, as when you called out "Great shot!" every time Sydney made a goal. Another example, money, is only worth something when you can use it to buy other things—either things that satisfy basic needs (food, water, shelter—all primary reinforcers) or other secondary reinforcers. If you were on a remote island in the middle of the Pacific Ocean and you had stacks of money, the money would not be useful if you could not spend it. What about the stickers on the behavior chart? They also are secondary reinforcers.

Sometimes, instead of stickers on a sticker chart, a token is used. Tokens, which are also secondary reinforcers, can then be traded in for rewards and prizes. Entire behavior management systems, known as token economies, are built around the use of these kinds of token reinforcers. Token economies have been found to be very effective at modifying behavior in a variety of settings such as schools, prisons, and mental hospitals. For example, a study by Cangi and Daly (2013) found that use of a token economy increased appropriate social behaviors and reduced inappropriate behaviors in a group of autistic school children. Autistic children tend to exhibit disruptive behaviors such as pinching and hitting. When the children in the study exhibited appropriate behavior (not hitting or pinching), they received a "quiet hands" token. When they hit or pinched, they lost a token. The children could then exchange specified amounts of tokens for minutes of playtime.

EVERYDAY CONNECTION: Behavior Modification in Children

Parents and teachers often use behavior modification to change a child's behavior. Behavior modification uses the principles of operant conditioning to accomplish behavior change so that undesirable behaviors are switched for more socially acceptable ones. Some teachers and parents create a sticker chart, in which several behaviors are listed (Figure 6.11). Sticker charts are a form of token economies, as described in the text. Each time children perform the behavior, they get a sticker, and after a certain number of stickers, they get a prize, or reinforcer. The goal is to increase acceptable behaviors and decrease misbehavior. Remember, it is best to reinforce desired behaviors, rather than to use punishment. In the classroom, the teacher can reinforce a wide range of behaviors, from students raising their hands, to walking quietly in the hall, to turning

in their homework. At home, parents might create a behavior chart that rewards children for things such as putting away toys, brushing their teeth, and helping with dinner. In order for behavior modification to be effective, the reinforcement needs to be connected with the behavior; the reinforcement must matter to the child and be done consistently.



Figure 6.11 Sticker charts are a form of positive reinforcement and a tool for behavior modification. Once this child earns a certain number of stickers for demonstrating a desired behavior, she will be rewarded with a trip to the ice cream parlor. (credit: Abigail Batchelder)

Time-out is another popular technique used in behavior modification with children. It operates on the principle of negative punishment. When a child demonstrates an undesirable behavior, she is removed from the desirable activity at hand (Figure 6.12). For example, say that Sophia and her brother Mario are playing with building blocks. Sophia throws some blocks at her brother, so you give her a warning that she will go to time-out if she does it again. A few minutes later, she throws more blocks at Mario. You remove Sophia from the room for a few minutes. When she comes back, she doesn't throw blocks.

There are several important points that you should know if you plan to implement time-out as a behavior modification technique. First, make sure the child is being removed from a desirable activity and placed in a less desirable location. If the activity is something undesirable for the child, this technique will backfire because it is more enjoyable for the child to be removed from the activity. Second, the length of the time-out is important. The general rule of thumb is one minute for each year of the child's age. Sophia is five; therefore, she sits in a time-out for five minutes. Setting a timer helps children know how long they have to sit in time-out. Finally, as a caregiver, keep several guidelines in mind over the course of a time-out: remain calm when directing your child to time-out; ignore your child during time-out (because caregiver attention may reinforce misbehavior); and give the child a hug or a kind word when time-out is over.

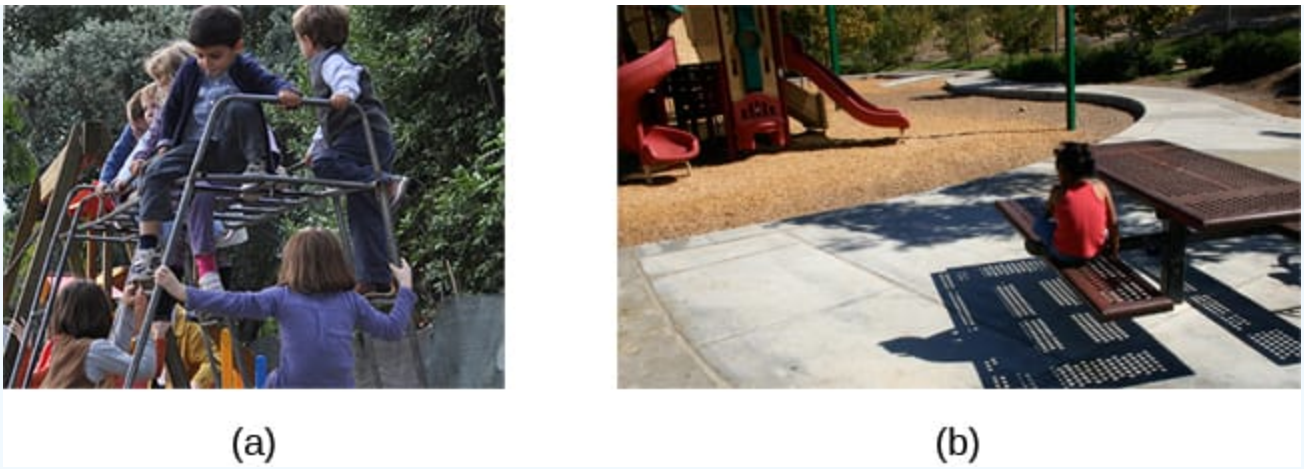


Figure **6.12** Time-out is a popular form of negative punishment used by caregivers. When a child misbehaves, he or she is removed from a desirable activity in an effort to decrease the unwanted behavior. For example, (a) a child might be playing on the playground with friends and push another child; (b) the child who misbehaved would then be removed from the activity for a short period of time. (credit a: modification of work by Simone Ramella; credit b: modification of work by "Spring Dew"/Flickr)

Reinforcement Schedules

Remember, the best way to teach a person or animal a behavior is to use positive reinforcement. For example, Skinner used positive reinforcement to teach rats to press a lever in a Skinner box. At first, the rat might randomly hit the lever while exploring the box, and out would come a pellet of food. After eating the pellet, what do you think the hungry rat did next? It hit the lever again, and received another pellet of food. Each time the rat hit the lever, a pellet of food came out. When an organism receives a reinforcer each time it displays a behavior, it is called **continuous reinforcement**. This reinforcement schedule is the quickest way to teach someone a behavior, and it is especially effective in training a new behavior. Let's look back at the dog that was learning to sit earlier in the chapter. Now, each time he sits, you give him a treat. Timing is important here: you will be most successful if you present the reinforcer immediately after he sits, so that he can make an association between the target behavior (sitting) and the consequence (getting a treat).

Optional: Link to Learning

You can watch this video clip of veterinarian Dr. Sophia Yin shaping a dog's behavior using the steps outlined above to learn more.

Once a behavior is trained, researchers and trainers often turn to another type of reinforcement schedule—partial reinforcement. In **partial reinforcement**, also referred to as intermittent reinforcement, the person or animal does not get reinforced every time they perform the desired behavior. There are several different types of partial reinforcement schedules (Table 6.3). These schedules are described as either fixed or variable, and as either interval or ratio. *Fixed* refers to the number of responses between reinforcements, or the amount of time between reinforcements, which is set and unchanging. *Variable* refers to the number of responses or amount of time between reinforcements, which varies or changes. *Interval* means the schedule is based on the time between reinforcements, and *ratio* means the schedule is based on the number of responses between reinforcements.

Reinforcement Schedules

Reinforcement Schedule	Description	Result	Example
Fixed interval	Reinforcement is delivered at predictable time intervals (e.g., after 5, 10, 15, and 20 minutes).	Moderate response rate with significant pauses after reinforcement	Hospital patient uses patient-controlled, doctor-timed pain relief

Reinforcement Schedules			
Reinforcement Schedule	**Description**	**Result**	**Example**
Variable interval	Reinforcement is delivered at unpredictable time intervals (e.g., after 5, 7, 10, and 20 minutes).	Moderate yet steady response rate	Checking Facebook
Fixed ratio	Reinforcement is delivered after a predictable number of responses (e.g., after 2, 4, 6, and 8 responses).	High response rate with pauses after reinforcement	Piecework—factory worker getting paid for every x number of items manufactured
Variable ratio	Reinforcement is delivered after an unpredictable number of responses (e.g., after 1, 4, 5, and 9 responses).	High and steady response rate	Gambling

Table 6.3

Now let's combine these four terms. A **fixed interval reinforcement schedule** is when behavior is rewarded after a set amount of time. For example, June undergoes major surgery in a hospital. During recovery, she is expected to experience pain and will require prescription medications for pain relief. June is given an IV drip with a patient-controlled painkiller. Her doctor sets a limit: one dose per hour. June pushes a button when pain becomes difficult, and she receives a dose of medication. Since the reward (pain relief) only occurs on a fixed interval, there is no point in exhibiting the behavior when it will not be rewarded.

With a **variable interval reinforcement schedule**, the person or animal gets the reinforcement based on varying amounts of time, which are unpredictable. Say that Manuel is the manager at a fast-food restaurant. Every once in a while someone from the quality control division comes to Manuel's restaurant. If the restaurant is clean and the service is fast, everyone on that shift earns a $20 bonus. Manuel never knows when the quality control person will show up, so he always tries to keep the restaurant clean and ensures that his employees provide prompt and courteous service. His productivity regarding prompt service and keeping a clean restaurant are steady because he wants his crew to earn the bonus.

With a **fixed ratio reinforcement schedule**, there are a set number of responses that must occur before the behavior is rewarded. Carla sells glasses at an eyeglass store, and she earns a commission every time she sells a pair of glasses. She always tries to sell people more pairs of glasses, including prescription sunglasses or a backup pair, so she can increase her commission. She does not care if the person really needs the prescription sunglasses, Carla just wants her bonus. The quality of what Carla sells does not matter because her commission is not based on quality; it's only based on the number of pairs sold. This distinction in the quality of performance can help determine which reinforcement method is most appropriate for a particular situation. Fixed ratios are better suited to optimize the quantity of output, whereas a fixed interval, in which the reward is not quantity based, can lead to a higher quality of output.

In a **variable ratio reinforcement schedule**, the number of responses needed for a reward varies. This is the most powerful partial reinforcement schedule. An example of the variable ratio reinforcement schedule is gambling. Imagine that Sarah—generally a smart, thrifty woman—visits Las Vegas for the first time. She is not a gambler, but out of curiosity she puts a quarter into the slot machine, and then another, and another. Nothing happens. Two dollars in quarters later, her curiosity is fading, and she is just about to quit. But then, the machine lights up, bells go off, and Sarah gets 50 quarters back. That's more like it! Sarah gets back to inserting quarters with renewed interest, and a few minutes later she has used up all her gains and is $10 in the hole. Now might be a sensible time to quit. And yet, she keeps putting money into the slot machine because she never knows when the next reinforcement is coming. She keeps thinking that with the next quarter she could win $50, or $100, or even more. Because the reinforcement schedule in most types of gambling has a variable ratio schedule, people keep trying and hoping that the next time they will win big. This is one of the reasons that gambling is so addictive—and so resistant to extinction.

In operant conditioning, extinction of a reinforced behavior occurs at some point after reinforcement stops, and the speed at which this happens depends on the reinforcement schedule. In a variable ratio schedule, the point of extinction comes very slowly, as described above. But in the other reinforcement schedules, extinction may come quickly. For example, if June presses the button for the pain relief medication before the allotted time her doctor has approved, no medication is administered. She is on a fixed interval reinforcement schedule (dosed hourly), so extinction occurs quickly when reinforcement doesn't come at the expected time. Among the reinforcement schedules, variable ratio is the most productive and the most resistant to extinction. Fixed interval is the least productive and the easiest to extinguish (Figure 6.13).

A graph has an x-axis labeled “Time” and a y-axis labeled “Cumulative number of responses.” Two lines labeled “Variable Ratio” and “Fixed Ratio” have similar, steep slopes. The variable ratio line remains straight and is marked in random points where reinforcement occurs. The fixed ratio line has consistently spaced marks indicating where reinforcement has occurred, but after each reinforcement, there is a small drop in the line before it resumes its overall slope. Two lines labeled “Variable Interval” and “Fixed Interval” have similar slopes at roughly a 45-degree angle. The variable interval line remains straight and is marked in random points where reinforcement occurs. The fixed interval line has consistently spaced marks indicating where reinforcement has occurred, but after each reinforcement, there is a drop in the line.

Figure 6.13 The four reinforcement schedules yield different response patterns. The variable ratio schedule is unpredictable and yields high and steady response rates, with little if any pause after reinforcement (e.g., gambler). A fixed ratio schedule is predictable and produces a high response rate, with a short pause after reinforcement (e.g., eyeglass saleswoman). The variable interval schedule is unpredictable and produces a moderate, steady response rate (e.g., restaurant manager). The fixed interval schedule yields a scallop-shaped response pattern, reflecting a significant pause after reinforcement (e.g., surgery patient).

CONNECT THE CONCEPTS: Gambling and the Brain

Skinner (1953) stated, “If the gambling establishment cannot persuade a patron to turn over money with no return, it may achieve the same effect by returning part of the patron's money on a variable-ratio schedule” (p. 397).

Skinner uses gambling as an example of the power of the variable-ratio reinforcement schedule for maintaining behavior even during long periods without any reinforcement. In fact, Skinner was so confident in his knowledge of gambling addiction that he even claimed he could turn a pigeon into a pathological gambler (“Skinner’s Utopia,” 1971). It is indeed true that variable-ratio schedules keep behavior quite persistent—just imagine the frequency of a child’s tantrums if a parent gives in even once to the behavior. The occasional reward makes it almost impossible to stop the behavior.

Recent research in rats has failed to support Skinner’s idea that training on variable-ratio schedules alone causes pathological gambling (Laskowski et al., 2019). However, other research suggests that gambling does seem to work on the brain in the same way as most addictive drugs, and so there may be some combination of brain chemistry and reinforcement schedule that could lead to problem gambling (Figure 6.14). Specifically, modern research shows the connection between gambling and the activation of the reward centers of the brain that use the neurotransmitter (brain chemical) dopamine (Murch & Clark, 2016). Interestingly, gamblers don’t even have to win to experience the “rush” of dopamine in the brain. “Near misses,” or almost winning but not actually winning, also have been shown to increase activity in the ventral striatum and other brain reward centers that use dopamine (Chase & Clark, 2010). These brain effects are almost identical to those produced by addictive drugs like cocaine and heroin (Murch & Clark, 2016). Based on the neuroscientific evidence showing these similarities, the DSM-5 now considers gambling an addiction, while earlier versions of the DSM classified gambling as an impulse control disorder.

A photograph shows four digital gaming machines.

Figure **6.14** Some research suggests that pathological gamblers use gambling to compensate for abnormally low levels of the hormone norepinephrine, which is associated with stress and is secreted in moments of arousal and thrill. (credit: Ted Murphy)

In addition to dopamine, gambling also appears to involve other neurotransmitters, including norepinephrine and serotonin (Potenza, 2013). Norepinephrine is secreted when a person feels stress, arousal, or thrill. It may be that pathological gamblers use gambling to increase their levels of this neurotransmitter. Deficiencies in serotonin might also contribute to compulsive behavior, including a gambling addiction (Potenza, 2013).

It may be that pathological gamblers’ brains are different than those of other people, and perhaps this difference may somehow have led to their gambling addiction, as these studies seem to suggest. However, it is very difficult to ascertain the cause because it is impossible to conduct a true experiment (it would be unethical to try to turn randomly assigned participants into problem gamblers). Therefore, it may be that causation actually moves in the opposite direction—perhaps the act of gambling somehow changes neurotransmitter levels in some gamblers’ brains. It also is possible that some overlooked factor, or confounding variable, played a role in both the gambling addiction and the differences in brain chemistry.

Cognition and Latent Learning

Strict behaviorists like Watson and Skinner focused exclusively on studying behavior rather than cognition (such as thoughts and expectations). In fact, Skinner was such a staunch believer that cognition didn't matter that his ideas were considered **radical behaviorism**. Skinner considered the mind a "black box"—something completely unknowable—and, therefore, something not to be studied. However, another behaviorist, Edward C. Tolman, had a different opinion. Tolman's experiments with rats demonstrated that organisms can learn even if they do not receive immediate reinforcement (Tolman & Honzik, 1930; Tolman, Ritchie, & Kalish, 1946). This finding was in conflict with the prevailing idea at the time that reinforcement must be immediate in order for learning to occur, thus suggesting a cognitive aspect to learning.

In the experiments, Tolman placed hungry rats in a maze with no reward for finding their way through it. He also studied a comparison group that was rewarded with food at the end of the maze. As the unreinforced rats explored the maze, they developed a **cognitive map**: a mental picture of the layout of the maze (Figure 6.15). After 10 sessions in the maze without reinforcement, food was placed in a goal box at the end of the maze. As soon as the rats became aware of the food, they were able to find their way through the maze quickly, just as quickly as the comparison group, which had been rewarded with food all along. This is known as **latent learning**: learning that occurs but is not observable in behavior until there is a reason to demonstrate it.

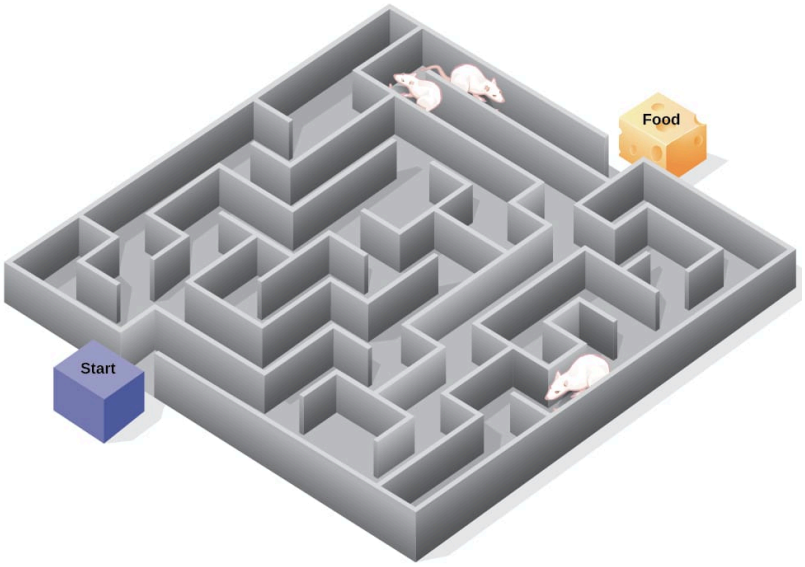


Figure 6.15 Psychologist Edward Tolman found that rats use cognitive maps to navigate through a maze. Have you ever worked your way through various levels on a video game? You learned when to turn left or right, move up or down. In that case you were relying on a cognitive map, just like the rats in a maze. (credit: modification of work by "FutUndBeidl"/Flickr)

Latent learning also occurs in humans. Children may learn by watching the actions of their parents but only demonstrate it at a later date, when the learned material is needed. For example, suppose that Ravi's dad drives him to school every day. In this way, Ravi learns the route from his house to his school, but he's never driven there himself, so he has not had a chance to demonstrate that he's learned the way. One morning Ravi's dad has to leave early for a meeting, so he can't drive Ravi to school. Instead, Ravi follows the same route on his bike that his dad would have taken in the car. This demonstrates latent learning. Ravi had learned the route to school, but had no need to demonstrate this knowledge earlier.

EVERYDAY CONNECTION: This Place Is Like a Maze

Have you ever gotten lost in a building and couldn't find your way back out? While that can be frustrating, you're not alone. At one time or another we've all gotten lost in places like a museum, hospital, or university library. Whenever we go someplace new, we build a mental representation—or cognitive map—of the location, as Tolman's rats built a cognitive map of their maze. However, some buildings are confusing because they include many areas that look alike or have short lines of sight. Because of this, it's often difficult to predict what's around a corner or decide whether to turn left or right to get out of a building. Psychologist Laura Carlson (2010) suggests that what we place in our cognitive map can impact our success in

navigating through the environment. She suggests that paying attention to specific features upon entering a building, such as a picture on the wall, a fountain, a statue, or an escalator, adds information to our cognitive map that can be used later to help find our way out of the building.

Optional: Link to Learning

You can watch this video about Carlson's studies on cognitive maps and navigation in buildings to learn more.

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6.4: Observational learning (modeling)

Learning Objectives

- Define observational learning
- Discuss the steps in the modeling process
- Explain the prosocial and antisocial effects of observational learning

Previous sections of this chapter focused on classical and operant conditioning, which are forms of associative learning. In **observational learning**, we learn by watching others and then imitating, or modeling, what they do or say. For instance, have you ever gone to YouTube to find a video showing you how to do something? The individuals performing the imitated behavior are called **models**. Research suggests that this imitative learning involves a specific type of neuron, called a mirror neuron (Hickock, 2010; Rizzolatti, Fadiga, Fogassi, & Gallese, 2002; Rizzolatti, Fogassi, & Gallese, 2006).

Humans and other animals are capable of observational learning. As you will see, the phrase "monkey see, monkey do" really is accurate (Figure 6.16). The same could be said about other animals. For example, in a study of social learning in chimpanzees, researchers gave juice boxes with straws to two groups of captive chimpanzees. The first group dipped the straw into the juice box, and then sucked on the small amount of juice at the end of the straw. The second group sucked through the straw directly, getting much more juice. When the first group, the "dippers," observed the second group, "the suckers," what do you think happened? All of the "dippers" in the first group switched to sucking through the straws directly. By simply observing the other chimps and modeling their behavior, they learned that this was a more efficient method of getting juice (Yamamoto, Humle, and Tanaka, 2013).



Figure 6.16 This spider monkey learned to drink water from a plastic bottle by seeing the behavior modeled by a human. (credit: U.S. Air Force, Senior Airman Kasey Close)

Imitation is much more obvious in humans, but is imitation really the sincerest form of flattery? Consider Claire's experience with observational learning. Claire's nine-year-old son, Jay, was getting into trouble at school and was defiant at home. Claire feared that Jay would end up like her brothers, two of whom were in prison. One day, after yet another bad day at school and another negative note from the teacher, Claire, at her wit's end, beat her son with a belt to get him to behave. Later that night, as she put her children to bed, Claire witnessed her four-year-old daughter, Anna, take a belt to her teddy bear and whip it. Claire was horrified, realizing that Anna was imitating her mother. It was then that Claire knew she wanted to discipline her children in a different manner.

Like Tolman, whose experiments with rats suggested a cognitive component to learning, psychologist Albert Bandura's ideas about learning were different from those of strict behaviorists. Bandura and other researchers proposed a brand of behaviorism called social learning theory, which took cognitive processes into account. According to Bandura, pure behaviorism could not

explain why learning can take place in the absence of external reinforcement. He felt that internal mental states must also have a role in learning and that observational learning involves much more than imitation. In imitation, a person simply copies what the model does. Observational learning is much more complex. According to Lefrançois (2012) there are several ways that observational learning can occur:

1. You learn a new response. After watching your coworker get chewed out by your boss for coming in late, you start leaving home 10 minutes earlier so that you won't be late.
2. You choose whether or not to imitate the model depending on what you saw happen to the model. Remember Julian and his father? When learning to surf, Julian might watch how his father pops up successfully on his surfboard and then attempt to do the same thing. On the other hand, Julian might learn not to touch a hot stove after watching his father get burned on a stove.
3. You learn a general rule that you can apply to other situations.

Bandura identified three kinds of models: live, verbal, and symbolic. A live model demonstrates a behavior in person, as when Ben stood up on his surfboard so that Julian could see how he did it. A verbal instructional model does not perform the behavior, but instead explains or describes the behavior, as when a soccer coach tells his young players to kick the ball with the side of the foot, not with the toe. A symbolic model can be fictional characters or real people who demonstrate behaviors in books, movies, television shows, video games, or Internet sources (Figure 6.17).

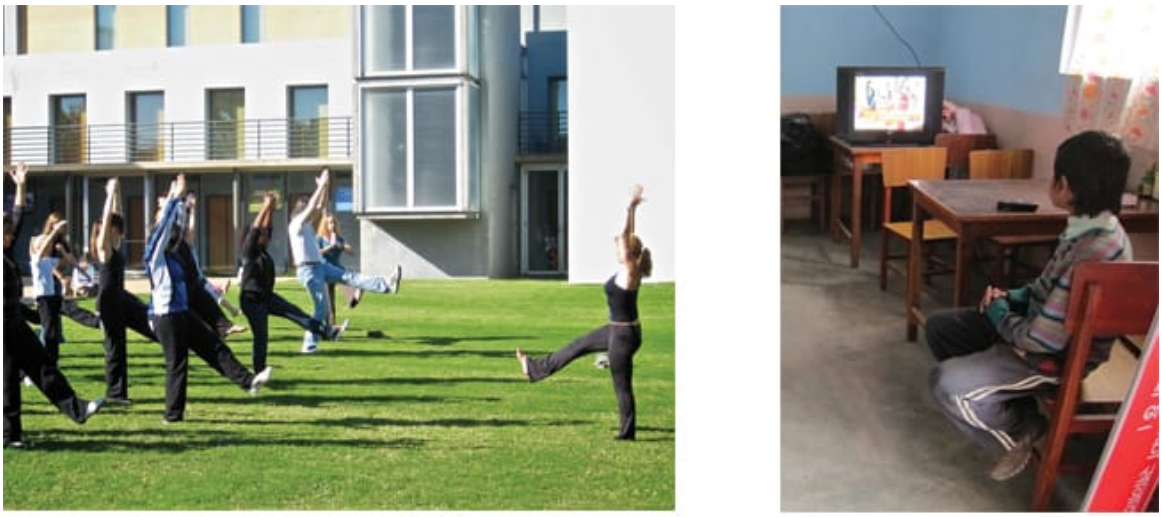


Figure 6.17 (a) Yoga students learn by observation as their yoga instructor demonstrates the correct stance and movement for her students (live model). (b) Models don't have to be present for learning to occur: through symbolic modeling, this child can learn a behavior by watching someone demonstrate it on television. (credit a: modification of work by Tony Cecala; credit b: modification of work by Andrew Hyde)

Optional: Link to Learning

Latent learning and modeling are used all the time in the world of marketing and advertising. This Ford commercial starring Derek Jeter played for months across the New York, New Jersey, and Connecticut areas. Jeter was an award-winning baseball player for the New York Yankees. The commercial aired in a part of the country where Jeter is an incredibly well-known athlete. He is wealthy, and considered very loyal and good looking. What message are the advertisers sending by having him featured in the ad? How effective do you think it is?

Steps in the Modeling Process

Of course, we don't learn a behavior simply by observing a model. Bandura described specific steps in the process of modeling that must be followed if learning is to be successful: attention, retention, reproduction, and motivation. First, you must be focused on what the model is doing—you have to pay attention. Next, you must be able to retain, or remember, what you observed; this is retention. Then, you must be able to perform the behavior that you observed and committed to memory; this is reproduction.

Finally, you must have motivation. You need to want to copy the behavior, and whether or not you are motivated depends on what happened to the model. If you saw that the model was reinforced for her behavior, you will be more motivated to copy her. This is known as **vicarious reinforcement**. On the other hand, if you observed the model being punished, you would be less motivated to copy her. This is called **vicarious punishment**. For example, imagine that four-year-old Allison watched her older sister Kaitlyn playing in their mother's makeup, and then saw Kaitlyn get a time out when their mother came in. After their mother left the room, Allison was tempted to play in the make-up, but she did not want to get a time-out from her mother. What do you think she did? Once you actually demonstrate the new behavior, the reinforcement you receive plays a part in whether or not you will repeat the behavior.

Bandura researched modeling behavior, particularly children's modeling of adults' aggressive and violent behaviors (Bandura, Ross, & Ross, 1961). He conducted an experiment with a five-foot inflatable doll that he called a Bobo doll. In the experiment, children's aggressive behavior was influenced by whether the teacher was punished for her behavior. In one scenario, a teacher acted aggressively with the doll, hitting, throwing, and even punching the doll, while a child watched. There were two types of responses by the children to the teacher's behavior. When the teacher was punished for her bad behavior, the children decreased their tendency to act as she had. When the teacher was praised or ignored (and not punished for her behavior), the children imitated what she did, and even what she said. They punched, kicked, and yelled at the doll.

Optional: Link to Learning

You can watch this video clip about the famous Bobo doll experiment to see a portion of the experiment and an interview with Albert Bandura.

What are the implications of this study? Bandura concluded that we watch and learn, and that this learning can have both prosocial and antisocial effects. Prosocial (positive) models can be used to encourage socially acceptable behavior. Parents in particular should take note of this finding. If you want your children to read, then read to them. Let them see you reading. Keep books in your home. Talk about your favorite books. If you want your children to be healthy, then let them see you eat right and exercise, and spend time engaging in physical fitness activities together. The same holds true for qualities like kindness, courtesy, and honesty. The main idea is that children observe and learn from their parents, even their parents' morals, so be consistent and toss out the old adage "Do as I say, not as I do," because children tend to copy what you do instead of what you say. Besides parents, many public figures, such as Martin Luther King, Jr. and Mahatma Gandhi, are viewed as prosocial models who are able to inspire global social change. Can you think of someone who has been a prosocial model in your life?

The antisocial effects of observational learning are also worth mentioning. As you saw from the example of Claire at the beginning of this section, her daughter viewed Claire's aggressive behavior and copied it. Research suggests that this may help to explain why abused children often grow up to be abusers themselves (Murrell, Christoff, & Henning, 2007). In fact, about 30% of abused children become abusive parents (U.S. Department of Health & Human Services, 2013). We tend to do what we know. Abused children, who grow up witnessing their parents deal with anger and frustration through violent and aggressive acts, often learn to behave in that manner themselves. Sadly, it's a vicious cycle that's difficult to break.

Some studies suggest that violent television shows, movies, and video games may also have antisocial effects (Figure 6.18) although further research needs to be done to understand the correlational and causational aspects of media violence and behavior. Some studies have found a link between viewing violence and aggression seen in children (Anderson & Gentile, 2008; Kirsch, 2010; Miller, Grabell, Thomas, Bermann, & Graham-Bermann, 2012). These findings may not be surprising, given that a child graduating from high school has been exposed to around 200,000 violent acts including murder, robbery, torture, bombings, beatings, and rape through various forms of media (Huston et al., 1992). Not only might viewing media violence affect aggressive behavior by teaching people to act that way in real life situations, but it has also been suggested that repeated exposure to violent acts also desensitizes people to it. Psychologists are working to understand this dynamic.



Figure 6.18 Can video games make us violent? Psychological researchers study this topic. (credit: "woodleywonderworks"/Flickr)

Optional: Link to Learning

You can view this video about the connection between violent video games and violent behavior to learn more.

What do you think?

Violent Media and Aggression

Does watching violent media or playing violent video games cause aggression? Albert Bandura's early studies suggested television violence increased aggression in children, and more recent studies support these findings. For example, research by Craig Anderson and colleagues (Anderson, Bushman, Donnerstein, Hummer, & Warbuten, 2015; Anderson et al., 2010; Bushman et al., 2016) found extensive evidence to suggest a causal link between hours of exposure to violent media and aggressive thoughts and behaviors. However, studies by Christopher Ferguson and others suggests that while there may be a link between violent media exposure and aggression, research to date has not accounted for other risk factors for aggression including mental health and family life (Ferguson, 2011; Gentile, 2016). What do think?

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6.5: Conditioning in everyday life

Learning Objectives

1. Review the ways that learning theories can be applied to understanding and modifying everyday behavior.
2. Describe the situations under which reinforcement may make people *less* likely to enjoy engaging in a behavior.
3. 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 behavior 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 (Simek & O'Brien, 1981; Pedalino & Gamboa, 1974; Azrin & Foxx, 1974; McGlynn, 1990). 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.

YouTube Video

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Video Clip: Television Ads. https://www.youtube.com/watch?v=FGT8BE3_y3A. Can you determine how classical conditioning is being used in these commercials?

A similar strategy is used by corporations that sponsor teams or events. For instance, if people enjoy watching a college 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 colors, 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 color 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 behavior, 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).

Psychology in Everyday Life: Operant Conditioning in the Classroom

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 behaviorism,

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 behavior. 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 they 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 6.5.10, 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 behavior. The children in the no reward groups and the children in the unexpected reward groups 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.

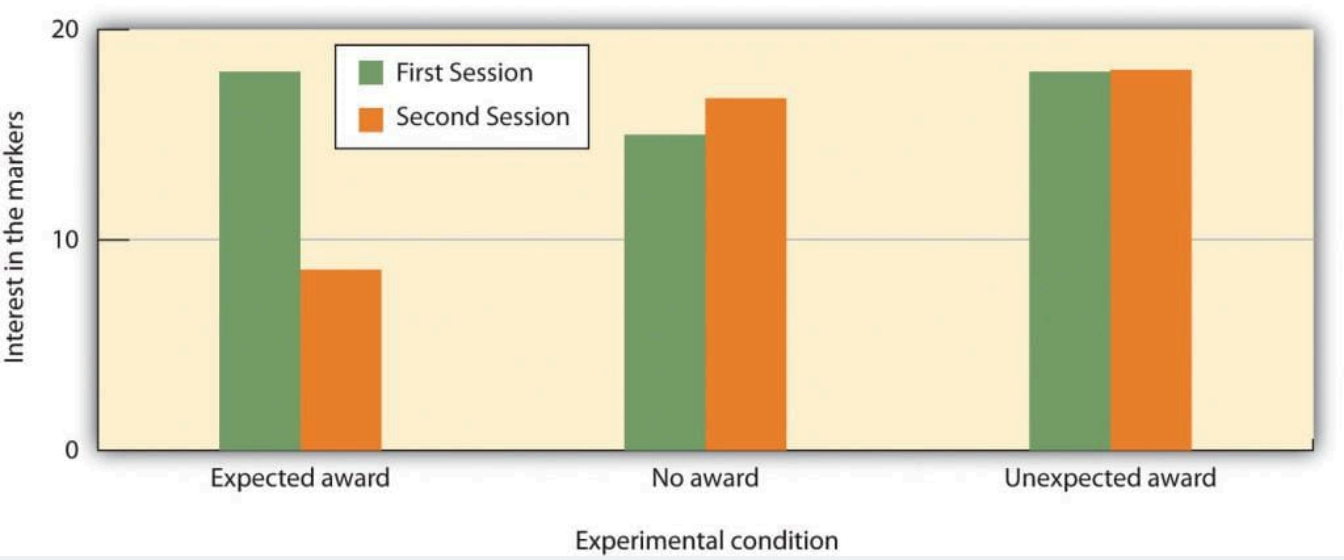


Figure 6.5.10: Undermining Intrinsic Interest. Mark Lepper and his colleagues (1973) found that giving rewards for playing with markers, which the children naturally enjoyed, could reduce their interest in the activity. Adapted from Lepper, M. R., Greene, D., & Nisbett, R. E. (1973). Undermining children's intrinsic interest with extrinsic reward: A test of the "overjustification" hypothesis. *Journal of Personality & Social Psychology, 28*(1), 129–137.

This research suggests that, although giving rewards may in many cases lead us to perform an activity more frequently or with more effort, reward may not always increase our liking for the activity. In some cases 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 behavior. 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 behavior are likely to change their behavior 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 behaviors (Rotter, 1945; Bandura, 1977; Miller & Dollard, 1941). 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 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 behavior 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 behavior, such as air pollution and the necessity of building even more highways.

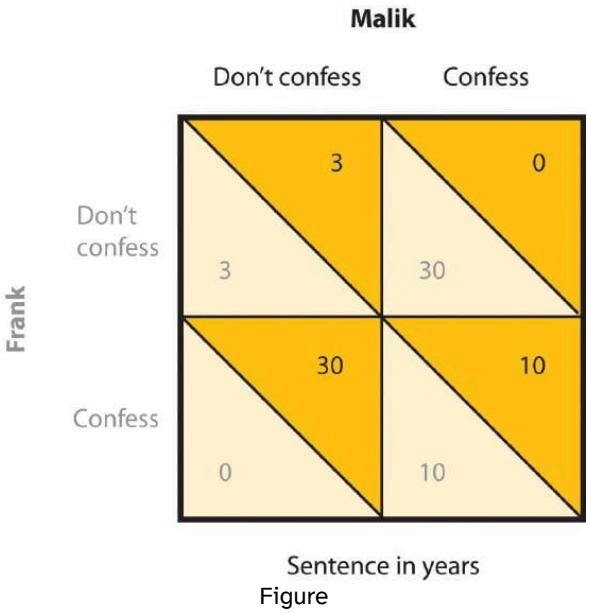
A social dilemma such as the commons dilemma is *a situation in which the behavior that creates the most positive outcomes for the individual may in the long term lead to negative consequences for the group as a whole*. The dilemmas are arranged in a way that it is easy to be selfish, because the personally 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 offense. In an attempt to gain more evidence, and thus to 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 6.5.11. 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

: 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.

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 such 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 6.5.11, 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 such 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 0 rather than 3 years in prison). So the matrix is arranged such 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 behavior 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 behaviors 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 behavior in it in terms of principles of learning.

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CHAPTER 6: CONDITIONING

6.1: Learning
6.2: Classical conditioning
6.3: Operant conditioning
6.4: Observational learning (modeling)
6.5: Conditioning in everyday life
6.6: Optional videos

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6.6: Optional videos

Optional videos

Overloaded by all the information you just learned? The video below provides a helpful overview of both classical and operant conditioning.

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View this YouTube Video online

Confused between classical and operant conditioning? The video below explains the differences between the two.

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UNIT III: HOW TO BE A SAVVY INFORMATION CONSUMER

Chapter 7: Heuristics and Biases

7.1: Judgement and Decision Making

7.2: Accuracy and Inaccuracy in Memory and Cognition

Chapter 8: Psychology as a Science

8.1: Using data

8.2: Why Research is Important

8.3: Psychologists Use the Scientific Method to Guide Their Research

Chapter 9: Research Methods

9.1: You Can Be an Informed Consumer of Psychological Research

Chapter 10: Statistical Thinking

10.1: Statistical Thinking

10.2: Avoid being fooled

Chapter 11: Finding Research Articles

11.1: Article Quality

11.2: Practical helps

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CHAPTER 7: HEURISTICS AND BIASES

7.1: Judgement and Decision Making

7.2: Accuracy and Inaccuracy in Memory and Cognition

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7.1: Judgement and Decision Making

By Max H. Bazerman

Harvard University

Humans are not perfect decision makers. Not only are we not perfect, but we depart from perfection or rationality in systematic and predictable ways. The understanding of these systematic and predictable departures is core to the field of judgment and decision making. By understanding these limitations, we can also identify strategies for making better and more effective decisions.

learning objectives

- Understand the systematic biases that affect our judgment and decision making.
- Develop strategies for making better decisions.
- Experience some of the biases through sample decisions.

Introduction

Every day you have the opportunity to make countless decisions: should you eat dessert, cheat on a test, or attend a sports event with your friends. If you reflect on your own history of choices you will realize that they vary in quality; some are rational and some are not. This module provides an overview of decision making and includes discussion of many of the common biases involved in this process.

In his Nobel Prize–winning work, psychologist Herbert Simon (1957; March & Simon, 1958) argued that our decisions are bounded in their rationality. According to the **bounded rationality** framework, human beings try to make rational decisions (such as weighing the costs and benefits of a choice) but our cognitive limitations prevent us from being fully rational. Time and cost constraints limit the quantity and quality of the information that is available to us. Moreover, we only retain a relatively small amount of information in our usable memory. And limitations on intelligence and perceptions constrain the ability of even very bright decision makers to accurately make the best choice based on the information that is available.

About 15 years after the publication of Simon's seminal work, Tversky and Kahneman (1973, 1974; Kahneman & Tversky, 1979) produced their own Nobel Prize–winning research, which provided critical information about specific systematic and predictable **biases**, or mistakes, that influence judgment (Kahneman received the prize after Tversky's death). The work of Simon, Tversky, and Kahneman paved the way to our modern understanding of judgment and decision making. And their two Nobel prizes signaled the broad acceptance of the field of behavioral decision research as a mature area of intellectual study.

What Would a Rational Decision Look Like?

Imagine that during your senior year in college, you apply to a number of doctoral programs, law schools, or business schools (or another set of programs in whatever field most interests you). The good news is that you receive many acceptance letters. So, how should you decide where to go? Bazerman and Moore (2013) outline the following six steps that you should take to make a rational decision: (1) define the problem (i.e., selecting the right graduate program), (2) identify the criteria necessary to judge the multiple options (location, prestige, faculty, etc.), (3) weight the criteria (rank them in terms of importance to you), (4) generate alternatives (the schools that admitted you), (5) rate each alternative on each criterion (rate each school on each criteria that you identified, and (6) compute the optimal decision. Acting rationally would require that you follow these six steps in a fully rational manner.



People often have to use incomplete information and intuition to make even the most important of decisions. A fully rational decision requires a careful, systematic process. [Image: CC0 Public Domain, goo.gl/m25gce]

I strongly advise people to think through important decisions such as this in a manner similar to this process. Unfortunately, we often don't. Many of us rely on our intuitions far more than we should. And when we do try to think systematically, the way we enter data into such formal decision-making processes is often biased.

Fortunately, psychologists have learned a great deal about the biases that affect our thinking. This knowledge about the systematic and predictable mistakes that even the best and the brightest make can help you identify flaws in your thought processes and reach better decisions.

Biases in Our Decision Process

Simon's concept of bounded rationality taught us that judgment deviates from rationality, but it did not tell us *how* judgment is biased. Tversky and Kahneman's (1974) research helped to diagnose the specific systematic, directional biases that affect human judgment. These biases are created by the tendency to short-circuit a rational decision process by relying on a number of simplifying strategies, or rules of thumb, known as **heuristics**. Heuristics allow us to cope with the complex environment surrounding our decisions. Unfortunately, they also lead to systematic and predictable biases.

To highlight some of these biases please answer the following three quiz items:

Problem 1 (adapted from Alpert & Raiffa, 1969):

Listed below are 10 uncertain quantities. Do not look up any information on these items. For each, write down your best estimate of the quantity. Next, put a lower and upper bound around your estimate, such that you are 98 percent confident that your range surrounds the actual quantity. Respond to each of these items even if you admit to knowing very little about these quantities.

1. The first year the Nobel Peace Prize was awarded
2. The date the French celebrate "Bastille Day"
3. The distance from the Earth to the Moon
4. The height of the Leaning Tower of Pisa
5. Number of students attending Oxford University (as of 2014)
6. Number of people who have traveled to space (as of 2013)
7. 2012-2013 annual budget for the University of Pennsylvania
8. Average life expectancy in Bangladesh (as of 2012)
9. World record for pull-ups in a 24-hour period
10. Number of colleges and universities in the Boston metropolitan area

Problem 2 (adapted from Joyce & Biddle, 1981):

We know that executive fraud occurs and that it has been associated with many recent financial scandals. And, we know that many cases of management fraud go undetected even when annual audits are performed. Do you think that the incidence of significant executive-level management fraud is more than 10 in 1,000 firms (that is, 1 percent) audited by Big Four accounting firms?

1. Yes, more than 10 in 1,000 Big Four clients have significant executive-level management fraud.
2. No, fewer than 10 in 1,000 Big Four clients have significant executive-level management fraud.

What is your estimate of the number of Big Four clients per 1,000 that have significant executive-level management fraud? (Fill in the blank below with the appropriate number.)

_____ in 1,000 Big Four clients have significant executive-level management fraud.

Problem 3 (adapted from Tversky & Kahneman, 1981):

Imagine that the United States is preparing for the outbreak of an unusual avian disease that is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows.

1. Program A: If Program A is adopted, 200 people will be saved.
2. Program B: If Program B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved.

Which of the two programs would you favor?

Overconfidence

On the first problem, if you set your ranges so that you were justifiably 98 percent confident, you should expect that approximately 9.8, or nine to 10, of your ranges would include the actual value. So, let's look at the correct answers:



Overconfidence is a natural part of most people's decision-making process and this can get us into trouble. Is it possible to overcome our faulty thinking? Perhaps. See the "Fixing Our Decisions" section below. [Image: Barn Images, https://goo.gl/IYzbDV, CC BY 2.0, goo.gl/BRvSA7]

1. 1901
2. 14th of July
3. 384,403 km (238,857 mi)
4. 56.67 m (183 ft)
5. 22,384 (as of 2014)

6. 536 people (as of 2013)
7. $6.007 billion
8. 70.3 years (as of 2012)
9. 4,321
10. 52

Count the number of your 98% ranges that actually surrounded the true quantities. If you surrounded nine to 10, you were appropriately confident in your judgments. But most readers surround only between three (30%) and seven (70%) of the correct answers, despite claiming 98% confidence that each range would surround the true value. As this problem shows, humans tend to be **overconfident** in their judgments.

Anchoring

Regarding the second problem, people vary a great deal in their final assessment of the level of executive-level management fraud, but most think that 10 out of 1,000 is too low. When I run this exercise in class, half of the students respond to the question that I asked you to answer. The other half receive a similar problem, but instead are asked whether the correct answer is higher or lower than 200 rather than 10. Most people think that 200 is high. But, again, most people claim that this "**anchor**" does not affect their final estimate. Yet, on average, people who are presented with the question that focuses on the number 10 (out of 1,000) give answers that are about one-half the size of the estimates of those facing questions that use an anchor of 200. When we are making decisions, any initial anchor that we face is likely to influence our judgments, even if the anchor is arbitrary. That is, we insufficiently adjust our judgments away from the anchor.

Framing

Turning to Problem 3, most people choose Program A, which saves 200 lives for sure, over Program B. But, again, if I was in front of a classroom, only half of my students would receive this problem. The other half would have received the same set-up, but with the following two options:

1. Program C: If Program C is adopted, 400 people will die.
2. Program D: If Program D is adopted, there is a one-third probability that no one will die and a two-thirds probability that 600 people will die.

Which of the two programs would you favor?

Careful review of the two versions of this problem clarifies that they are objectively the same. Saving 200 people (Program A) means losing 400 people (Program C), and Programs B and D are also objectively identical. Yet, in one of the most famous problems in judgment and decision making, most individuals choose Program A in the first set and Program D in the second set (Tversky & Kahneman, 1981). People respond very differently to saving versus losing lives—even when the difference is based just on the "**framing**" of the choices.

The problem that I asked you to respond to was framed in terms of saving lives, and the implied reference point was the worst outcome of 600 deaths. Most of us, when we make decisions that concern gains, are risk averse; as a consequence, we lock in the possibility of saving 200 lives for sure. In the alternative version, the problem is framed in terms of losses. Now the implicit reference point is the best outcome of no deaths due to the avian disease. And in this case, most people are risk seeking when making decisions regarding losses.

These are just three of the many biases that affect even the smartest among us. Other research shows that we are biased in favor of information that is easy for our minds to retrieve, are insensitive to the importance of base rates and sample sizes when we are making inferences, assume that random events will always look random, search for information that confirms our expectations even when disconfirming information would be more informative, claim a priori knowledge that didn't exist due to the hindsight bias, and are subject to a host of other effects that continue to be developed in the literature (Bazerman & Moore, 2013).

Contemporary Developments

Bounded rationality served as the integrating concept of the field of behavioral decision research for 40 years. Then, in 2000, Thaler (2000) suggested that decision making is bounded in two ways not precisely captured by the concept of bounded rationality. First, he argued that our **willpower is bounded** and that, as a consequence, we give greater weight to present

concerns than to future concerns. Our immediate motivations are often inconsistent with our long-term interests in a variety of ways, such as the common failure to save adequately for retirement or the difficulty many people have staying on a diet. Second, Thaler suggested that our **self-interest is bounded** such that we care about the outcomes of others. Sometimes we positively value the outcomes of others—giving them more of a commodity than is necessary out of a desire to be fair, for example. And, in unfortunate contexts, we sometimes are willing to forgo our own benefits out of a desire to harm others.



The concept of bounded willpower may explain why many of us are better shoppers than savers. [Image: CC0 Public Domain, goo.gl/m25gce]

My colleagues and I have recently added two other important bounds to the list. Chugh, Banaji, and Bazerman (2005) and Banaji and Bhaskar (2000) introduced the concept of **bounded ethicality**, which refers to the notion that our ethics are limited in ways we are not even aware of ourselves. Second, Chugh and Bazerman (2007) developed the concept of **bounded awareness** to refer to the broad array of focusing failures that affect our judgment, specifically the many ways in which we fail to notice obvious and important information that is available to us.

A final development is the application of judgment and decision-making research to the areas of behavioral economics, behavioral finance, and behavioral marketing, among others. In each case, these fields have been transformed by applying and extending research from the judgment and decision-making literature.

Fixing Our Decisions

Ample evidence documents that even smart people are routinely impaired by biases. Early research demonstrated, unfortunately, that awareness of these problems does little to reduce bias (Fischhoff, 1982). The good news is that more recent research documents interventions that do help us overcome our faulty thinking (Bazerman & Moore, 2013).

One critical path to fixing our biases is provided in Stanovich and West's (2000) distinction between **System 1** and **System 2** decision making. System 1 processing is our intuitive system, which is typically fast, automatic, effortless, implicit, and emotional. System 2 refers to decision making that is slower, conscious, effortful, explicit, and logical. The six logical steps of decision making outlined earlier describe a System 2 process.

Clearly, a complete System 2 process is not required for every decision we make. In most situations, our System 1 thinking is quite sufficient; it would be impractical, for example, to logically reason through every choice we make while shopping for groceries. But, preferably, System 2 logic should influence our most important decisions. Nonetheless, we use our System 1 processes for most decisions in life, relying on it even when making important decisions.

The key to reducing the effects of bias and improving our decisions is to transition from trusting our intuitive System 1 thinking toward engaging more in deliberative System 2 thought. Unfortunately, the busier and more rushed people are, the more they have on their minds, and the more likely they are to rely on System 1 thinking (Chugh, 2004). The frantic pace of professional life suggests that executives often rely on System 1 thinking (Chugh, 2004).

Fortunately, it is possible to identify conditions where we rely on intuition at our peril and substitute more deliberative thought. One fascinating example of this substitution comes from journalist Michael Lewis' (2003) account of how Billy Beane, the general manager of the Oakland Athletics, improved the outcomes of the failing baseball team after recognizing that the intuition of baseball executives was limited and systematically biased and that their intuitions had been incorporated into important decisions in ways that created enormous mistakes. Lewis (2003) documents that baseball professionals tend to overgeneralize from their personal experiences, be overly influenced by players' very recent performances, and overweigh what they see with their own eyes, despite the fact that players' multiyear records provide far better data. By substituting valid predictors of future performance (System 2 thinking), the Athletics were able to outperform expectations given their very limited payroll.



Nudges can be used to help people make better decisions about saving for retirement. [Image: Tax Credits, https://goo.gl/YLuyth, CC BY 2.0, goo.gl/BRvSA7]

Another important direction for improving decisions comes from Thaler and Sunstein's (2008) book *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Rather than setting out to debias human judgment, Thaler and Sunstein outline a strategy for how "decision architects" can change environments in ways that account for human bias and trigger better decisions as a result. For example, Beshears, Choi, Laibson, and Madrian (2008) have shown that simple changes to defaults can dramatically improve people's decisions. They tackle the failure of many people to save for retirement and show that a simple change can significantly influence enrollment in 401(k) programs. In most companies, when you start your job, you need to proactively sign up to join the company's retirement savings plan. Many people take years before getting around to doing so. When, instead, companies automatically enroll their employees in 401(k) programs and give them the opportunity to "opt out," the net enrollment rate rises significantly. By changing defaults, we can counteract the human tendency to live with the status quo.

Similarly, Johnson and Goldstein's (2003) cross-European organ donation study reveals that countries that have opt-in organ donation policies, where the default is not to harvest people's organs without their prior consent, sacrifice thousands of lives in comparison to opt-out policies, where the default is to harvest organs. The United States and too many other countries require that citizens opt in to organ donation through a proactive effort; as a consequence, consent rates range between 4.25%–44% across these countries. In contrast, changing the decision architecture to an opt-out policy improves consent rates to 85.9% to 99.98%. Designing the donation system with knowledge of the power of defaults can dramatically change donation rates without changing the options available to citizens. In contrast, a more intuitive strategy, such as the one in place in the United States, inspires defaults that result in many unnecessary deaths.

Concluding Thoughts

Our days are filled with decisions ranging from the small (what should I wear today?) to the important (should we get married?). Many have real world consequences on our health, finances and relationships. Simon, Kahneman, and Tversky created a field that highlights the surprising and predictable deficiencies of the human mind when making decisions. As we understand more about our own biases and thinking shortcomings we can begin to take them into account or to avoid them. Only now have we reached the frontier of using this knowledge to help people make better decisions.

Outside Resources

Book: Bazerman, M. H., & Moore, D. (2013). Judgment in managerial decision making (8th ed.). John Wiley & Sons Inc.

Book: Kahneman, D. (2011) Thinking, Fast and Slow. New York, NY: Farrar, Straus and Giroux.

Book: Thaler, R. H., & Sunstein, C. R. (2008). Nudge: Improving Decisions about Health, Wealth, and Happiness. New Haven, CT: Yale University Press.

Discussion Questions

1. Are the biases in this module a problem in the real world?
2. How would you use this module to be a better decision maker?
3. Can you see any biases in today's newspaper?

Vocabulary

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.

Biases
The systematic and predictable mistakes that influence the judgment of even very talented human beings.

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.

Framing
The bias to be systematically affected by the way in which information is presented, while holding the objective information constant.

Heuristics
cognitive (or thinking) strategies that simplify decision making by using mental short-cuts

Overconfident
The bias to have greater confidence in your judgment than is warranted based on a rational assessment.

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.

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7.2: Accuracy and Inaccuracy in Memory and Cognition

Learning Objectives

1. Outline the variables that can influence the accuracy of our memory for events.
2. Explain how schemas can distort our memories.
3. 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 behaviors.

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 7.2.3). 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 7.2.3: 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 colorful, 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 college 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 the *National Enquirer*. 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. Kaavya Viswanathan, the author of the book *How Opal Mehta Got Kissed, Got Wild, and Got a Life*, was accused of plagiarism when it was revealed that many parts of her book were very similar to passages from other material. Viswanathan argued that she had simply forgotten that she had read the other works, mistakenly assuming she had made up the material herself. And 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 didn't 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

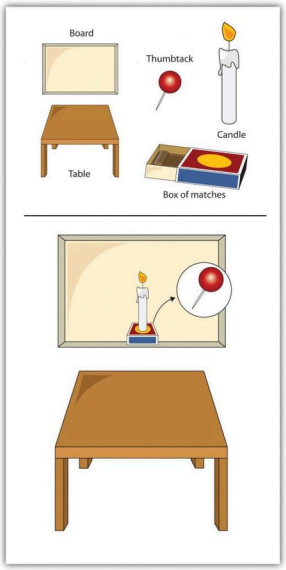
We have seen that schemas help us remember information by organizing material into coherent representations. However, although schemas can improve our memories, they may also lead to cognitive biases. Using schemas may lead us to falsely remember things that never happened to us and to distort or misremember 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 fourth-grade 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 college 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 7.2.19). 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

: 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 Jennifer Thompson 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 the 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*.

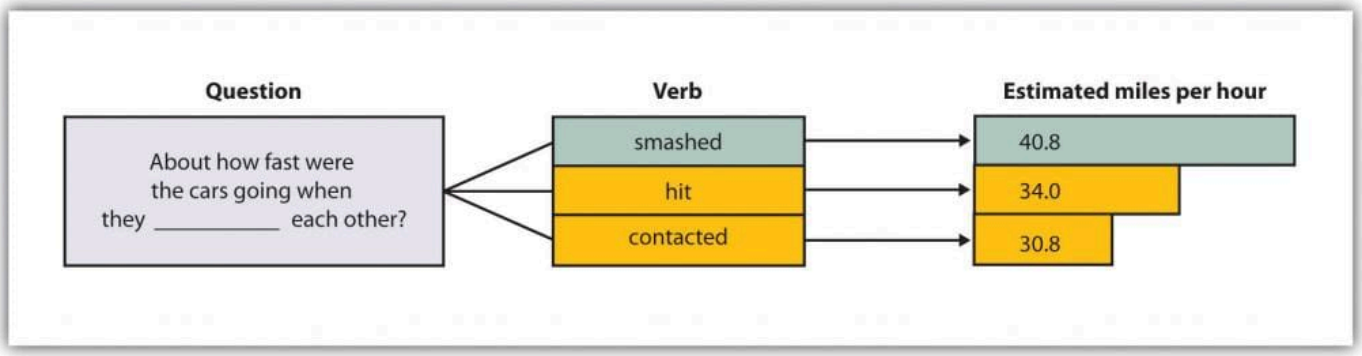
In an experiment by Loftus and Palmer (1974), participants viewed a film of a traffic accident and then, according to random assignment to experimental conditions, answered one of three questions:

"About how fast were the cars going when they hit each other?"

"About how fast were the cars going when they smashed each other?"

"About how fast were the cars going when they contacted each other?"

As you can see in Figure 7.2.20, 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

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. Adapted from Loftus, E. F., & Palmer, J. C. (1974). Reconstruction of automobile destruction: An example of the interaction between language and memory.
Journal of Verbal Learning & Verbal Behavior, 13
(5), 585–589.

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 (e.g., moving to a new house) and did not (e.g., being lost in a shopping mall) happen to their children. 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 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 Jennifer Thompson's mistaken identity of Ronald Cotton 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 college 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 (e.g., Jennifer Thompson) 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 2001, and perhaps also when you heard that Princess Diana was killed in 1997 or when the verdict of the O. J. Simpson trial was announced in 1995. 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 1, 6, 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. Schmolck, Buffalo, and Squire (2000) found similar distortions in memories of news about the verdict in the O. J. Simpson trial.

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 7.2.4. 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 7.2.4: 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 behavior 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 neighborhood 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, colorful, 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 checkbook. By tracking eye movements, the researchers determined that people were more likely to look at the gun than at the checkbook, 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 we might better not have. 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 favor 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 behavior*. 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 color 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

: 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. kinnigurl – Winter Olympic Men's Snowboard Cross medalists – CC BY-SA 2.0.

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. 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 aren't 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 (more than 50,000 people are killed on U.S. highways every year). Because people don't accurately calibrate their behaviors 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 (Slovic, 2000).

Salience and accessibility also color how we perceive our social worlds, which may have a big influence on our behavior. 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 behavior, 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?

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8.1: Using data

We are bombarded every day with claims about how the world works, claims that have a direct impact on how we think about and solve problems in society and our personal lives. This module explores important considerations for evaluating the trustworthiness of such claims by contrasting between scientific thinking and everyday observations (also known as “anecdotal evidence”).

INTRODUCTION

Why are some people so much happier than others? Is it harmful for children to have imaginary companions? How might students study more effectively?

Even if you’ve never considered these questions before, you probably have some guesses about their answers. Maybe you think getting rich or falling in love leads to happiness. Perhaps you view imaginary friends as expressions of a dangerous lack of realism. What’s more, if you were to ask your friends, they would probably also have opinions about these questions—opinions that may even differ from your own.

A quick internet search would yield even more answers. We live in the “Information Age,” with people having access to more explanations and answers than at any other time in history. But, although the *quantity* of information is continually increasing, it’s always good practice to consider the *quality* of what you read or watch: Not all information is equally trustworthy. The trustworthiness of information is especially important in an era when “fake news,” urban myths, misleading “click-bait,” and conspiracy theories compete for our attention alongside well-informed conclusions grounded in evidence. Determining what information is well-informed is a crucial concern and a central task of science. Science is a way of using observable **data** to help explain and understand the world around us in a trustworthy way.

In this module, you will learn about scientific thinking. You will come to understand how scientific research informs our knowledge and helps us create theories. You will also come to appreciate how scientific reasoning is different from the types of reasoning people often use to form personal opinions.

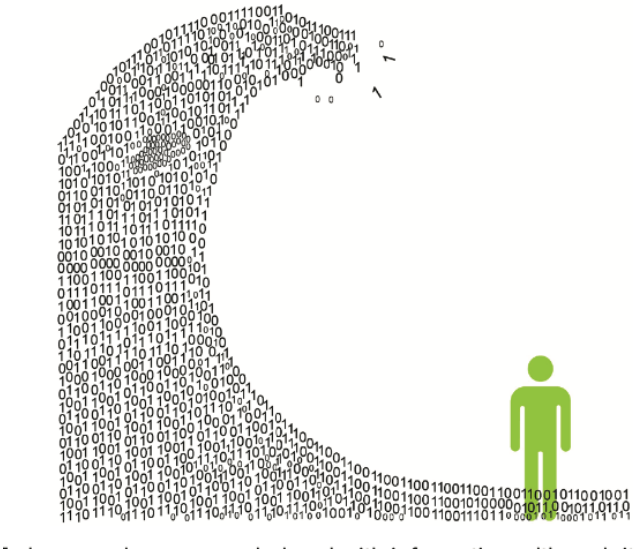


Figure 8.1.1: Today, people are overwhelmed with information, although it varies in quality. [“Social Media Information Overload” by Mark Smiciklas/ Flickr is licensed under CC BY-NC 2.0.]

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8.2: Why Research is Important

Learning Objectives

- Explain how scientific research addresses questions about behavior
- Discuss how scientific research guides public policy
- Appreciate how scientific research can be important in making personal decisions

Scientific research is a critical tool for successfully navigating our complex world. Without it, we would be forced to rely solely on intuition, other people's authority, and blind luck. While many of us feel confident in our abilities to decipher and interact with the world around us, history is filled with examples of how very wrong we can be when we fail to recognize the need for evidence in supporting claims. At various times in history, we would have been certain that the sun revolved around a flat earth, that the earth's continents did not move, and that mental illness was caused by possession (Figure 2.2). It is through systematic scientific research that we divest ourselves of our preconceived notions and superstitions and gain an objective understanding of ourselves and our world.



Figure **2.2** Some of our ancestors, across the world and over the centuries, believed that trephination—the practice of making a hole in the skull, as shown here—allowed evil spirits to leave the body, thus curing mental illness and other disorders. (credit: "taiproject"/Flickr)

The goal of all scientists is to better understand the world around them. Psychologists focus their attention on understanding behavior, as well as the cognitive (mental) and physiological (body) processes that underlie behavior. In contrast to other methods that people use to understand the behavior of others, such as intuition and personal experience, the hallmark of scientific research is that there is evidence to support a claim. Scientific knowledge is empirical: It is grounded in objective, tangible evidence that can be observed time and time again, regardless of who is observing.

While behavior is observable, the mind is not. If someone is crying, we can see behavior. However, the reason for the behavior is more difficult to determine. Is the person crying due to being sad, in pain, or happy? Sometimes we can learn the reason for someone's behavior by simply asking a question, like "Why are you crying?" However, there are situations in which an individual is either uncomfortable or unwilling to answer the question honestly, or is incapable of answering. For example, infants would not be able to explain why they are crying. In such circumstances, the psychologist must be creative in finding ways to better understand behavior. This chapter explores how scientific knowledge is generated, and how important that knowledge is in forming decisions in our personal lives and in the public domain.

Use of Research Information

Trying to determine which theories are and are not accepted by the scientific community can be difficult, especially in an area of research as broad as psychology. More than ever before, we have an incredible amount of information at our fingertips, and a simple internet search on any given research topic might result in a number of contradictory studies. In these cases, we are witnessing the scientific community going through the process of reaching a consensus, and it could be quite some time before a consensus emerges. For example, the explosion in our use of technology has led researchers to question whether this ultimately helps or hinders us. The use and implementation of technology in educational settings has become widespread over the last few decades. Researchers are coming to different conclusions regarding the use of technology. To illustrate this point, a study investigating a smartphone app targeting surgery residents (graduate students in surgery training) found that the use of this app can increase student engagement and raise test scores (Shaw & Tan, 2015). Conversely, another study found that the use of technology in undergraduate student populations had negative impacts on sleep, communication, and time management skills (Massimini & Peterson, 2009). Until sufficient amounts of research have been conducted, there will be no clear consensus on the effects that technology has on a student's acquisition of knowledge, study skills, and mental health.

In the meantime, we should strive to think critically about the information we encounter by exercising a degree of healthy skepticism. When someone makes a claim, we should examine the claim from a number of different perspectives: what is the expertise of the person making the claim, what might they gain if the claim is valid, does the claim seem justified given the evidence, and what do other researchers think of the claim? This is especially important when we consider how much information in advertising campaigns and on the internet claims to be based on “scientific evidence” when in actuality it is a belief or perspective of just a few individuals trying to sell a product or draw attention to their perspectives.

We should be informed consumers of the information made available to us because decisions based on this information have significant consequences. One such consequence can be seen in politics and public policy. Imagine that you have been elected as the governor of your state. One of your responsibilities is to manage the state budget and determine how to best spend your constituents’ tax dollars. As the new governor, you need to decide whether to continue funding early intervention programs. These programs are designed to help children who come from low-income backgrounds, have special needs, or face other disadvantages. These programs may involve providing a wide variety of services to maximize the children's development and position them for optimal levels of success in school and later in life (Blann, 2005). While such programs sound appealing, you would want to be sure that they also proved effective before investing additional money in these programs. Fortunately, psychologists and other scientists have conducted vast amounts of research on such programs and, in general, the programs are found to be effective (Neil & Christensen, 2009; Peters-Scheffer, Didden, Korzilius, & Sturmey, 2011). While not all programs are equally effective, and the short-term effects of many such programs are more pronounced, there is reason to believe that many of these programs produce long-term benefits for participants (Barnett, 2011). If you are committed to being a good steward of taxpayer money, you would want to look at research. Which programs are most effective? What characteristics of these programs make them effective? Which programs promote the best outcomes? After examining the research, you would be best equipped to make decisions about which programs to fund.

Link to Learning

Watch this video about early childhood program effectiveness to learn how scientists evaluate effectiveness and how best to invest money into programs that are most effective.

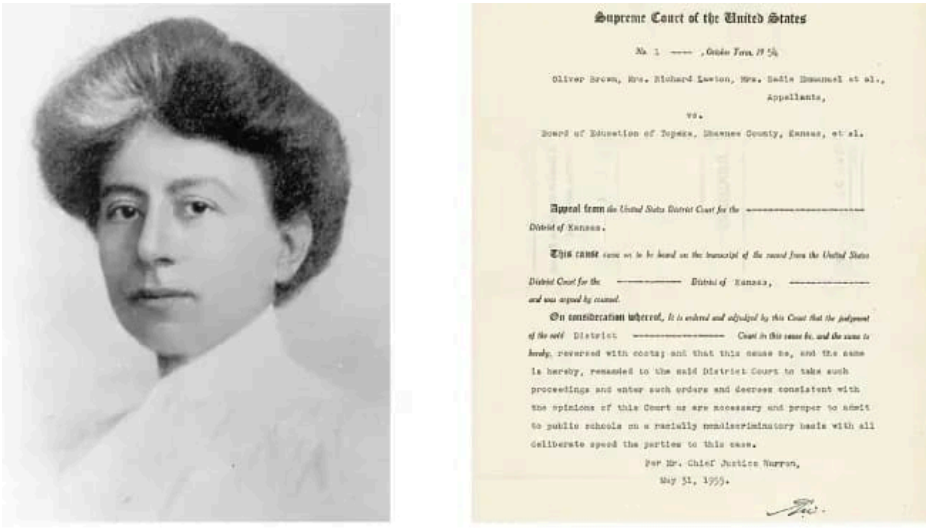
Ultimately, it is not just politicians who can benefit from using research in guiding their decisions. We all might look to research from time to time when making decisions in our lives. Imagine you just found out that a close friend has breast cancer or that one of your young relatives has recently been diagnosed with autism. In either case, you want to know which treatment options are most successful with the fewest side effects. How would you find that out? You would probably talk with your doctor and personally review the research that has been done on various treatment options—always with a critical eye to ensure that you are as informed as possible.

In the end, research is what makes the difference between facts and opinions. **Facts** are observable realities, and **opinions** are personal judgments, conclusions, or attitudes that may or may not be accurate. In the scientific community, facts can be established only using evidence collected through empirical research.

NOTABLE RESEARCHERS

Psychological research has a long history involving important figures from diverse backgrounds. While the introductory chapter discussed several researchers who made significant contributions to the discipline, there are many more individuals who deserve attention in considering how psychology has advanced as a science through their work (Figure 2.3). For instance, Margaret Floy Washburn (1871–1939) was the first woman to earn a PhD in psychology. Her research focused on animal behavior and cognition (Margaret Floy Washburn, PhD, n.d.). Mary Whiton Calkins (1863–1930) was a preeminent first-generation American psychologist who opposed the behaviorist movement, conducted significant research into memory, and established one of the earliest experimental psychology labs in the United States (Mary Whiton Calkins, n.d.).

Francis Sumner (1895–1954) was the first African American to receive a PhD in psychology in 1920. His dissertation focused on issues related to psychoanalysis. Sumner also had research interests in racial bias and educational justice. Sumner was one of the founders of Howard University's department of psychology, and because of his accomplishments, he is sometimes referred to as the "Father of Black Psychology." Thirteen years later, Inez Beverly Prosser (1895–1934) became the first African American woman to receive a PhD in psychology. Prosser's research highlighted issues related to education in segregated versus integrated schools, and ultimately, her work was very influential in the hallmark *Brown v. Board of Education* Supreme Court ruling that segregation of public schools was unconstitutional (Ethnicity and Health in America Series: Featured Psychologists, n.d.).



(a) (b)

Figure **2.3** (a) Margaret Floy Washburn was the first woman to earn a doctorate degree in psychology. (b) The outcome of *Brown v. Board of Education* was influenced by the research of psychologist Inez Beverly Prosser, who was the first African American woman to earn a PhD in psychology.

Although the establishment of psychology's scientific roots occurred first in Europe and the United States, it did not take much time until researchers from around the world began to establish their own laboratories and research programs. For example, some of the first experimental psychology laboratories in South America were founded by Horatio Piñero (1869–1919) at two institutions in Buenos Aires, Argentina (Godoy & Brussino, 2010). In India, Gunamudian David Boaz (1908–1965) and Narendra Nath Sen Gupta (1889–1944) established the first independent departments of psychology at the University of Madras and the University of Calcutta, respectively. These developments provided an opportunity for Indian researchers to make important contributions to the field (Gunamudian David Boaz, n.d.; Narendra Nath Sen Gupta, n.d.).

When the American Psychological Association (APA) was first founded in 1892, all of the members were white males (Women and Minorities in Psychology, n.d.). However, by 1905, Mary Whiton Calkins was elected as the first female president of the APA, and by 1946, nearly one-quarter of American psychologists were female. Psychology became a popular degree option for students enrolled in the nation's historically black higher education institutions, increasing the number of black Americans who went on to become psychologists. Given demographic shifts occurring in the United States and increased access to higher educational opportunities among historically underrepresented populations, there is reason to hope that the diversity of the field will increasingly match the larger population, and that the research contributions made by the psychologists of the future will better serve people of all backgrounds (Women and Minorities in Psychology, n.d.).

The Process of Scientific Research

Scientific knowledge is advanced through a process known as the scientific method. Basically, ideas (in the form of theories and hypotheses) are tested against the real world (in the form of empirical observations), and those empirical observations lead to more ideas that are tested against the real world, and so on. In this sense, the scientific process is circular. The types of reasoning within the circle are called deductive and inductive. In **deductive reasoning**, ideas are tested in the real world; in **inductive reasoning**, real-world observations lead to new ideas (Figure 2.4). These processes are inseparable, like inhaling and exhaling, but different research approaches place different emphasis on the deductive and inductive aspects.

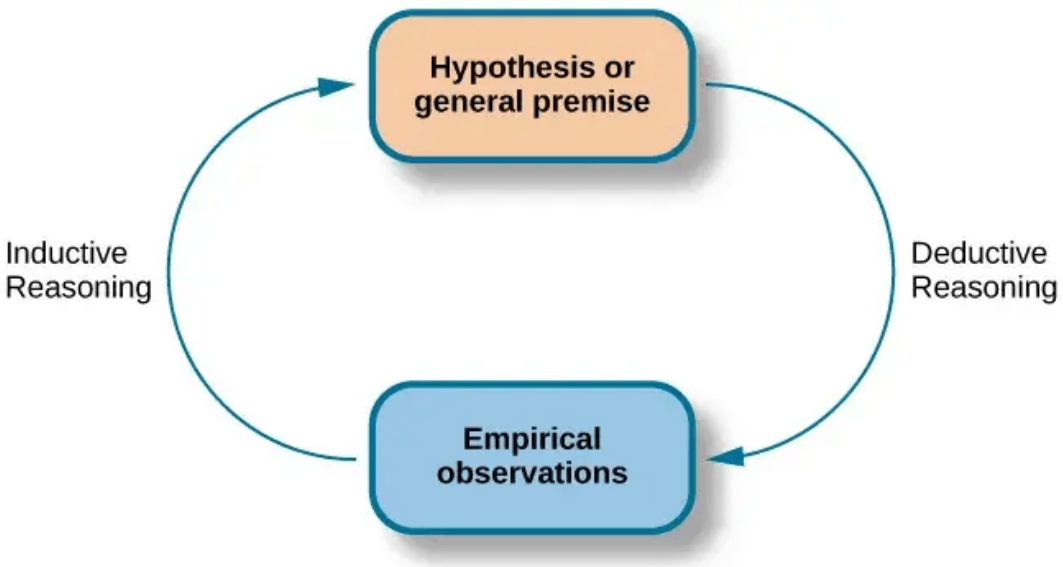


Figure **2.4** Psychological research relies on both inductive and deductive reasoning.

In the scientific context, deductive reasoning begins with a generalization—one hypothesis—that is then used to reach logical conclusions about the real world. If the hypothesis is correct, then the logical conclusions reached through deductive reasoning should also be correct. A deductive reasoning argument might go something like this: All living things require energy to survive (this would be your hypothesis). Ducks are living things. Therefore, ducks require energy to survive (logical conclusion). In this example, the hypothesis is correct; therefore, the conclusion is correct as well. Sometimes, however, an incorrect hypothesis may lead to a logical but incorrect conclusion. Consider this argument: all ducks are born with the ability to see. Quackers is a duck. Therefore, Quackers was born with the ability to see. Scientists use deductive reasoning to empirically test their hypotheses. Returning to the example of the ducks, researchers might design a study to test the hypothesis that if all living things require energy to survive, then ducks will be found to require energy to survive.

Deductive reasoning starts with a generalization that is tested against real-world observations; however, inductive reasoning moves in the opposite direction. Inductive reasoning uses empirical observations to construct broad generalizations. Unlike deductive reasoning, conclusions drawn from inductive reasoning may or may not be correct, regardless of the observations on which they are based. For instance, you may notice that your favorite fruits—apples, bananas, and oranges—all grow on trees; therefore, you assume that all fruit must grow on trees. This would be an example of inductive reasoning, and, clearly, the existence of strawberries, blueberries, and kiwi demonstrate that this generalization is not correct despite it being based on a number of direct observations. Scientists use inductive reasoning to formulate theories, which in turn generate hypotheses that are tested with deductive reasoning. In the end, science involves both deductive and inductive processes.

For example, case studies, which you will read about in the next section, are heavily weighted on the side of empirical observations. Thus, case studies are closely associated with inductive processes as researchers gather massive amounts of observations and seek interesting patterns (new ideas) in the data. Experimental research, on the other hand, puts great emphasis on deductive reasoning.

We've stated that theories and hypotheses are ideas, but what sort of ideas are they, exactly? A **theory** is a well-developed set of ideas that propose an explanation for observed phenomena. Theories are repeatedly checked against the world, but they tend to be too complex to be tested all at once; instead, researchers create hypotheses to test specific aspects of a theory.

A **hypothesis** is a testable prediction about how the world will behave if our idea is correct, and it is often worded as an if-then statement (e.g., if I study all night, I will get a passing grade on the test). The hypothesis is extremely important because it bridges the gap between the realm of ideas and the real world. As specific hypotheses are tested, theories are modified and refined to reflect and incorporate the result of these tests Figure 2.5.

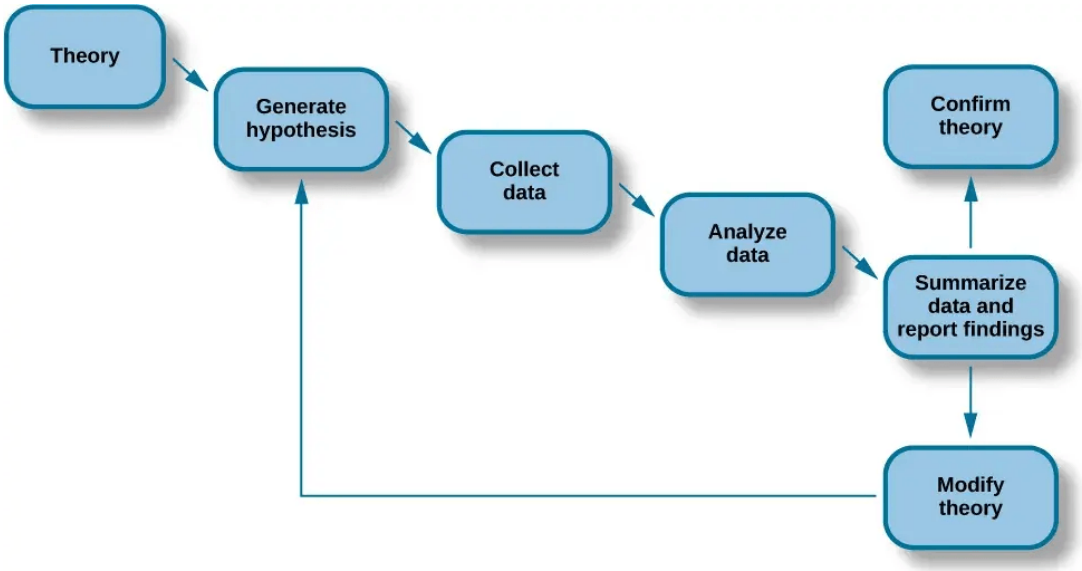


Figure **2.5** The scientific method involves deriving hypotheses from theories and then testing those hypotheses. If the results are consistent with the theory, then the theory is supported. If the results are not consistent, then the theory should be modified and new hypotheses will be generated.

To see how this process works, let's consider a specific theory and a hypothesis that might be generated from that theory. As you'll learn in a later chapter, the James-Lange theory of emotion asserts that emotional experience relies on the physiological arousal associated with the emotional state. If you walked out of your home and discovered a very aggressive snake waiting on your doorstep, your heart would begin to race and your stomach churn. According to the James-Lange theory, these physiological changes would result in your feeling of fear. A hypothesis that could be derived from this theory might be that a person who is unaware of the physiological arousal that the sight of the snake elicits will not feel fear.

A scientific hypothesis is also **falsifiable**, or capable of being shown to be incorrect. Recall from the introductory chapter that Sigmund Freud had lots of interesting ideas to explain various human behaviors (Figure 2.6). However, a major criticism of Freud's theories is that many of his ideas are not falsifiable; for example, it is impossible to imagine empirical observations that would disprove the existence of the id, the ego, and the superego—the three elements of personality described in Freud's theories. Despite this, Freud's theories are widely taught in introductory psychology texts because of their historical significance for personality psychology and psychotherapy, and these remain the root of all modern forms of therapy.

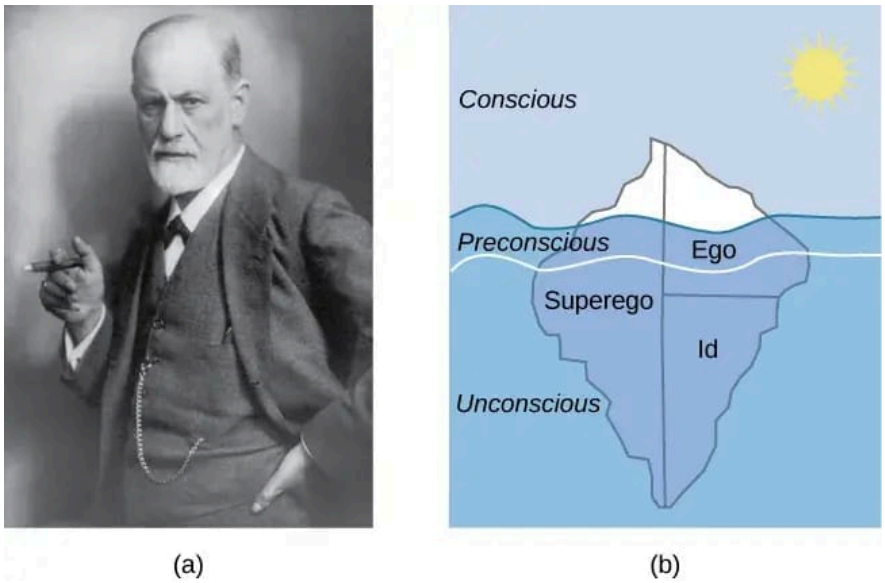


Figure **2.6** Many of the specifics of (a) Freud's theories, such as (b) his division of the mind into id, ego, and superego, have fallen out of favor in recent decades because they are not falsifiable. In broader strokes, his views set the stage for much of psychological thinking today, such as the unconscious nature of the majority of psychological processes.

In contrast, the James-Lange theory does generate falsifiable hypotheses, such as the one described above. Some individuals who suffer significant injuries to their spinal columns are unable to feel the bodily changes that often accompany emotional experiences. Therefore, we could test the hypothesis by determining how emotional experiences differ between individuals who have the ability to detect these changes in their physiological arousal and those who do not. In fact, this research has been conducted and while the emotional experiences of people deprived of an awareness of their physiological arousal may be less intense, they still experience emotion (Chwalisz, Diener, & Gallagher, 1988).

Scientific research's dependence on falsifiability allows for great confidence in the information that it produces. Typically, by the time information is accepted by the scientific community, it has been tested repeatedly.

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8.3: Psychologists Use the Scientific Method to Guide Their Research

Learning Objectives

1. Describe the principles of the scientific method and explain its importance in conducting and interpreting research.
2. Differentiate laws from theories and explain how research hypotheses are developed and tested.
3. 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 behavior and solve social problems. Philosophers, religious leaders, and politicians, among others, also strive to provide explanations for human behavior. 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 behavior. Rather than accepting a politician's contention that creating (or abandoning) a new center 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 modifications 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 behavior 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 behavior 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 among 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 a 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 8.3.1. The conceptual variables are represented within circles at the top of the figure, and the measured variables are represented within squares at the bottom. 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 in this example) will cause changes in the corresponding measured variables. The measured variables are then used to draw inferences about the conceptual variables.

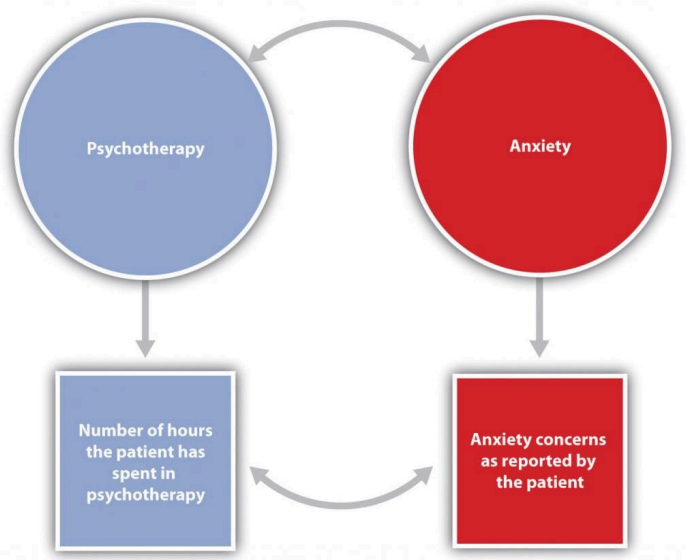


Figure 8.3.1: Diagram of a Research Hypothesis. In this research hypothesis, the conceptual variable of attending psychotherapy is operationalized using the number of hours of psychotherapy the client has completed, and the conceptual variable of anxiety is operationalized using self-reported levels of anxiety. The research hypothesis is that more psychotherapy will be related to less reported anxiety.

Table 8.3.1 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 8.3.1: 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

Conducting Ethical Research

One of the questions that all scientists must address concerns the ethics of their research. Physicists are concerned about

the potentially harmful outcomes of their experiments with nuclear materials. Biologists worry about the potential outcomes of creating genetically engineered human babies. Medical researchers agonize over the ethics of withholding potentially beneficial drugs from control groups in clinical trials. Likewise, psychologists are continually considering the ethics of their research.

Research in psychology may cause some stress, harm, or inconvenience for the people who participate in that research. For instance, researchers may require introductory psychology students to participate in research projects and then deceive these students, at least temporarily, about the nature of the research. Psychologists may induce stress, anxiety, or negative moods in their participants, expose them to weak electrical shocks, or convince them to behave in ways that violate their moral standards. And researchers may sometimes use animals in their research, potentially harming them in the process.

Decisions about whether research is ethical are made using established ethical codes developed by scientific organizations, such as the American Psychological Association, and federal governments. In the United States, the Department of Health and Human Services provides the guidelines for ethical standards in research. Some research, such as the research conducted by the Nazis on prisoners during World War II, is perceived as immoral by almost everyone. Other procedures, such as the use of animals in research testing the effectiveness of drugs, are more controversial.

Scientific research has provided information that has improved the lives of many people. Therefore, it is unreasonable to argue that because scientific research has costs, no research should be conducted. This argument fails to consider the fact that there are significant costs to *not* doing research and that these costs may be greater than the potential costs of conducting the research (Rosenthal, 1994). In each case, before beginning to conduct the research, scientists have attempted to determine the potential risks and benefits of the research and have come to the conclusion that the potential benefits of conducting the research outweigh the potential costs to the research participants.

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 behavior 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 behavioral 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 behavior. The codes of ethics of the American Psychological Association and other organizations 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.

Ensuring That Research Is Ethical

Making decisions about the ethics of research involves weighing the costs and benefits of conducting versus not conducting a given research project. The costs involve potential harm to the research participants and to the field, whereas the benefits include the potential for advancing knowledge about human behavior and offering various advantages, some educational, to the individual participants. Most generally, the ethics of a given research project are determined through a *cost-benefit analysis*, in which the costs are compared to the benefits. If the potential costs of the research appear to outweigh any potential benefits that might come from it, then the research should not proceed.

Arriving at a cost-benefit ratio is not simple. For one thing, there is no way to know ahead of time what the effects of a given procedure will be on every person or animal who participates or what benefit to society the research is likely to produce. In addition, what is ethical is defined by the current state of thinking within society, and thus perceived costs and benefits change over time. The U.S. Department of Health and Human Services regulations require that all universities receiving funds from the department set up an *Institutional Review Board (IRB)* to determine whether proposed research meets department regulations. The Institutional Review Board (IRB) is *a committee of at least five members whose goal it is to determine the cost-benefit ratio of research conducted within an institution*. The IRB approves the procedures of all the research conducted at the institution before the research can begin. The board may suggest modifications to the procedures, or (in rare cases) it may inform the scientist that the research violates Department of Health and Human Services guidelines and thus cannot be conducted at all.

One important tool for ensuring that research is ethical is the use of *informed consent*. A sample informed consent form is shown in Figure 8.3.2. Informed consent, *conducted before a participant begins a research session, is designed to explain the research procedures and inform the participant of his or her rights during the investigation*. The informed consent explains as much as possible about the true nature of the study, particularly everything that might be expected to influence willingness to participate, but it may in some cases withhold some information that allows the study to work.



Consent Form: Interactions

I state that I am 18 years of age or older and wish to participate in a program of research being conducted by Dr. Charles Stangor at the University of Maryland, College Park, Department of Psychology.

The purpose of the research is to study how individuals get to know each other. In the remainder of the study I will be having a short conversation with another person. This interaction will be videotaped. At the end of the interaction, I will be asked to complete some questionnaires about how I felt during and what I remember about the interaction. The entire experiment will take about 45 minutes.

I furthermore consent to allow the videotape that has been made of me and my partner to be used in the research. I understand that the videotape will be used for research purposes only, and no one else except the present experimenter and one other person who will help code the tape will ever view it.

I understand that code numbers will be used to identify the videotapes and that all written material that I contribute will be kept separate from the videos. As a result, it will not be possible to connect my name to my videotape.

I understand that both my partner and I have the right to withdraw the tape from the study at any point.

I understand that the experiment is not designed to help me personally but that the researchers hope to learn more about interpersonal interactions.

I understand that I am free to ask questions or to withdraw from participation at any time without penalty.

Dr. Charles Stangor
Department of Psychology
Room 3123
555-5921

Signature of participant

_____

Date

_____

Figure 8.3.2: Sample Consent Form. The informed consent form explains the research procedures and informs the participant of his or her rights during the investigation. Adapted from Stangor, C. (2011). *Research methods for the behavioral sciences* (4th ed.). Mountain View, CA: Cengage.

Because participating in research has the potential for producing long-term changes in the research participants, all participants should be fully debriefed immediately after their participation. The debriefing is *a procedure designed to fully explain the purposes and procedures of the research and remove any harmful aftereffects of participation*.

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. 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.

APA Guidelines on Humane Care and Use of Animals in Research

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

- Psychologists acquire, care for, use, and dispose of animals in compliance with current federal, state, and local laws and regulations, and with professional standards.
- 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.
- 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.
- Psychologists make reasonable efforts to minimize the discomfort, infection, illness, and pain of animal subjects.
- 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.
- Psychologists perform surgical procedures under appropriate anesthesia and follow techniques to avoid infection and minimize pain during and after surgery.
- 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. (American Psychological Association, 2002)



Understanding Animal Research. Psychologists may use animals in their research, but they make reasonable efforts to minimize the discomfort the animals experience. – Rabbit in Research for Animal Testing – CC BY 2.0.

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, believes 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 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 practiced 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 behavior, 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 assure 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 have 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?

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CHAPTER 9: RESEARCH METHODS

9.1: You Can Be an Informed Consumer of Psychological Research

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CHAPTER 8: PSYCHOLOGY AS A SCIENCE

8.1: Using data
8.2: Why Research is Important
8.3: Psychologists Use the Scientific Method to Guide Their Research

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9.1: You Can Be an Informed Consumer of Psychological Research

Learning Objectives

1. Outline the four potential threats to the validity of research and discuss how they may make it difficult to accurately interpret research findings.
2. Describe how confounding may reduce the internal validity of an experiment.
3. 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.

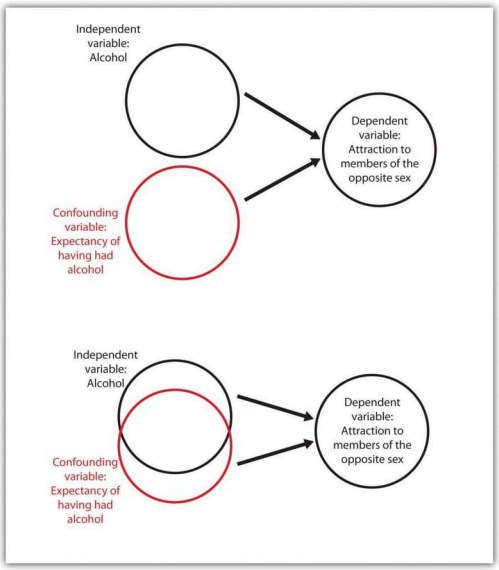
Statistical conclusion validity refers to *the extent to which we can be certain that the researcher has drawn accurate conclusions about the statistical significance of the research*. Research will be invalid if the conclusions made about the research hypothesis are incorrect because statistical inferences 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 either to drink orange juice mixed with vodka or to drink 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 (Figure 9.1.18). 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 expectancies about having consumed alcohol.

Figure 9.1.18 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 twelve 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.

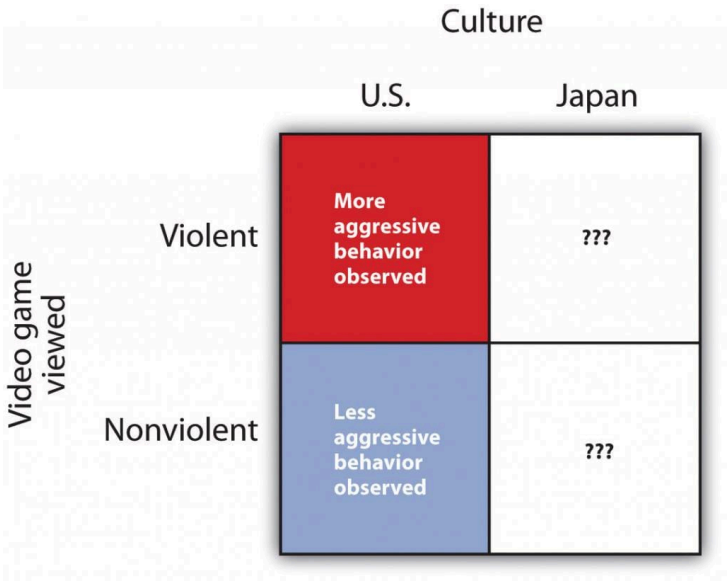
To avoid experimenter bias, researchers frequently run experiments in which the researchers are *blind to condition*. This means that although the experimenters know the research hypotheses, they do not know which conditions the participants are assigned to. Experimenter bias cannot occur if the researcher 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 college 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 behaviors 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 American children by showing violent and nonviolent films to a sample of both Japanese and American 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 (Figure 9.1.19).

Figure 9.1.19 A Cross-Cultural Replication



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 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 (1) specifies inclusion criteria that indicate exactly which studies will or will not be included in the analysis, (2) systematically searches for all studies that meet the inclusion criteria, and (3) 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” (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 American Psychological Association or the American Psychological Society.

Try to check on the accuracy of the material and discern whether the sources of information seem current. Is the information cited such 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 Corporation, now PepsiCo Inc., conducted the "Pepsi Challenge" by randomly assigning individuals to taste either a Pepsi or a Coke. The researchers labeled 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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10.1: Statistical Thinking

By Beth Chance and Allan Rossman

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As our society increasingly calls for evidence-based decision making, it is important to consider how and when we can draw valid inferences from data. This module will use four recent research studies to highlight key elements of a statistical investigation.

learning objectives

- Define basic elements of a statistical investigation.
- Describe the role of p-values and confidence intervals in statistical inference.
- Describe the role of random sampling in generalizing conclusions from a sample to a population.
- Describe the role of random assignment in drawing cause-and-effect conclusions.
- Critique statistical studies.

Introduction

Does drinking coffee actually increase your life expectancy? A recent study (Freedman, Park, Abnet, Hollenbeck, & Sinha, 2012) found that men who drank at least six cups of coffee a day had a 10% lower chance of dying (women 15% lower) than those who drank none. Does this mean you should pick up or increase your own coffee habit?

Modern society has become awash in studies such as this; you can read about several such studies in the news every day. Moreover, data abound everywhere in modern life. Conducting such a study well, and interpreting the results of such studies well for making informed decisions or setting policies, requires understanding basic ideas of statistics, the science of gaining insight from data. Rather than relying on anecdote and intuition, statistics allows us to systematically study phenomena of interest.



People around the world differ in their preferences for drinking coffee versus drinking tea. Would the results of the coffee study be the same in Canada as in China? [Image: Duncan, https://goo.gl/vbMyTm, CC BY-NC 2.0, goo.gl/l8UUGY]

Key components to a statistical investigation are:

- Planning the study: Start by asking a testable research question and deciding how to collect data. For example, how long was the study period of the coffee study? How many people were recruited for the study, how were they recruited, and from where? How old were they? What other variables were recorded about the individuals, such as smoking habits, on the comprehensive lifestyle questionnaires? Were changes made to the participants' coffee habits during the course of the study?
- Examining the data: What are appropriate ways to examine the data? What graphs are relevant, and what do they reveal? What descriptive statistics can be calculated to summarize relevant aspects of the data, and what do they reveal? What patterns do you see in the data? Are there any individual observations that deviate from the overall pattern, and what do they reveal? For example, in the coffee study, did the proportions differ when we compared the smokers to the non-smokers?
- Inferring from the data: What are valid statistical methods for drawing inferences "beyond" the data you collected? In the coffee study, is the 10%–15% reduction in risk of death something that could have happened just by chance?
- Drawing conclusions: Based on what you learned from your data, what conclusions can you draw? Who do you think these conclusions apply to? (Were the people in the coffee study older? Healthy? Living in cities?) Can you draw a **cause-and-effect** conclusion about your treatments? (Are scientists now saying that the coffee drinking is the cause of the decreased risk of death?)

Notice that the numerical analysis ("crunching numbers" on the computer) comprises only a small part of overall statistical investigation. In this module, you will see how we can answer some of these questions and what questions you should be asking about any statistical investigation you read about.

Distributional Thinking

When data are collected to address a particular question, an important first step is to think of meaningful ways to organize and examine the data. The most fundamental principle of statistics is that data vary. The pattern of that variation is crucial to capture and to understand. Often, careful presentation of the data will address many of the research questions without requiring more sophisticated analyses. It may, however, point to additional questions that need to be examined in more detail.

Example 1: Researchers investigated whether cancer pamphlets are written at an appropriate level to be read and understood by cancer patients (Short, Moriarty, & Cooley, 1995). Tests of reading ability were given to 63 patients. In addition, readability level was determined for a sample of 30 pamphlets, based on characteristics such as the lengths of words and sentences in the pamphlet. The results, reported in terms of grade levels, are displayed in Table 1.

Patients' reading levels	< 3	3	4	5	6	7	8	9	10	11	12	> 12	Total
Count (number of patients)	6	4	4	3	3	2	6	5	4	7	2	17	63

Pamphlet's readability levels	6	7	8	9	10	11	12	13	14	15	16	Total
Count (number of pamphlets)	3	3	8	4	1	1	4	2	1	2	1	30

Table 1. Frequency tables of patient reading levels and pamphlet readability levels.

These two variables reveal two fundamental aspects of statistical thinking:

- Data *vary*. More specifically, values of a variable (such as reading level of a cancer patient or readability level of a cancer pamphlet) vary.
- Analyzing the pattern of variation, called the **distribution** of the variable, often reveals insights.

Addressing the research question of whether the cancer pamphlets are written at appropriate levels for the cancer patients requires comparing the two distributions. A naïve comparison might focus only on the centers of the distributions. Both medians turn out to be ninth grade, but considering only medians ignores the variability and the overall distributions of these data. A more illuminating approach is to compare the entire distributions, for example with a graph, as in Figure 1.

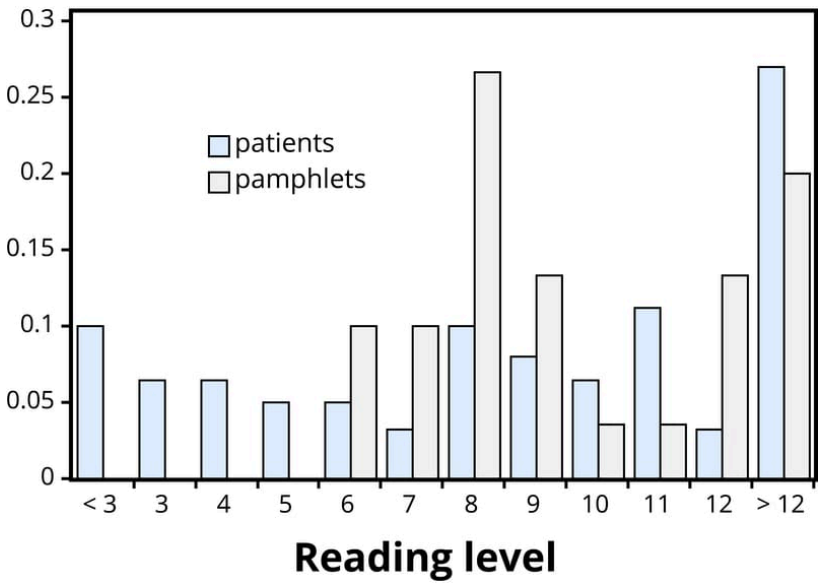


Figure 2.3.1: Comparison of patient reading levels and pamphlet readability levels.

Figure 2.3.1 makes clear that the two distributions are not well aligned at all. The most glaring discrepancy is that many patients (17/63, or 27%, to be precise) have a reading level below that of the most readable pamphlet. These patients will need help to understand the information provided in the cancer pamphlets. Notice that this conclusion follows from considering the distributions as a whole, not simply measures of center or variability, and that the graph contrasts those distributions more immediately than the frequency tables.

Statistical Significance

Even when we find patterns in data, often there is still uncertainty in various aspects of the data. For example, there may be potential for measurement errors (even your own body temperature can fluctuate by almost 1 °F over the course of the day). Or we may only have a "snapshot" of observations from a more long-term process or only a small subset of individuals from the population of interest. In such cases, how can we determine whether patterns we see in our small set of data is convincing evidence of a systematic phenomenon in the larger process or population?

Example 2: In a study reported in the November 2007 issue of *Nature*, researchers investigated whether pre-verbal infants take into account an individual's actions toward others in evaluating that individual as appealing or aversive (Hamlin, Wynn, & Bloom, 2007). In one component of the study, 10-month-old infants were shown a "climber" character (a piece of wood with "googly" eyes glued onto it) that could not make it up a hill in two tries. Then the infants were shown two scenarios for the climber's next try, one where the climber was pushed to the top of the hill by another character ("helper"), and one where the climber was pushed back down the hill by another character ("hinderer"). The infant was alternately shown these two scenarios several times. Then the infant was presented with two pieces of wood (representing the helper and the hinderer characters) and asked to pick one to play with. The researchers found that of the 16 infants who made a clear choice, 14 chose to play with the helper toy.



Correlation does not equal causation: When babies get their first teeth their saliva production increases but this does not mean that increased saliva causes them to get their teeth. [Image: Ben McLeod, https://goo.gl/0EkXpV, CC BY-NC-SA 2.0, goo.gl/Toc0ZF]

One possible explanation for this clear majority result is that the helping behavior of the one toy increases the infants' likelihood of choosing that toy. But are there other possible explanations? What about the color of the toy? Well, prior to collecting the data, the researchers arranged so that each color and shape (red square and blue circle) would be seen by the same number of infants. Or maybe the infants had right-handed tendencies and so picked whichever toy was closer to their right hand? Well, prior to collecting the data, the researchers arranged it so half the infants saw the helper toy on the right and half on the left. Or, maybe the shapes of these wooden characters (square, triangle, circle) had an effect? Perhaps, but again, the researchers controlled for this by rotating which shape was the helper toy, the hinderer toy, and the climber. When designing experiments, it is important to *control* for as many variables as might affect the responses as possible.

It is beginning to appear that the researchers accounted for all the other plausible explanations. But there is one more important consideration that cannot be controlled—if we did the study again with these 16 infants, they might not make the same choices. In other words, there is some *randomness* inherent in their selection process. Maybe each infant had no genuine preference at all, and it was simply "random luck" that led to 14 infants picking the helper toy. Although this random component cannot be controlled, we can apply a *probability model* to investigate the pattern of results that would occur in the long run if random chance were the only factor.

If the infants were equally likely to pick between the two toys, then each infant had a 50% chance of picking the helper toy. It's like each infant tossed a coin, and if it landed heads, the infant picked the helper toy. So if we tossed a coin 16 times, could it land heads 14 times? Sure, it's possible, but it turns out to be very unlikely. Getting 14 (or more) heads in 16 tosses is about as likely as tossing a coin and getting 9 heads in a row. This probability is referred to as a **p-value**. The p-value tells you how often a random process would give a result at least as extreme as what was found in the actual study, assuming there was nothing other than random chance at play. So, if we assume that each infant was choosing equally, then the probability that 14 or more out of 16 infants would choose the helper toy is found to be 0.0021. We have only two logical possibilities: either the infants have a genuine preference for the helper toy, or the infants have no preference (50/50) and an outcome that would occur only 2 times in 1,000 iterations happened in this study. Because this p-value of 0.0021 is quite small, we conclude that the study provides very strong evidence that these infants have a genuine preference for the helper toy. We often compare the p-value to some cut-off value (called the level of **significance**, typically around 0.05). If the p-value is smaller than that cut-off value, then we reject the hypothesis that only random chance was at play here. In this case, these researchers would conclude that *significantly* more than half of the infants in the study chose the helper toy, giving strong evidence of a genuine preference for the toy with the helping behavior.

Generalizability



Generalizability is an important research consideration: The results of studies with widely representative samples are more likely to generalize to the population. [Image: Mike PD, https://goo.gl/ynFCMC, CC BY-NC-SA 2.0, goo.gl/Toc0ZF]

One limitation to the previous study is that the conclusion only applies to the 16 infants in the study. We don't know much about how those 16 infants were selected. Suppose we want to select a subset of individuals (a **sample**) from a much larger group of individuals (the **population**) in such a way that conclusions from the sample can be **generalized** to the larger population. This is the question faced by pollsters every day.

Example 3: The General Social Survey (GSS) is a survey on societal trends conducted every other year in the United States. Based on a sample of about 2,000 adult Americans, researchers make claims about what percentage of the U.S. population consider themselves to be "liberal," what percentage consider themselves "happy," what percentage feel "rushed" in their daily lives, and many other issues. The key to making these claims about the larger population of all American adults lies in how the sample is selected. The goal is to select a sample that is representative of the population, and a common way to achieve this goal is to select a **random sample** that gives every member of the population an equal chance of being selected for the sample. In its simplest form, random sampling involves numbering every member of the population and then using a computer to randomly select the subset to be surveyed. Most polls don't operate exactly like this, but they do use probability-based sampling methods to select individuals from nationally representative panels.

In 2004, the GSS reported that 817 of 977 respondents (or 83.6%) indicated that they always or sometimes feel rushed. This is a clear majority, but we again need to consider variation due to *random sampling*. Fortunately, we can use the same probability model we did in the previous example to investigate the probable size of this error. (Note, we can use the coin-tossing model when the actual population size is much, much larger than the sample size, as then we can still consider the probability to be the same for every individual in the sample.) This probability model predicts that the sample result will be within 3 percentage points of the population value (roughly 1 over the square root of the sample size, the **margin of error**). A statistician would conclude, with 95% confidence, that between 80.6% and 86.6% of all adult Americans in 2004 would have responded that they sometimes or always feel rushed.

The key to the margin of error is that when we use a probability sampling method, we can make claims about how often (in the long run, with repeated random sampling) the sample result would fall within a certain distance from the unknown population value by chance (meaning by random sampling variation) alone. Conversely, non-random samples are often suspect to bias, meaning the sampling method systematically over-represents some segments of the population and under-represents others. We also still need to consider other sources of bias, such as individuals not responding honestly. These sources of error are not measured by the margin of error.

Cause and Effect Conclusions

In many research studies, the primary question of interest concerns differences between groups. Then the question becomes how were the groups formed (e.g., selecting people who already drink coffee vs. those who don't). In some studies, the researchers

actively form the groups themselves. But then we have a similar question—could any differences we observe in the groups be an artifact of that group-formation process? Or maybe the difference we observe in the groups is so large that we can discount a "fluke" in the group-formation process as a reasonable explanation for what we find?

Example 4: A psychology study investigated whether people tend to display more creativity when they are thinking about intrinsic or extrinsic motivations (Ramsey & Schafer, 2002, based on a study by Amabile, 1985). The subjects were 47 people with extensive experience with creative writing. Subjects began by answering survey questions about either intrinsic motivations for writing (such as the pleasure of self-expression) or extrinsic motivations (such as public recognition). Then all subjects were instructed to write a haiku, and those poems were evaluated for creativity by a panel of judges. The researchers conjectured beforehand that subjects who were thinking about intrinsic motivations would display more creativity than subjects who were thinking about extrinsic motivations. The creativity scores from the 47 subjects in this study are displayed in Figure 2, where higher scores indicate more creativity.

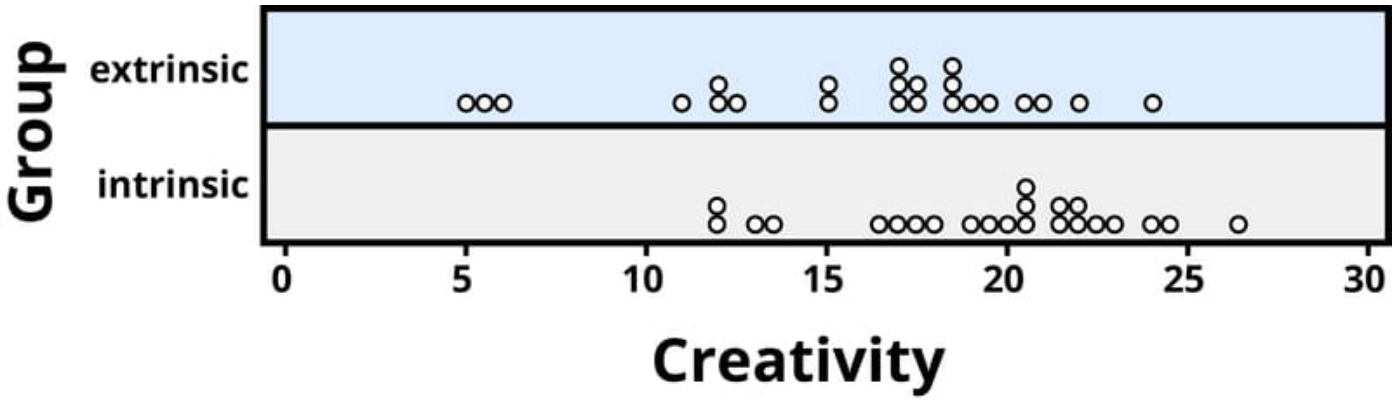


Figure 2.3.2: Creativity scores separated by type of motivation.

In this example, the key question is whether the type of motivation *affects* creativity scores. In particular, do subjects who were asked about intrinsic motivations tend to have higher creativity scores than subjects who were asked about extrinsic motivations?

Figure 2.3.2 reveals that both motivation groups saw considerable variability in creativity scores, and these scores have considerable overlap between the groups. In other words, it's certainly not always the case that those with extrinsic motivations have higher creativity than those with intrinsic motivations, but there may still be a statistical *tendency* in this direction. (Psychologist Keith Stanovich (2013) refers to people's difficulties with thinking about such probabilistic tendencies as "the Achilles heel of human cognition.")

The mean creativity score is 19.88 for the intrinsic group, compared to 15.74 for the extrinsic group, which supports the researchers' conjecture. Yet comparing only the means of the two groups fails to consider the variability of creativity scores in the groups. We can measure variability with statistics using, for instance, the standard deviation: 5.25 for the extrinsic group and 4.40 for the intrinsic group. The standard deviations tell us that most of the creativity scores are within about 5 points of the mean score in each group. We see that the mean score for the intrinsic group lies within one standard deviation of the mean score for extrinsic group. So, although there is a tendency for the creativity scores to be higher in the intrinsic group, on average, the difference is not extremely large.

We again want to consider possible explanations for this difference. The study only involved individuals with extensive creative writing experience. Although this limits the population to which we can generalize, it does not explain why the mean creativity score was a bit larger for the intrinsic group than for the extrinsic group. Maybe women tend to receive higher creativity scores? Here is where we need to focus on how the individuals were assigned to the motivation groups. If only women were in the intrinsic motivation group and only men in the extrinsic group, then this would present a problem because we wouldn't know if the intrinsic group did better because of the different type of motivation or because they were women. However, the researchers guarded against such a problem by **randomly assigning** the individuals to the motivation groups. Like flipping a coin, each individual was just as likely to be assigned to either type of motivation. Why is this helpful? Because this random assignment tends to balance out all the variables related to creativity we can think of, and even those we don't think of in advance, between the two groups. So we should have a similar male/female split between the two groups; we should have a similar age distribution between the two groups; we should have a similar distribution of educational background between the two groups; and so on. Random assignment should produce groups that are as similar as possible except for the type of motivation, which presumably eliminates all those other variables as possible explanations for the observed tendency for higher scores in the intrinsic group.

But does this always work? No, so by "luck of the draw" the groups may be a little different prior to answering the motivation survey. So then the question is, is it possible that an unlucky random assignment is responsible for the observed difference in creativity scores between the groups? In other words, suppose each individual's poem was going to get the same creativity score no matter which group they were assigned to, that the type of motivation in no way impacted their score. Then how often would the random-assignment process alone lead to a difference in mean creativity scores as large (or larger) than 19.88 – 15.74 = 4.14 points?

We again want to apply to a probability model to approximate a p-value, but this time the model will be a bit different. Think of writing everyone's creativity scores on an index card, shuffling up the index cards, and then dealing out 23 to the extrinsic motivation group and 24 to the intrinsic motivation group, and finding the difference in the group means. We (better yet, the computer) can repeat this process over and over to see how often, when the scores don't change, random assignment leads to a difference in means at least as large as 4.41. Figure 2.3.3 shows the results from 1,000 such hypothetical random assignments for these scores.

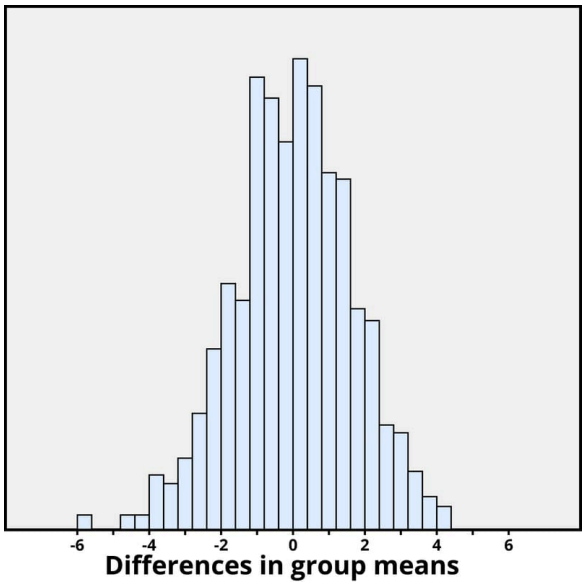


Figure 2.3.3: Differences in group means under random assignment alone.

Only 2 of the 1,000 simulated random assignments produced a difference in group means of 4.41 or larger. In other words, the approximate p-value is 2/1000 = 0.002. This small p-value indicates that it would be very surprising for the random assignment process alone to produce such a large difference in group means. Therefore, as with Example 2, we have strong evidence that focusing on intrinsic motivations tends to increase creativity scores, as compared to thinking about extrinsic motivations.

Notice that the previous statement implies a cause-and-effect relationship between motivation and creativity score; is such a strong conclusion justified? Yes, because of the random assignment used in the study. That should have balanced out any other variables between the two groups, so now that the small p-value convinces us that the higher mean in the intrinsic group wasn't just a coincidence, the only reasonable explanation left is the difference in the type of motivation. Can we generalize this conclusion to everyone? Not necessarily—we could cautiously generalize this conclusion to individuals with extensive experience in creative writing similar the individuals in this study, but we would still want to know more about how these individuals were selected to participate.

Conclusion



Researchers employ the scientific method that involves a great deal of statistical thinking: generate a hypothesis --> design a study to test that hypothesis --> conduct the study --> analyze the data --> report the results. [Image: widdowquinn, https://goo.gl/9l8Dht, CC BY-NC-SA 2.0, goo.gl/Toc0ZF]

Statistical thinking involves the careful design of a study to collect meaningful data to answer a focused research question, detailed analysis of patterns in the data, and drawing conclusions that go beyond the observed data. Random sampling is paramount to generalizing results from our sample to a larger population, and random assignment is key to drawing cause-and-effect conclusions. With both kinds of randomness, probability models help us assess how much random variation we can expect in our results, in order to determine whether our results could happen by chance alone and to estimate a margin of error.

So where does this leave us with regard to the coffee study mentioned at the beginning of this module? We can answer many of the questions:

- This was a 14-year study conducted by researchers at the National Cancer Institute.
- The results were published in the June issue of the *New England Journal of Medicine*, a respected, peer-reviewed journal.
- The study reviewed coffee habits of more than 402,000 people ages 50 to 71 from six states and two metropolitan areas. Those with cancer, heart disease, and stroke were excluded at the start of the study. Coffee consumption was assessed once at the start of the study.
- About 52,000 people died during the course of the study.
- People who drank between two and five cups of coffee daily showed a lower risk as well, but the amount of reduction increased for those drinking six or more cups.
- The sample sizes were fairly large and so the p-values are quite small, even though percent reduction in risk was not extremely large (dropping from a 12% chance to about 10%–11%).
- Whether coffee was caffeinated or decaffeinated did not appear to affect the results.
- This was an observational study, so no cause-and-effect conclusions can be drawn between coffee drinking and increased longevity, contrary to the impression conveyed by many news headlines about this study. In particular, it's possible that those with chronic diseases don't tend to drink coffee.

This study needs to be reviewed in the larger context of similar studies and consistency of results across studies, with the constant caution that this was not a randomized experiment. Whereas a statistical analysis can still "adjust" for other potential confounding variables, we are not yet convinced that researchers have identified them all or completely isolated why this decrease in death risk is evident. Researchers can now take the findings of this study and develop more focused studies that address new questions.

Outside Resources

Apps: Interactive web applets for teaching and learning statistics include the collection at
http://www.rossmanchance.com/applets/

P-Value extravaganza

Web: Inter-university Consortium for Political and Social Research
http://www.icpsr.umich.edu/index.html

Web: The Consortium for the Advancement of Undergraduate Statistics
https://www.causeweb.org/

Discussion Questions

1. Find a recent research article in your field and answer the following: What was the primary research question? How were individuals selected to participate in the study? Were summary results provided? How strong is the evidence presented in favor or against the research question? Was random assignment used? Summarize the main conclusions from the study, addressing the issues of statistical significance, statistical confidence, generalizability, and cause and effect. Do you agree with the conclusions drawn from this study, based on the study design and the results presented?
2. Is it reasonable to use a random sample of 1,000 individuals to draw conclusions about all U.S. adults? Explain why or why not.

Vocabulary

Cause-and-effect
Related to whether we say one variable is causing changes in the other variable, versus other variables that may be related to these two variables.

Confidence interval
An interval of plausible values for a population parameter; the interval of values within the margin of error of a statistic.

Distribution
The pattern of variation in data.

Generalizability
Related to whether the results from the sample can be generalized to a larger population.

Margin of error
The expected amount of random variation in a statistic; often defined for 95% confidence level.

Parameter
A numerical result summarizing a population (e.g., mean, proportion).

Population
A larger collection of individuals that we would like to generalize our results to.

P-value
The probability of observing a particular outcome in a sample, or more extreme, under a conjecture about the larger population or process.

Random assignment
Using a probability-based method to divide a sample into treatment groups.

Random sampling
Using a probability-based method to select a subset of individuals for the sample from the population.

Sample
The collection of individuals on which we collect data.

Statistic
A numerical result computed from a sample (e.g., mean, proportion).

Statistical significance
A result is statistically significant if it is unlikely to arise by chance alone.

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10.2: Avoid being fooled

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11.1: Article Quality

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11.2: Practical helps

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CHAPTER 10: STATISTICAL THINKING

10.1: Statistical Thinking
10.2: Avoid being fooled

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UNIT IV: HOW TO WORK WELL WITH OTHERS

Chapter 12: Personality

12.1: Personality

12.2: The Origins of Personality

12.3: Is Personality More Nature or More Nurture? Behavioral and Molecular Genetics

12.4: Personality (Summary)

Chapter 13: Development and Aging

13.1: Development and Aging

13.2: Lifespan Theories

13.3: Late Adulthood- Aging, Retiring, and Bereavement

Chapter 14: Social Influence

14.1: Social Influence

14.2: Conformity, Compliance, and Obedience

14.3: Working With Others- The Costs and Benefits of Social Groups

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Chapter 15: Prejudice and Discrimination

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15.2: Understanding Prejudice And Discrimination

15.3: Types Of Prejudice And Discrimination

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15.5: Stereotypes And Self-fulfilling Prophecy

15.6: In-groups And Out-groups

Chapter 16: Helping and Conflict

16.1: Latané And Darley's Model Of Helping

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CHAPTER 12: PERSONALITY

12.1: Personality
12.2: The Origins of Personality
12.3: Is Personality More Nature or More Nurture? Behavioral and Molecular Genetics
12.4: Personality (Summary)

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12.1: Personality

Learning Objectives

1. Outline and critique the early approaches to assessing personality.
2. Define and review the strengths and limitations of the trait approach to personality.
3. Summarize the measures that have been used to assess psychological disorders.

Early theories assumed that personality was expressed in people's physical appearance. One early approach, developed by the German physician Franz Joseph Gall (1758–1828) and known as *phrenology*, was based on the idea that we could measure personality by assessing the patterns of bumps on people's skulls (Figure 12.1.1). In the Victorian age, phrenology was taken seriously and many people promoted its use as a source of psychological insight and self-knowledge. Machines were even developed for helping people analyze skulls (Simpson, 2005). However, because careful scientific research did not validate the predictions of the theory, phrenology has now been discredited in contemporary psychology.

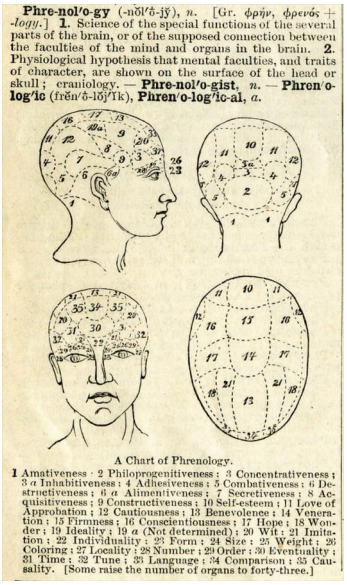


Figure 12.1.1: Phrenology. This definition of phrenology with a chart of the skull appeared in Webster's Academic Dictionary, circa 1895. Webster's Academic Dictionary – Wikimedia Commons – public domain.

Another approach, known as *somatology*, championed by the psychologist William Herbert Sheldon (1898–1977), was based on the idea that we could determine personality from people's body types (Figure 12.1.2). Sheldon (1940) argued that people with more body fat and a rounder physique ("endomorphs") were more likely to be assertive and bold, whereas thinner people ("ectomorphs") were more likely to be introverted and intellectual. As with phrenology, scientific research did not validate the predictions of the theory, and somatology has now been discredited in contemporary psychology.

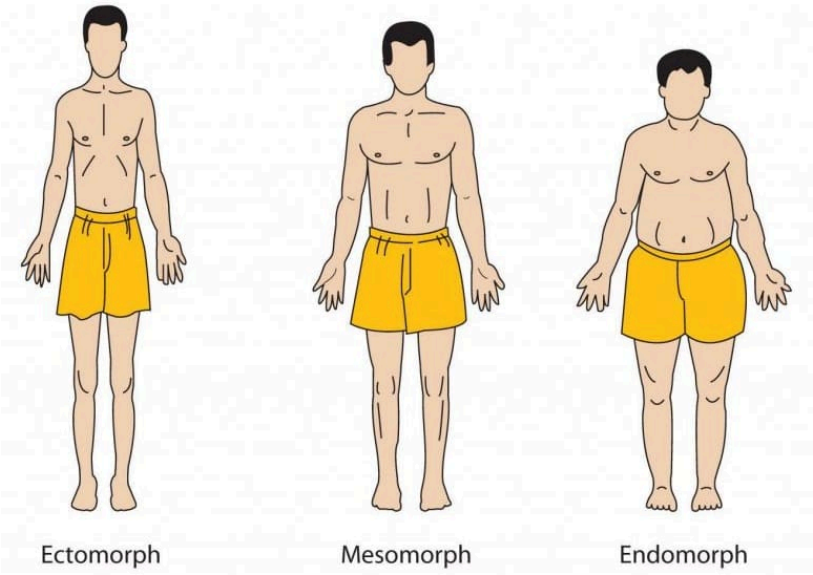


Figure 12.1.2: Sheldon's Body Types. William Sheldon erroneously believed that people with different body types had different personalities.

Another approach to detecting personality is known as *physiognomy*, or the idea that it is possible to assess personality from facial characteristics. In contrast to phrenology and somatology, for which no research support has been found, contemporary research has found that people are able to detect some aspects of a person's character—for instance, whether they are gay or straight and whether they are Democrats or Republicans—at above chance levels by looking only at his or her face (Rule & Ambady, 2010; Rule, Ambady, Adams, & Macrae, 2008; Rule, Ambady, & Hallett, 2009).

Despite these results, the ability to detect personality from faces is not guaranteed. Olivola and Todorov (2010) recently studied the ability of thousands of people to guess the personality characteristics of hundreds of thousands of faces on the website What's My Image? (www.whatsmyimage.com). In contrast to the predictions of physiognomy, the researchers found that these people would have made more accurate judgments about the strangers if they had just guessed, using their expectations about what people in general are like, rather than trying to use the particular facial features of individuals to help them. It seems then that the predictions of physiognomy may also, in the end, find little empirical support.

Personality as Traits

Personalities are characterized in terms of traits, which are *relatively enduring characteristics that influence our behavior across many situations*. Personality traits such as introversion, friendliness, conscientiousness, honesty, and helpfulness are important because they help explain consistencies in behavior.

The most popular way of measuring traits is by administering personality tests on which people self-report about their own characteristics. Psychologists have investigated hundreds of traits using the self-report approach, and this research has found many personality traits that have important implications for behavior. You can see some examples of the personality dimensions that have been studied by psychologists and their implications for behavior in Table 12.1.1.

Table 12.1.1: Some Personality Traits That Predict Behavior

Trait	Description	Examples of behaviors exhibited by people who have the trait
Authoritarianism (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950)	A cluster of traits including conventionalism, superstition, toughness, and exaggerated concerns with sexuality	Authoritarians are more likely to be prejudiced, to conform to leaders, and to display rigid behaviors.

Trait	Description	Examples of behaviors exhibited by people who have the trait
Individualism-collectivism (Triandis, 1989)	Individualism is the tendency to focus on oneself and one's personal goals; collectivism is the tendency to focus on one's relations with others.	Individualists prefer to engage in behaviors that make them stand out from others, whereas collectivists prefer to engage in behaviors that emphasize their similarity to others.
Internal versus external locus of control (Rotter, 1966)	In comparison to those with an external locus of control, people with an internal locus of control are more likely to believe that life events are due largely to their own efforts and personal characteristics.	People with higher internal locus of control are happier, less depressed, and healthier in comparison to those with an external locus of control.
Need for achievement (McClelland, 1958)	The desire to make significant accomplishments by mastering skills or meeting high standards	Those high in need for achievement select tasks that are not too difficult to be sure they will succeed in them.
Need for cognition (Cacioppo & Petty, 1982)	The extent to which people engage in and enjoy effortful cognitive activities	People high in the need for cognition pay more attention to arguments in ads.
Regulatory focus (Shah, Higgins, & Friedman, 1998)	Refers to differences in the motivations that energize behavior, varying from a *promotion orientation* (seeking out new opportunities) to a *prevention orientation* (avoiding negative outcomes)	People with a promotion orientation are more motivated by goals of gaining money, whereas those with prevention orientation are more concerned about losing money.
Self-consciousness (Fenigstein, Sheier, & Buss, 1975)	The tendency to introspect and examine one's inner self and feelings	People high in self-consciousness spend more time preparing their hair and makeup before they leave the house.
Self-esteem (Rosenberg, 1965)	High self-esteem means having a positive attitude toward oneself and one's capabilities.	High self-esteem is associated with a variety of positive psychological and health outcomes.
Sensation seeking (Zuckerman, 2007)	The motivation to engage in extreme and risky behaviors	Sensation seekers are more likely to engage in risky behaviors such as extreme and risky sports, substance abuse, unsafe sex, and crime.

Sources: Adorno, T. W., Frenkel-Brunswik, E., Levinson, D. J., & Sanford, R. N. (1950). *The authoritarian personality*. New York, NY: Harper; Triandis, H. (1989). The self and social behavior in differing cultural contexts. *Psychological Review, 93*, 506–520; Rotter, J. (1966). Generalized expectancies of internal versus external locus of control of reinforcement. *Psychological Monographs, 80*; McClelland, D. C. (1958). Methods of measuring human motivation. In John W. Atkinson (Ed.), *Motives in fantasy, action and society*. Princeton, NJ: D. Van Nostrand; Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology, 42*, 116–131; Shah, J., Higgins, T., & Friedman, R. S. (1998). Performance incentives and means: How regulatory focus influences goal attainment. *Journal of Personality and Social Psychology, 74*(2), 285–293; Fenigstein, A., Scheier, M. F., & Buss, A. H. (1975). Public and private self-consciousness: Assessment and theory. *Journal of Consulting and Clinical Psychology, 43*, 522–527; Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press; Zuckerman, M. (2007). *Sensation seeking and risky behavior*. Washington, DC: American Psychological Association.

Example of a Trait Measure

You can try completing a self-report measure of personality (a short form of the Five-Factor Personality Test) here. There are 120 questions and it should take you about 15–20 minutes to complete. You will receive feedback about your personality after you have finished the test.

www.personalitytest.net/ipip/ipipneo120.htm

As with intelligence tests, the utility of self-report measures of personality depends on their *reliability* and *construct validity*. Some popular measures of personality are not useful because they are unreliable or invalid. Perhaps you have heard of a personality test known as the Myers-Briggs Type Indicator (MBTI). If so, you are not alone, because the MBTI is the most widely administered personality test in the world, given millions of times a year to employees in thousands of companies. The MBTI categorizes people

into one of four categories on each of four dimensions: *introversion* versus *extraversion*, *sensing* versus *intuiting*, *thinking* versus *feeling*, and *judging* versus *perceiving*.

Although completing the MBTI can be useful for helping people think about individual differences in personality, and for "breaking the ice" at meetings, the measure itself is not psychologically useful because it is not reliable or valid. People's classifications change over time, and scores on the MBTI do not relate to other measures of personality or to behavior (Hunsley, Lee, & Wood, 2003). Measures such as the MBTI remind us that it is important to scientifically and empirically test the effectiveness of personality tests by assessing their stability over time and their ability to predict behavior.

One of the challenges of the trait approach to personality is that there are so many of them; there are at least 18,000 English words that can be used to describe people (Allport & Odbert, 1936). Thus a major goal of psychologists is to take this vast number of descriptors (many of which are very similar to each other) and to determine the underlying important or "core" traits among them (John, Angleitner, & Ostendorf, 1988).

The trait approach to personality was pioneered by early psychologists, including Gordon Allport (1897–1967), Raymond Cattell (1905–1998), and Hans Eysenck (1916–1997). Each of these psychologists believed in the idea of the trait as the stable unit of personality, and each attempted to provide a list or taxonomy of the most important trait dimensions. Their approach was to provide people with a self-report measure and then to use statistical analyses to look for the underlying "factors" or "clusters" of traits, according to the frequency and the co-occurrence of traits in the respondents.

Allport (1937) began his work by reducing the 18,000 traits to a set of about 4,500 traitlike words that he organized into three levels according to their importance. He called them "cardinal traits" (the most important traits), "central traits" (the basic and most useful traits), and "secondary traits" (the less obvious and less consistent ones). Cattell (1990) used a statistical procedure known as *factor analysis* to analyze the correlations among traits and to identify the most important ones. On the basis of his research he identified what he referred to as "source" (more important) and "surface" (less important) traits, and he developed a measure that assessed 16 dimensions of traits based on personality adjectives taken from everyday language.

Hans Eysenck was particularly interested in the biological and genetic origins of personality and made an important contribution to understanding the nature of a fundamental personality trait: *extraversion* versus *introversion* (Eysenck, 1998). Eysenck proposed that people who are extroverted (i.e., who enjoy socializing with others) have lower levels of naturally occurring arousal than do introverts (who are less likely to enjoy being with others). Eysenck argued that extroverts have a greater desire to socialize with others to increase their arousal level, which is naturally too low, whereas introverts, who have naturally high arousal, do not desire to engage in social activities because they are overly stimulating.

The fundamental work on trait dimensions conducted by Allport, Cattell, Eysenck, and many others has led to contemporary trait models, the most important and well-validated of which is the Five-Factor (Big Five) Model of Personality. According to this model, *there are five fundamental underlying trait dimensions that are stable across time, cross-culturally shared, and explain a substantial proportion of behavior* (Costa & McCrae, 1992; Goldberg, 1982). As you can see in Table 12.1.2, the five dimensions (sometimes known as the "Big Five") are *agreeableness, conscientiousness, extraversion, neuroticism, and openness to experience*. (You can remember them using the watery acronyms CANOE or OCEAN.)

Table 12.1.2: The Five Factors of the Five-Factor Model of Personality

Dimension	Sample items	Description	Examples of behaviors predicted by the trait
Openness to experience	"I have a vivid imagination"; "I have a rich vocabulary"; "I have excellent ideas."	A general appreciation for art, emotion, adventure, unusual ideas, imagination, curiosity, and variety of experience	Individuals who are highly open to experience tend to have distinctive and unconventional decorations in their home. They are also likely to have books on a wide variety of topics, a diverse music collection, and works of art on display.
Conscientiousness	"I am always prepared"; "I am exacting in my work"; "I follow a schedule."	A tendency to show self-discipline, act dutifully, and aim for achievement	Individuals who are conscientious have a preference for planned rather than spontaneous behavior.

Dimension	Sample items	Description	Examples of behaviors predicted by the trait
Extraversion	"I am the life of the party"; "I feel comfortable around people"; "I talk to a lot of different people at parties."	The tendency to experience positive emotions and to seek out stimulation and the company of others	Extroverts enjoy being with people. In groups they like to talk, assert themselves, and draw attention to themselves.
Agreeableness	"I am interested in people"; "I feel others' emotions"; "I make people feel at ease."	A tendency to be compassionate and cooperative rather than suspicious and antagonistic toward others; reflects individual differences in general concern for social harmony	Agreeable individuals value getting along with others. They are generally considerate, friendly, generous, helpful, and willing to compromise their interests with those of others.
Neuroticism	"I am not usually relaxed"; "I get upset easily"; "I am easily disturbed"	The tendency to experience negative emotions, such as anger, anxiety, or depression; sometimes called "emotional instability"	Those who score high in neuroticism are more likely to interpret ordinary situations as threatening and minor frustrations as hopelessly difficult. They may have trouble thinking clearly, making decisions, and coping effectively with stress.

A large body of research evidence has supported the five-factor model. The Big Five dimensions seem to be cross-cultural, because the same five factors have been identified in participants in China, Japan, Italy, Hungary, Turkey, and many other countries (Triandis & Suh, 2002). The Big Five dimensions also accurately predict behavior. For instance, a pattern of high conscientiousness, low neuroticism, and high agreeableness predicts successful job performance (Tett, Jackson, & Rothstein, 1991). Scores on the Big Five dimensions also predict the performance of U.S. presidents; ratings of openness to experience are correlated positively with ratings of presidential success, whereas ratings of agreeableness are correlated negatively with success (Rubenzer, Faschingbauer, & Ones, 2000). The Big Five factors are also increasingly being used in helping researchers understand the dimensions of psychological disorders such as anxiety and depression (Oldham, 2010; Saulsman & Page, 2004).

An advantage of the five-factor approach is that it is parsimonious. Rather than studying hundreds of traits, researchers can focus on only five underlying dimensions. The Big Five may also capture other dimensions that have been of interest to psychologists. For instance, the trait dimension of *need for achievement* relates to the Big Five variable of conscientiousness, and *self-esteem* relates to low neuroticism. On the other hand, the Big Five factors do not seem to capture all the important dimensions of personality. For instance, the Big Five does not capture moral behavior, although this variable is important in many theories of personality. And there is evidence that the Big Five factors are not exactly the same across all cultures (Cheung & Leung, 1998).

Situational Influences on Personality

One challenge to the trait approach to personality is that traits may not be as stable as we think they are. When we say that Malik is friendly, we mean that Malik is friendly today and will be friendly tomorrow and even next week. And we mean that Malik is friendlier than average in all situations. But what if Malik were found to behave in a friendly way with his family members but to be unfriendly with his fellow classmates? This would clash with the idea that traits are stable across time and situation.

The psychologist Walter Mischel (1968) reviewed the existing literature on traits and found that there was only a relatively low correlation (about $r = .30$) between the traits that a person expressed in one situation and those that they expressed in other situations. In one relevant study, Hartshorne, May, Maller, & Shuttleworth (1928) examined the correlations among various behavioral indicators of honesty in children. They also enticed children to behave either honestly or dishonestly in different situations, for instance, by making it easy or difficult for them to steal and cheat. The correlations among children's behavior was low, generally less than $r = .30$, showing that children who steal in one situation are not always the same children who steal in a different situation. And similar low correlations were found in adults on other measures, including dependency, friendliness, and conscientiousness (Bem & Allen, 1974).

Psychologists have proposed two possibilities for these low correlations. One possibility is that the natural tendency for people to see traits in others leads us to believe that people have stable personalities when they really do not. In short, perhaps traits are more in the heads of the people who are doing the judging than they are in the behaviors of the people being observed. The fact that people tend to use human personality traits, such as the Big Five, to judge animals in the same way that they use these traits

to judge humans is consistent with this idea (Gosling, 2001). And this idea also fits with research showing that people use their knowledge representation (schemas) about people to help them interpret the world around them and that these schemas color their judgments of others' personalities (Fiske & Taylor, 2007).

Research has also shown that people tend to see more traits in other people than they do in themselves. You might be able to get a feeling for this by taking the following short quiz. First, think about a person you know—your mom, your roommate, or a classmate—and choose which of the three responses on each of the four lines best describes him or her. Then answer the questions again, but this time about yourself.

1.	Energetic	Relaxed	Depends on the situation
2.	Skeptical	Trusting	Depends on the situation
3.	Quiet	Talkative	Depends on the situation
4.	Intense	Calm	Depends on the situation

Richard Nisbett and his colleagues (Nisbett, Caputo, Legant, & Marecek, 1973) had college students complete this same task for themselves, for their best friend, for their father, and for the (at the time well-known) newscaster Walter Cronkite. As you can see in Figure 12.1.3, the participants chose one of the two trait terms more often for other people than they did for themselves, and chose "depends on the situation" more frequently for themselves than they did for the other people. These results also suggest that people may perceive more consistent traits in others than they should.

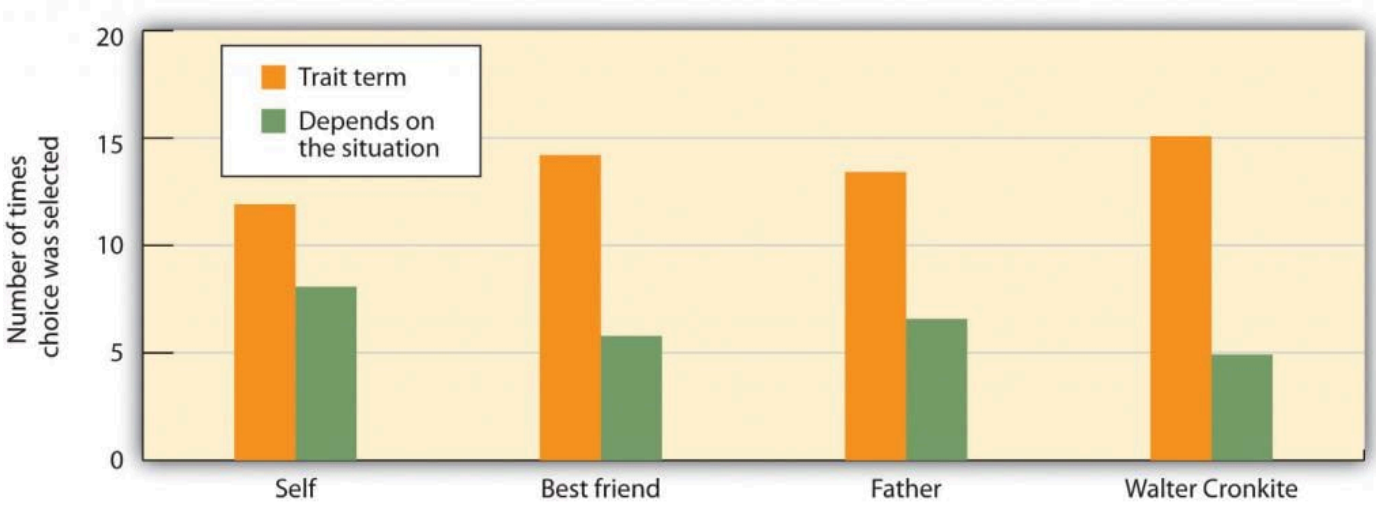


Figure 12.1.3: We Tend to Overestimate the Traits of Others. Nisbett, Caputo, Legant, and Marecek (1973) found that participants checked off a trait term (such as "energetic" or "talkative") rather than "depends on the situation" less often when asked to describe themselves than when asked to describe others. Adapted from Nisbett, R. E., Caputo, C., Legant, P., & Marecek, J. (1973). Behavior as seen by the actor and as seen by the observer. *Journal of Personality and Social Psychology, 27*(2), 154–164.

The human tendency to perceive traits is so strong that it is very easy to convince people that trait descriptions of themselves are accurate. Imagine that you had completed a personality test and the psychologist administering the measure gave you this description of your personality:

You have a great need for other people to like and admire you. You have a tendency to be critical of yourself. You have a great deal of unused capacity, which you have not turned to your advantage. While you have some personality weaknesses, you are generally able to compensate for them. Disciplined and self-controlled outside, you tend to be worrisome and insecure inside. At times you have serious doubts as to whether you have made the right decision or done the right thing.

I would imagine that you might find that it described you. You probably do criticize yourself at least sometimes, and you probably do sometimes worry about things. The problem is that you would most likely have found some truth in a personality description that was the opposite. Could this description fit you too?

You frequently stand up for your own opinions even if it means that others may judge you negatively. You have a tendency to find the positives in your own behavior. You work to the fullest extent of your capabilities. You have few personality weaknesses, but

some may show up under stress. You sometimes confide in others that you are concerned or worried, but inside you maintain discipline and self-control. You generally believe that you have made the right decision and done the right thing.

The Barnum effect refers to *the observation that people tend to believe in descriptions of their personality that supposedly are descriptive of them but could in fact describe almost anyone*. The Barnum effect helps us understand why many people believe in astrology, horoscopes, fortune-telling, palm reading, tarot card reading, and even some personality tests. People are likely to accept descriptions of their personality if they think that they have been written for them, even though they cannot distinguish their own tarot card or horoscope readings from those of others at better than chance levels (Hines, 2003). Again, people seem to believe in traits more than they should.



Figure 12.1.4: The popularity of tarot card reading, crystal ball reading, horoscopes, palm reading, and other techniques shows the human propensity to believe in traits. Conny Sandland – Fortune teller in Little India, Klang, Malaysia – CC BY-NC 2.0; thaths – Tarot cards on a Thai fortune teller's table – CC BY-NC 2.0.

A second way that psychologists responded to Mischel's findings was by searching even more carefully for the existence of traits. One insight was that the relationship between a trait and a behavior is less than perfect because people can express their traits in different ways (Mischel & Shoda, 2008). People high in extraversion, for instance, may become teachers, salesmen, actors, or even criminals. Although the behaviors are very different, they nevertheless all fit with the meaning of the underlying trait.

Psychologists also found that, because people do behave differently in different situations, personality will only predict behavior when the behaviors are aggregated or averaged across different situations. We might not be able to use the personality trait of openness to experience to determine what Saul will do on Friday night, but we can use it to predict what he will do over the next year in a variety of situations. When many measurements of behavior are combined, there is much clearer evidence for the stability of traits and for the effects of traits on behavior (Roberts & DelVecchio, 2000; Srivastava, John, Gosling, & Potter, 2003).

Taken together, these findings make a very important point about personality, which is that it not only comes from inside us but is also shaped by the situations that we are exposed to. Personality is derived from our interactions with and observations of others, from our interpretations of those interactions and observations, and from our choices of which social situations we prefer to enter or avoid (Bandura, 1986). In fact, behaviorists such as B. F. Skinner explain personality entirely in terms of the environmental influences that the person has experienced. Because we are profoundly influenced by the situations that we are exposed to, our behavior does change from situation to situation, making personality less stable than we might expect. And yet personality does matter—we can, in many cases, use personality measures to predict behavior across situations.

The MMPI and Projective Tests

One of the most important measures of personality (which is used primarily to assess deviations from a "normal" or "average" personality) is the Minnesota Multiphasic Personality Inventory (MMPI), *a test used around the world to identify personality and psychological disorders* (Tellegen et al., 2003). The MMPI was developed by creating a list of more than 1,000 true-false questions and choosing those that best differentiated patients with different psychological disorders from other people. The current version (the MMPI-2) has more than 500 questions, and the items can be combined into a large number of different subscales. Some of the most important of these are shown in Table 12.1.3, but there are also scales that represent family problems, work attitudes, and many other dimensions. The MMPI also has questions that are designed to detect the tendency of the respondents to lie, fake, or simply not answer the questions.

Table 12.1.3 Some of the Major Subscales of the MMPI

Abbreviation	Description	What is measured	No. of items
Hs	Hypochondriasis	Concern with bodily symptoms	32

Abbreviation	Description	What is measured	No. of items
D	Depression	Depressive symptoms	57
Hy	Hysteria	Awareness of problems and vulnerabilities	60
Pd	Psychopathic deviate	Conflict, struggle, anger, respect for society's rules	50
MF	Masculinity/femininity	Stereotypical masculine or feminine interests/behaviors	56
Pa	Paranoia	Level of trust, suspiciousness, sensitivity	40
Pt	Psychasthenia	Worry, anxiety, tension, doubts, obsessiveness	48
Sc	Schizophrenia	Odd thinking and social alienation	78
Ma	Hypomania	Level of excitability	46
Si	Social introversion	People orientation	69

To interpret the results, the clinician looks at the pattern of responses across the different subscales and makes a diagnosis about the potential psychological problems facing the patient. Although clinicians prefer to interpret the patterns themselves, a variety of research has demonstrated that computers can often interpret the results as well as can clinicians (Garb, 1998; Karon, 2000). Extensive research has found that the MMPI-2 can accurately predict which of many different psychological disorders a person suffers from (Graham, 2006).

One potential problem with a measure like the MMPI is that it asks people to consciously report on their inner experiences. But much of our personality is determined by unconscious processes of which we are only vaguely or not at all aware. Projective measures are *measures of personality in which unstructured stimuli, such as inkblots, drawings of social situations, or incomplete sentences, are shown to participants, who are asked to freely list what comes to mind as they think about the stimuli*. Experts then score the responses for clues to personality. The proposed advantage of these tests is that they are more indirect—they allow the respondent to freely express whatever comes to mind, including perhaps the contents of their unconscious experiences.

One commonly used projective test is the *Rorschach Inkblot Test*, developed by the Swiss psychiatrist Hermann Rorschach (1884–1922). The Rorschach Inkblot Test is *a projective measure of personality in which the respondent indicates his or her thoughts about a series of 10 symmetrical inkblots* (Figure 12.1.5). The Rorschach is administered millions of time every year. The participants are asked to respond to the inkblots, and their responses are systematically scored in terms of what, where, and why they saw what they saw. For example, people who focus on the details of the inkblots may have obsessive-compulsive tendencies, whereas those who talk about sex or aggression may have sexual or aggressive problems.

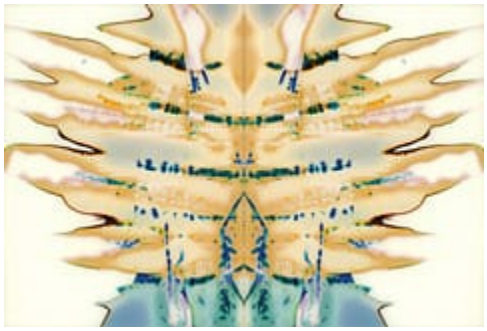


Figure 12.1.5 Rorschach Inkblots. The Rorschach Inkblot Test is a projective test designed to assess psychological disorders.Dominic Alves – Fuji Butterfly – CC BY 2.0.

Another frequently administered projective test is the *Thematic Apperception Test (TAT)*, developed by the psychologist Henry Murray (1893–1988). The Thematic Apperception Test (TAT) is *a projective measure of personality in which the respondent is asked to create stories about sketches of ambiguous situations, most of them of people, either alone or with others* (Figure 12.1.6). The sketches are shown to individuals, who are asked to tell a story about what is happening in the picture. The TAT assumes that people may be unwilling or unable to admit their true feelings when asked directly but that these feelings will show up in the stories about the pictures. Trained coders read the stories and use them to develop a personality profile of the respondent.

Other popular projective tests include those that ask the respondent to draw pictures, such as the Draw-A-Person test (Machover, 1949), and free association tests in which the respondent quickly responds with the first word that comes to mind when the

examiner says a test word. Another approach is the use of “anatomically correct” dolls that feature representations of the male and female genitals. Investigators allow children to play with the dolls and then try to determine on the basis of the play if the children may have been sexually abused.

The advantage of projective tests is that they are less direct, allowing people to avoid using their defense mechanisms and therefore show their “true” personality. The idea is that when people view ambiguous stimuli they will describe them according to the aspects of personality that are most important to them, and therefore bypass some of the limitations of more conscious responding.

Despite their widespread use, however, the empirical evidence supporting the use of projective tests is mixed (Karon, 2000; Wood, Nezworski, Lilienfeld, & Garb, 2003). The reliability of the measures is low because people often produce very different responses on different occasions. The construct validity of the measures is also suspect because there are very few consistent associations between Rorschach scores or TAT scores and most personality traits. The projective tests often fail to distinguish between people with psychological disorders and those without or to correlate with other measures of personality or with behavior.

In sum, projective tests are more useful as icebreakers to get to know a person better, to make the person feel comfortable, and to get some ideas about topics that may be of importance to that person than for accurately diagnosing personality.

Psychology in Everyday Life: Leaders and Leadership

One trait that has been studied in thousands of studies is leadership, *the ability to direct or inspire others to achieve goals*. *Trait theories of leadership* are theories based on the idea that some people are simply “natural leaders” because they possess personality characteristics that make them effective (Zaccaro, 2007). Consider Bill Gates, the founder of the Microsoft Corporation, shown in Figure 12.1.7. What characteristics do you think he possessed that allowed him to create such a strong company, even though many similar companies failed?



Figure 12.1.7: Varieties of Leaders. Which personality traits do you think characterize these leaders?[1]

Research has found that being intelligent is an important characteristic of leaders, as long as the leader communicates to others in a way that is easily understood by his or her followers (Simonton, 1994, 1995). Other research has found that people with good social skills, such as the ability to accurately perceive the needs and goals of the group members and to communicate with others, also tend to make good leaders (Kenny & Zaccaro, 1983).

Because so many characteristics seem to be related to leader skills, some researchers have attempted to account for leadership not in terms of individual traits, but rather in terms of a package of traits that successful leaders seem to have. Some have considered this in terms of charisma (Sternberg & Lubart, 1995; Sternberg, 2002). Charismatic leaders are *leaders who are enthusiastic, committed, and self-confident; who tend to talk about the importance of group goals at a broad level; and who make personal sacrifices for the group*. Charismatic leaders express views that support and validate existing group norms but that also contain a vision of what the group could or should be. Charismatic leaders use their referent power to motivate, uplift, and inspire others. And research has found a positive relationship between a leader’s charisma and effective leadership performance (Simonton, 1988).

Another trait-based approach to leadership is based on the idea that leaders take either *transactional* or *transformational* leadership styles with their subordinates (Bass, 1999; Pieterse, Van Knippenberg, Schippers, & Stam, 2010). *Transactional* leaders are the more regular leaders, who work with their subordinates to help them understand what is required of them and to get the job done. *Transformational* leaders, on the other hand, are more like charismatic leaders—they have a vision of where the group is going, and attempt to stimulate and inspire their workers to move beyond their present status and to create a new and better future.

Despite the fact that there appear to be at least some personality traits that relate to leadership ability, the most important approaches to understanding leadership take into consideration both the personality characteristics of the leader as well as the situation in which the leader is operating. In some cases the situation itself is important. For instance, you might remember that President George W. Bush's ratings as a leader increased dramatically after the September 11, 2001, terrorist attacks on the World Trade Center. This is a classic example of how a situation can influence the perceptions of a leader's skill.

In still other cases, different types of leaders may perform differently in different situations. Leaders whose personalities lead them to be more focused on fostering harmonious social relationships among the members of the group, for instance, are particularly effective in situations in which the group is already functioning well and yet it is important to keep the group members engaged in the task and committed to the group outcomes. Leaders who are more task-oriented and directive, on the other hand, are more effective when the group is not functioning well and needs a firm hand to guide it (Ayman, Chemers, & Fiedler, 1995).

Key Takeaways

- Personality is an individual's consistent patterns of feeling, thinking, and behaving.
- Personality is driven in large part by underlying individual motivations, where motivation refers to a need or desire that directs behavior.
- Early theories assumed that personality was expressed in people's physical appearance. One of these approaches, known as physiognomy, has been validated by current research.
- Personalities are characterized in terms of traits—relatively enduring characteristics that influence our behavior across many situations.
- The most important and well-validated theory about the traits of normal personality is the Five-Factor Model of Personality.
- There is often only a low correlation between the specific traits that a person expresses in one situation and those that he expresses in other situations. This is in part because people tend to see more traits in other people than they do in themselves. Personality predicts behavior better when the behaviors are aggregated or averaged across different situations.
- The Minnesota Multiphasic Personality Inventory (MMPI) is the most important measure of psychological disorders.
- Projective measures are measures of personality in which unstructured stimuli, such as inkblots, drawings of social situations, or incomplete sentences are shown to participants, who are asked to freely list what comes to mind as they think about the stimuli. Despite their widespread use, however, the empirical evidence supporting the use of projective tests is mixed.

Exercises and Critical Thinking

1. Consider your own personality and those of people you know. What traits do you enjoy in other people, and what traits do you dislike?
2. Consider some of the people who have had an important influence on you. What were the personality characteristics of these people that made them so influential?

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12.2: The Origins of Personality

Learning Objectives

1. Describe the strengths and limitations of the psychodynamic approach to explaining personality.
2. Summarize the accomplishments of the neo-Freudians.
3. Identify the major contributions of the humanistic approach to understanding personality.

Although measures such as the Big Five and the Minnesota Multiphasic Personality Inventory (MMPI) are able to effectively assess personality, they do not say much about where personality comes from. In this section we will consider two major theories of the origin of personality: *psychodynamic* and *humanistic* approaches.

Psychodynamic Theories of Personality: The Role of the Unconscious

One of the most important psychological approaches to understanding personality is based on the theorizing of the Austrian physician and psychologist Sigmund Freud (1856–1939), who founded what today is known as the psychodynamic approach to understanding personality. Many people know about Freud because his work has had a huge impact on our everyday thinking about psychology, and the psychodynamic approach is one of the most important approaches to psychological therapy (Roudinesco, 2003; Taylor, 2009). Freud is probably the best known of all psychologists, in part because of his impressive observation and analyses of personality (there are 24 volumes of his writings). As is true of all theories, many of Freud's ingenious ideas have turned out to be at least partially incorrect, and yet other aspects of his theories are still influencing psychology.

Freud was influenced by the work of the French neurologist Jean-Martin Charcot (1825–1893), who had been interviewing patients (almost all women) who were experiencing what was at the time known as *hysteria*. Although it is no longer used to describe a psychological disorder, hysteria at the time referred to a set of personality and physical symptoms that included chronic pain, fainting, seizures, and paralysis.

Charcot could find no biological reason for the symptoms. For instance, some women experienced a loss of feeling in their hands and yet not in their arms, and this seemed impossible given that the nerves in the arms are the same that are in the hands. Charcot was experimenting with the use of hypnosis, and he and Freud found that under hypnosis many of the hysterical patients reported having experienced a traumatic sexual experience, such as sexual abuse, as children (Dolnick, 1998).

Freud and Charcot also found that during hypnosis the remembering of the trauma was often accompanied by an outpouring of emotion, known as *catharsis*, and that following the catharsis the patient's symptoms were frequently reduced in severity. These observations led Freud and Charcot to conclude that these disorders were caused by psychological rather than physiological factors.

Freud used the observations that he and Charcot had made to develop his theory regarding the sources of personality and behavior, and his insights are central to the fundamental themes of psychology. In terms of free will, Freud did not believe that we were able to control our own behaviors. Rather, he believed that all behaviors are predetermined by motivations that lie outside our awareness, in the unconscious. These forces show themselves in our dreams, in neurotic symptoms such as obsessions, while we are under hypnosis, and in Freudian "slips of the tongue" in which people reveal their unconscious desires in language. Freud argued that we rarely understand why we do what we do, although we can make up explanations for our behaviors after the fact. For Freud the mind was like an iceberg, with the many motivations of the unconscious being much larger, but also out of sight, in comparison to the consciousness of which we are aware (Figure 12.2.8).

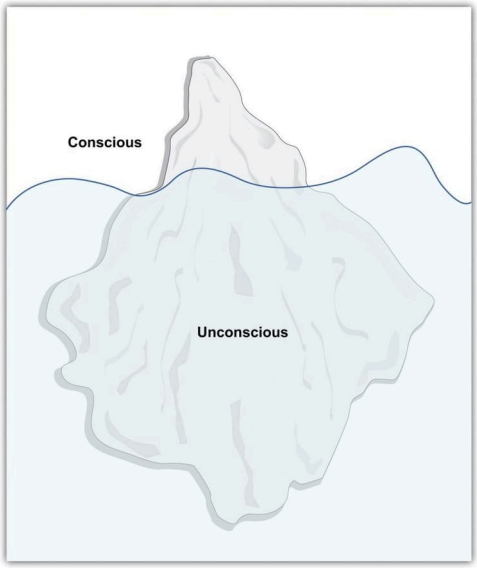


Figure 12.2.8 Mind as Iceberg. In Sigmund Freud's conceptualization of personality, the most important motivations are unconscious, just as the major part of an iceberg is under water.

Id, Ego, and Superego

Freud proposed that the mind is divided into three components: *id*, *ego*, and *superego*, and that the interactions and conflicts among the components create personality (Freud, 1923/1943). According to Freudian theory, the id is *the component of personality that forms the basis of our most primitive impulses*. The id is entirely unconscious, and it drives our most important motivations, including the sexual drive (*libido*) and the aggressive or destructive drive (*Thanatos*). According to Freud, the id is driven by the *pleasure principle*—the desire for immediate gratification of our sexual and aggressive urges. The id is why we smoke cigarettes, drink alcohol, view pornography, tell mean jokes about people, and engage in other fun or harmful behaviors, often at the cost of doing more productive activities.

In stark contrast to the id, the superego represents *our sense of morality and oughts*. The superego tell us all the things that we shouldn't do, or the duties and obligations of society. The superego strives for perfection, and when we fail to live up to its demands we feel guilty.

In contrast to the id, which is about the pleasure principle, the function of the *ego* is based on the *reality principle*—the idea that we must delay gratification of our basic motivations until the appropriate time with the appropriate outlet. The ego is *the largely conscious controller or decision-maker of personality*. The ego serves as the intermediary between the desires of the id and the constraints of society contained in the superego (Figure 12.2.9). We may wish to scream, yell, or hit, and yet our ego normally tells us to wait, reflect, and choose a more appropriate response.

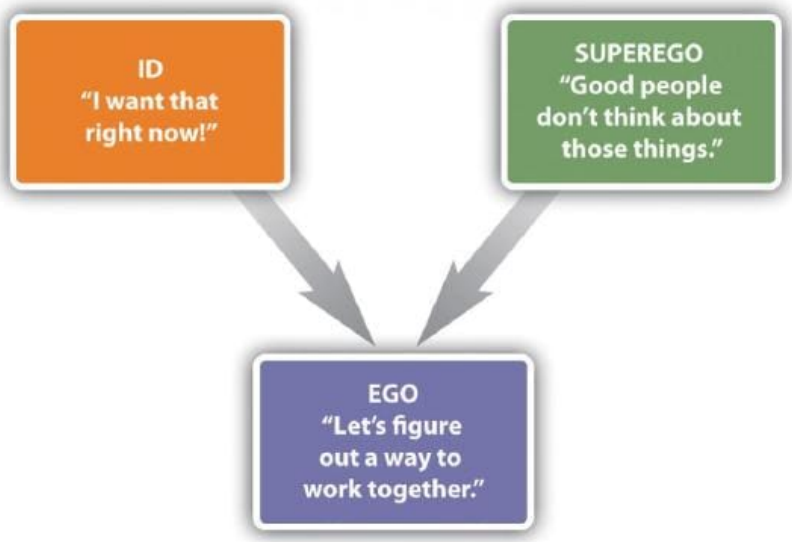


Figure 12.2.9: Ego, Id, and Superego in Interaction

Freud believed that psychological disorders, and particularly the experience of anxiety, occur when there is conflict or imbalance among the motivations of the id, ego, and superego. When the ego finds that the id is pressing too hard for immediate pleasure, it attempts to correct for this problem, often through the use of defense mechanisms—*unconscious psychological strategies used to cope with anxiety and to maintain a positive self-image*. Freud believed that the defense mechanisms were essential for effective coping with everyday life, but that any of them could be overused (Table 12.2.4).

Table 12.2.4: The Major Freudian Defense Mechanisms

Defense mechanism	Definition	Possible behavioral example
Displacement	Diverting threatening impulses away from the source of the anxiety and toward a more acceptable source	A student who is angry at her professor for a low grade lashes out at her roommate, who is a safer target of her anger.
Projection	Disguising threatening impulses by attributing them to others	A man with powerful unconscious sexual desires for women claims that women use him as a sex object.
Rationalization	Generating self-justifying explanations for our negative behaviors	A drama student convinces herself that getting the part in the play wasn't that important after all.
Reaction formation	Making unacceptable motivations appear as their exact opposite	Jane is sexually attracted to friend Jake, but she claims in public that she intensely dislikes him.
Regression	Retreating to an earlier, more childlike, and safer stage of development	A college student who is worried about an important test begins to suck on his finger.
Repression (or denial)	Pushing anxiety-arousing thoughts into the unconscious	A person who witnesses his parents having sex is later unable to remember anything about the event.
Sublimation	Channeling unacceptable sexual or aggressive desires into acceptable activities	A person participates in sports to sublimate aggressive drives. A person creates music or art to sublimate sexual drives.

The most controversial, and least scientifically valid, part of Freudian theory is its explanations of personality development. Freud argued that personality is developed through a series of *psychosexual stages*, each focusing on pleasure from a different part of the body (Table 12.2.5). Freud believed that sexuality begins in infancy, and that the appropriate resolution of each stage has implications for later personality development.

Table 12.2.5 Freud's Stages of Psychosexual Development

Stage	Approximate ages	Description
Oral	Birth to 18 months	Pleasure comes from the mouth in the form of sucking, biting, and chewing.
Anal	18 months to 3 years	Pleasure comes from bowel and bladder elimination and the constraints of toilet training.
Phallic	3 years to 6 years	Pleasure comes from the genitals, and the conflict is with sexual desires for the opposite-sex parent.
Latency	6 years to puberty	Sexual feelings are less important.
Genital	Puberty and older	If prior stages have been properly reached, mature sexual orientation develops.

In the first of Freud's proposed stages of psychosexual development, which begins at birth and lasts until about 18 months of age, the focus is on the mouth. During this *oral stage*, the infant obtains sexual pleasure by sucking and drinking. Infants who receive either too little or too much gratification become *fixated* or "locked" in the oral stage, and are likely to regress to these points of fixation under stress, even as adults. According to Freud, a child who receives too little oral gratification (e.g., who was underfed or neglected) will become *orally dependent* as an adult and be likely to manipulate others to fulfill his or her needs rather than becoming independent. On the other hand, the child who was overfed or overly gratified will resist growing up and try to return to the prior state of dependency by acting helpless, demanding satisfaction from others, and acting in a needy way.

The *anal stage*, lasting from about 18 months to 3 years of age is when children first experience psychological conflict. During this stage children desire to experience pleasure through bowel movements, but they are also being toilet trained to delay this gratification. Freud believed that if this toilet training was either too harsh or too lenient, children would become fixated in the anal stage and become likely to regress to this stage under stress as adults. If the child received too little anal gratification (i.e., if the parents had been very harsh about toilet training), the adult personality will be *anal retentive*—stingy, with a compulsive seeking of order and tidiness. On the other hand, if the parents had been too lenient, the *anal expulsive* personality results, characterized by a lack of self-control and a tendency toward messiness and carelessness.

The *phallic stage*, which lasts from age 3 to age 6 is when the penis (for boys) and clitoris (for girls) become the primary erogenous zone for sexual pleasure. During this stage, Freud believed that children develop a powerful but unconscious attraction for the opposite-sex parent, as well as a desire to eliminate the same-sex parent as a rival. Freud based his theory of sexual development in boys (the "Oedipus complex") on the Greek mythological character Oedipus, who unknowingly killed his father and married his mother, and then put his own eyes out when he learned what he had done. Freud argued that boys will normally eventually abandon their love of the mother, and instead identify with the father, also taking on the father's personality characteristics, but that boys who do not successfully resolve the Oedipus complex will experience psychological problems later in life. Although it was not as important in Freud's theorizing, in girls the phallic stage is often termed the "Electra complex," after the Greek character who avenged her father's murder by killing her mother. Freud believed that girls frequently experienced *penis envy*, the sense of deprivation supposedly experienced by girls because they do not have a penis.

The *latency stage* is a period of relative calm that lasts from about 6 years to 12 years. During this time, Freud believed that sexual impulses were repressed, leading boys and girls to have little or no interest in members of the opposite sex.

The fifth and last stage, the *genital stage*, begins about 12 years of age and lasts into adulthood. According to Freud, sexual impulses return during this time frame, and if development has proceeded normally to this point, the child is able to move into the development of mature romantic relationships. But if earlier problems have not been appropriately resolved, difficulties with establishing intimate love attachments are likely.

Freud's Followers: The Neo-Freudians

Freudian theory was so popular that it led to a number of followers, including many of Freud's own students, who developed, modified, and expanded his theories. Taken together, these approaches are known as neo-Freudian theories. *The neo-Freudian theories are theories based on Freudian principles that emphasize the role of the unconscious and early experience in shaping personality but place less evidence on sexuality as the primary motivating force in personality and are more optimistic concerning the prospects for personality growth and change in personality in adults*.

Alfred Adler (1870–1937) was a follower of Freud who developed his own interpretation of Freudian theory. Adler proposed that the primary motivation in human personality was not sex or aggression, but rather the striving for superiority. According to Adler,

we desire to be better than others and we accomplish this goal by creating a unique and valuable life. We may attempt to satisfy our need for superiority through our school or professional accomplishments, or by our enjoyment of music, athletics, or other activities that seem important to us.

Adler believed that psychological disorders begin in early childhood. He argued that children who are either overly nurtured or overly neglected by their parents are later likely to develop an *inferiority complex*—a psychological state in which people feel that they are not living up to expectations, leading them to have low self-esteem, with a tendency to try to overcompensate for the negative feelings. People with an inferiority complex often attempt to demonstrate their superiority to others at all costs, even if it means humiliating, dominating, or alienating them. According to Adler, most psychological disorders result from misguided attempts to compensate for the inferiority complex in order meet the goal of superiority.

Carl Jung (1875–1961) was another student of Freud who developed his own theories about personality. Jung agreed with Freud about the power of the unconscious but felt that Freud overemphasized the importance of sexuality. Jung argued that in addition to the personal unconscious, there was also a collective unconscious, or *a collection of shared ancestral memories*. Jung believed that the collective unconscious contains a variety of *archetypes*, or cross-culturally universal symbols, which explain the similarities among people in their emotional reactions to many stimuli. Important archetypes include the mother, the goddess, the hero, and the mandala or circle, which Jung believed symbolized a desire for wholeness or unity. For Jung, the underlying motivation that guides successful personality is *self-realization*, or learning about and developing the self to the fullest possible extent.

Karen Horney (the last syllable of her last name rhymes with “eye”; 1855–1952), was a German physician who applied Freudian theories to create a personality theory that she thought was more balanced between men and women. Horney believed that parts of Freudian theory, and particularly the ideas of the Oedipus complex and penis envy, were biased against women. Horney argued that women’s sense of inferiority was not due to their lack of a penis but rather to their dependency on men, an approach that the culture made it difficult for them to break from. For Horney, the underlying motivation that guides personality development is the desire for *security*, the ability to develop appropriate and supportive relationships with others.

Another important neo-Freudian was Erich Fromm (1900–1980). Fromm’s focus was on the negative impact of technology, arguing that the increases in its use have led people to feel increasingly isolated from others. Fromm believed that the independence that technology brings us also creates the need “escape from freedom,” that is, to become closer to others.

Research Focus: How the Fear of Death Causes Aggressive Behavior

Fromm believed that the primary human motivation was to escape the fear of death, and contemporary research has shown how our concerns about dying can influence our behavior. In this research, people have been made to confront their death by writing about it or otherwise being reminded of it, and effects on their behavior are then observed. In one relevant study, McGregor et al. (1998) demonstrated that people who are provoked may be particularly aggressive after they have been reminded of the possibility of their own death. The participants in the study had been selected, on the basis of prior reporting, to have either politically liberal or politically conservative views. When they arrived at the lab they were asked to write a short paragraph describing their opinion of politics in the United States. In addition, half of the participants (the *mortality salient condition*) were asked to “briefly describe the emotions that the thought of your own death arouses in you” and to “jot down as specifically as you can, what you think will happen to you as you physically die, and once you are physically dead.” Participants in the *exam control condition* also thought about a negative event, but not one associated with a fear of death. They were instructed to “please briefly describe the emotions that the thought of your next important exam arouses in you” and to “jot down as specifically as you can, what you think will happen to you as you physically take your next exam, and once you are physically taking your next exam.”

Then the participants read the essay that had supposedly just been written by another person. (The other person did not exist, but the participants didn’t know this until the end of the experiment.) The essay that they read had been prepared by the experimenters to be very negative toward politically liberal views or to be very negative toward politically conservative views. Thus one-half of the participants were provoked by the other person by reading a statement that strongly conflicted with their own political beliefs, whereas the other half read an essay in which the other person’s views supported their own (liberal or conservative) beliefs.

At this point the participants moved on to what they thought was a completely separate study in which they were to be tasting and giving their impression of some foods. Furthermore, they were told that it was necessary for the participants in the research to administer the food samples to each other. At this point, the participants found out that the food they were

going to be sampling was spicy hot sauce and that they were going to be administering the sauce to the very person whose essay they had just read. In addition, the participants read some information about the other person that indicated that he very much disliked eating spicy food. Participants were given a taste of the hot sauce (it was really hot!) and then instructed to place a quantity of it into a cup for the other person to sample. Furthermore, they were told that the other person would have to eat all the sauce.

As you can see in Figure 12.2.10, McGregor et al. found that the participants who had not been reminded of their own death, even if they had been insulted by the partner, did not retaliate by giving him a lot of hot sauce to eat. On the other hand, the participants who were both provoked by the other person and who had also been reminded of their own death administered significantly more hot sauce than did the participants in the other three conditions. McGregor et al. (1998) argued that thinking about one's own death creates a strong concern with maintaining one's one cherished worldviews (in this case our political beliefs). When we are concerned about dying we become more motivated to defend these important beliefs from the challenges made by others, in this case by aggressing through the hot sauce.

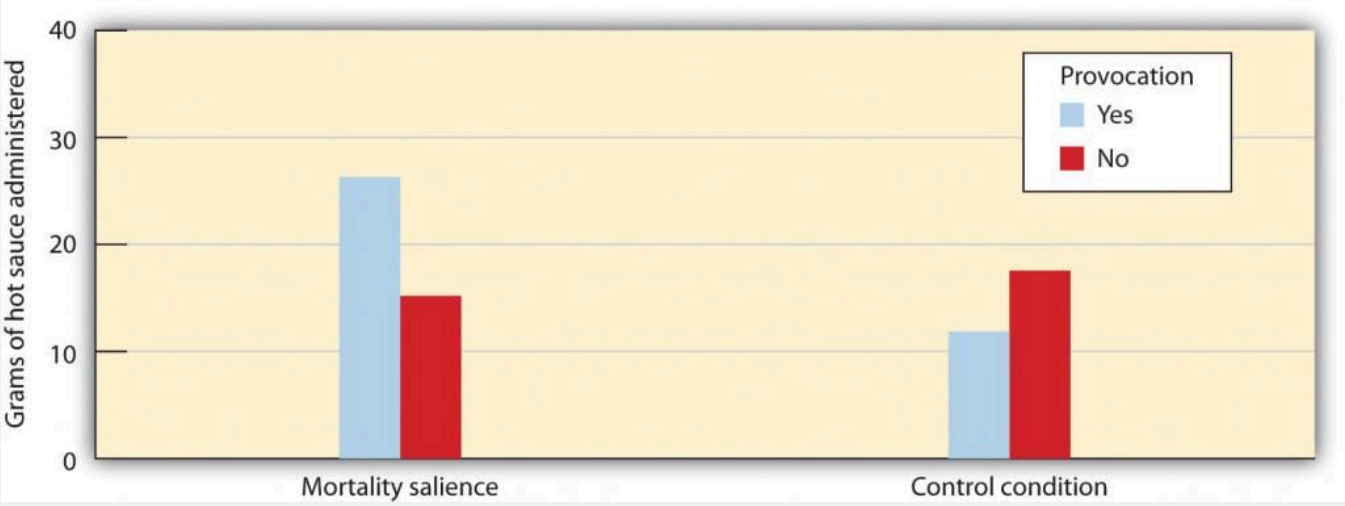


Figure 12.2.10 Aggression as a Function of Mortality Salience and Provocation. Participants who had been provoked by a stranger who disagreed with them on important opinions, and who had also been reminded of their own death, administered significantly more unpleasant hot sauce to the partner than did the participants in the other three conditions. Adapted from McGregor, H. A., Lieberman, J. D., Greenberg, J., Solomon, S., Arndt, J., Simon, L.,...Pyszczynski, T. (1998). Terror management and aggression: Evidence that mortality salience motivates aggression against worldview-threatening others. *Journal of Personality and Social Psychology*, 74(3), 590–605.

Strengths and Limitations of Freudian and Neo-Freudian Approaches

Freud has probably exerted a greater impact on the public's understanding of personality than any other thinker, and he has also in large part defined the field of psychology. Although Freudian psychologists no longer talk about oral, anal, or genital "fixations," they do continue to believe that our childhood experiences and unconscious motivations shape our personalities and our attachments with others, and they still make use of psychodynamic concepts when they conduct psychological therapy.

Nevertheless, Freud's theories, as well as those of the neo-Freudians, have in many cases failed to pass the test of empiricism, and as a result they are less influential now than they have been in the past (Crews, 1998). The problems are first, that it has proved to be difficult to rigorously test Freudian theory because the predictions that it makes (particularly those regarding defense mechanisms) are often vague and unfalsifiable, and second, that the aspects of the theory that can be tested often have not received much empirical support.

As examples, although Freud claimed that children exposed to overly harsh toilet training would become fixated in the anal stage and thus be prone to excessive neatness, stinginess, and stubbornness in adulthood, research has found few reliable associations between toilet training practices and adult personality (Fisher & Greenberg, 1996). And since the time of Freud, the need to repress sexual desires would seem to have become much less necessary as societies have tolerated a wider variety of sexual practices. And yet the psychological disorders that Freud thought we caused by this repression have not decreased.

There is also little scientific support for most of the Freudian defense mechanisms. For example, studies have failed to yield evidence for the existence of repression. People who are exposed to traumatic experiences in war have been found to remember

their traumas only too well (Kihlstrom, 1997). Although we may attempt to push information that is anxiety-arousing into our unconscious, this often has the ironic effect of making us think about the information even more strongly than if we hadn't tried to repress it (Newman, Duff, & Baumeister, 1997). It is true that children remember little of their childhood experiences, but this seems to be true of both negative as well as positive experiences, is true for animals as well, and probably is better explained in terms of the brain's inability to form long-term memories than in terms of repression. On the other hand, Freud's important idea that expressing or talking through one's difficulties can be psychologically helpful has been supported in current research (Baddeley & Pennebaker, 2009) and has become a mainstay of psychological therapy.

A particular problem for testing Freudian theories is that almost anything that conflicts with a prediction based in Freudian theory can be explained away in terms of the use of a defense mechanism. A man who expresses a lot of anger toward his father may be seen via Freudian theory to be experiencing the Oedipus complex, which includes conflict with the father. But a man who expresses no anger at all toward the father also may be seen as experiencing the Oedipus complex by repressing the anger. Because Freud hypothesized that either was possible, but did not specify when repression would or would not occur, the theory is difficult to falsify.

In terms of the important role of the unconscious, Freud seems to have been at least in part correct. More and more research demonstrates that a large part of everyday behavior is driven by processes that are outside our conscious awareness (Kihlstrom, 1987). And yet, although our unconscious motivations influence every aspect of our learning and behavior Freud probably overestimated the extent to which these unconscious motivations are primarily sexual and aggressive.

Taken together, it is fair to say that Freudian theory, like most psychological theories, was not entirely correct and that it has had to be modified over time as the results of new studies have become available. But the fundamental ideas about personality that Freud proposed, as well as the use of talk therapy as an essential component of therapy, are nevertheless still a major part of psychology and are used by clinical psychologists every day.

Focusing on the Self: Humanism and Self-Actualization

Psychoanalytic models of personality were complemented during the 1950s and 1960s by the theories of humanistic psychologists. In contrast to the proponents of psychoanalysis, humanists embraced the notion of free will. Arguing that people are free to choose their own lives and make their own decisions, humanistic psychologists focused on the underlying motivations that they believed drove personality, focusing on the nature of the self-concept, *the set of beliefs about who we are*, and self-esteem, *our positive feelings about the self*.

One of the most important humanists, Abraham Maslow (1908–1970), conceptualized personality in terms of a pyramid-shaped *hierarchy of motives* (Figure 12.2.11). At the base of the pyramid are the lowest-level motivations, including hunger and thirst, and safety and belongingness. Maslow argued that only when people are able to meet the lower-level needs are they able to move on to achieve the higher-level needs of self-esteem, and eventually self-actualization, which is *the motivation to develop our innate potential to the fullest possible extent*.

Maslow studied how successful people, including Albert Einstein, Abraham Lincoln, Martin Luther King Jr., Helen Keller, and Mahatma Gandhi had been able to lead such successful and productive lives. Maslow (1970) believed that self-actualized people are creative, spontaneous, and loving of themselves and others. They tend to have a few deep friendships rather than many superficial ones, and are generally private. He felt that these individuals do not need to conform to the opinions of others because they are very confident and thus free to express unpopular opinions. Self-actualized people are also likely to have *peak experiences*, or transcendent moments of tranquility accompanied by a strong sense of connection with others.

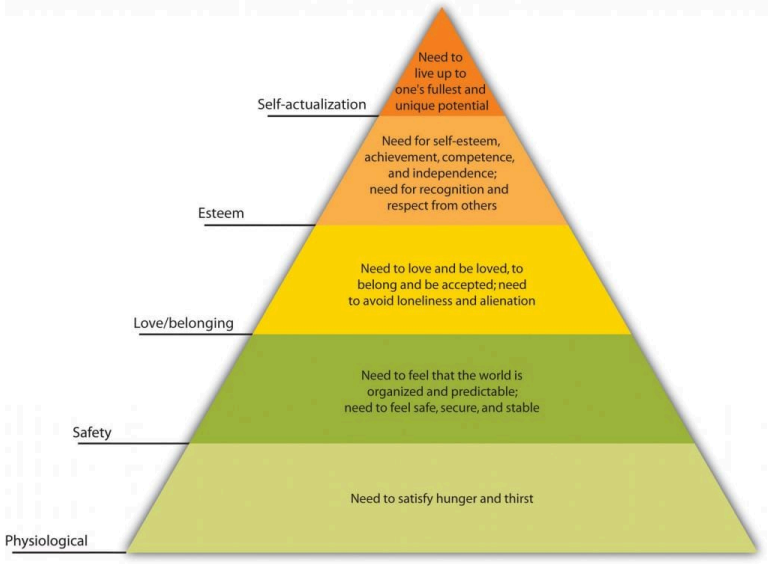


Figure 12.2.11 Maslow's Hierarchy of Needs. Abraham Maslow conceptualized personality in terms of a hierarchy of needs. The highest of these motivations is self-actualization.

Perhaps the best-known humanistic theorist is Carl Rogers (1902–1987). Rogers was positive about human nature, viewing people as primarily moral and helpful to others, and believed that we can achieve our full potential for emotional fulfillment if the self-concept is characterized by unconditional positive regard—*a set of behaviors including being genuine, open to experience, transparent, able to listen to others, and self-disclosing and empathic*. When we treat ourselves or others with unconditional positive regard, we express understanding and support, even while we may acknowledge failings. Unconditional positive regard allows us to admit our fears and failures, to drop our pretenses, and yet at the same time to feel completely accepted for what we are. The principle of unconditional positive regard has become a foundation of psychological therapy; therapists who use it in their practice are more effective than those who do not (Prochaska & Norcross, 2007; Yalom, 1995).

Although there are critiques of the humanistic psychologists (e.g., that Maslow focused on historically productive rather than destructive personalities in his research and thus drew overly optimistic conclusions about the capacity of people to do good), the ideas of humanism are so powerful and optimistic that they have continued to influence both everyday experiences as well as psychology. Today the *positive psychology movement* argues for many of these ideas, and research has documented the extent to which thinking positively and openly has important positive consequences for our relationships, our life satisfaction, and our psychological and physical health (Seligman & Csikszentmihalyi, 2000).

Research Focus: Self-Discrepancies, Anxiety, and Depression

Tory Higgins and his colleagues (Higgins, Bond, Klein, & Strauman, 1986; Strauman & Higgins, 1988) have studied how different aspects of the self-concept relate to personality characteristics. These researchers focused on the types of emotional distress that we might experience as a result of how we are currently evaluating our self-concept. Higgins proposes that the emotions we experience are determined both by our perceptions of how well our own behaviors meet up to the standards and goals we have provided ourselves (our *internal standards*) and by our perceptions of how others think about us (our *external standards*). Furthermore, Higgins argues that different types of *self-discrepancies* lead to different types of negative emotions.

In one of Higgins's experiments (Higgins, Bond, Klein, & Strauman., 1986), participants were first asked to describe themselves using a self-report measure. The participants listed 10 thoughts that they thought described the kind of person they actually are; this is the *actual self-concept*. Then, participants also listed 10 thoughts that they thought described the type of person they would "ideally like to be" (the *ideal self-concept*) as well as 10 thoughts describing the way that someone else—for instance, a parent—thinks they "ought to be" (the *ought self-concept*).

Higgins then divided his participants into two groups. Those with *low self-concept discrepancies* were those who listed similar traits on all three lists. Their ideal, ought, and actual self-concepts were all pretty similar and so they were not considered to be vulnerable to threats to their self-concept. The other half of the participants, those with *high self-concept discrepancies*, were those for whom the traits listed on the ideal and ought lists were very different from those listed on the actual self list. These participants were expected to be vulnerable to threats to the self-concept.

Then, at a later research session, Higgins first asked people to express their current emotions, including those related to sadness and anxiety. After obtaining this baseline measure Higgins activated either ideal or ought discrepancies for the participants. Participants in the *ideal self-discrepancy priming* condition were asked to think about and discuss their own and their parents' hopes and goals for them. Participants in the *ought self-priming condition* listed their own and their parents' beliefs concerning their duty and obligations. Then all participants again indicated their current emotions.

As you can see in Figure 12.2.12, for low self-concept discrepancy participants, thinking about their ideal or ought selves did not much change their emotions. For high self-concept discrepancy participants, however, priming the ideal self-concept increased their sadness and dejection, whereas priming the ought self-concept increased their anxiety and agitation. These results are consistent with the idea that discrepancies between the ideal and the actual self lead us to experience sadness, dissatisfaction, and other depression-related emotions, whereas discrepancies between the actual and ought self are more likely to lead to fear, worry, tension, and other anxiety-related emotions.

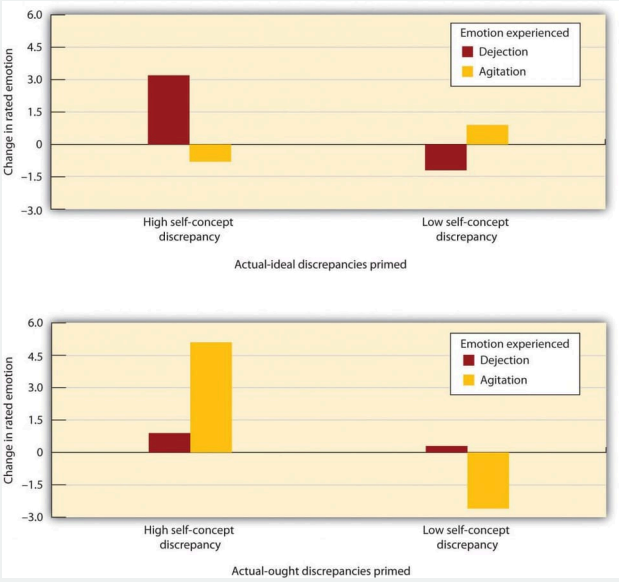


Figure 12.2.12 Results From Higgins, Bond, Klein, and Strauman, 1986. Higgins and his colleagues documented the impact of self-concept discrepancies on emotion. For participants with low self-concept discrepancies (right bars), seeing words that related to the self had little influence on emotions. For those with high self-concept discrepancies (left bars), priming the ideal self increased dejection whereas priming the ought self increased agitation. Adapted from Higgins, E. T., Bond, R. N., Klein, R., & Strauman, T. (1986). Self-discrepancies and emotional vulnerability: How magnitude, accessibility, and type of discrepancy influence affect. *Journal of Personality and Social Psychology*, 51(1), 5–15.

One of the critical aspects of Higgins's approach is that, as is our personality, our feelings are also influenced both by our own behavior and by our expectations of how other people view us. This makes it clear that even though you might not care that much about achieving in school, your failure to do well may still produce negative emotions because you realize that your parents do think it is important.

Key Takeaways

- One of the most important psychological approaches to understanding personality is based on the psychodynamic approach to personality developed by Sigmund Freud.
- For Freud the mind was like an iceberg, with the many motivations of the unconscious being much larger, but also out of sight, in comparison to the consciousness of which we are aware.
- Freud proposed that the mind is divided into three components: id, ego, and superego, and that the interactions and conflicts among the components create personality.

- Freud proposed that we use defense mechanisms to cope with anxiety and to maintain a positive self-image.
- Freud argued that personality is developed through a series of psychosexual stages, each focusing on pleasure from a different part of the body.
- The neo-Freudian theorists, including Adler, Jung, Horney, and Fromm, emphasized the role of the unconscious and early experience in shaping personality, but placed less evidence on sexuality as the primary motivating force in personality.
- Psychoanalytic and behavioral models of personality were complemented during the 1950s and 1960s by the theories of humanistic psychologists, including Maslow and Rogers.

Exercises and Critical Thinking

1. Based on your understanding of psychodynamic theories, how would you analyze your own personality? Are there aspects of the theory that might help you explain your own strengths and weaknesses?
2. Based on your understanding of humanistic theories, how would you try to change your behavior to better meet the underlying motivations of security, acceptance, and self-realization?
3. Consider your own self-concept discrepancies. Do you have an actual-ideal or actual-ought discrepancy? Which one is more important for you, and why?

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12.3: Is Personality More Nature or More Nurture? Behavioral and Molecular Genetics

Learning Objectives

1. Explain how genes transmit personality from one generation to the next.
2. Outline the methods of behavioral genetics studies and the conclusions that we can draw from them about the determinants of personality.
3. 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 behaviors 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 behaviors 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 behaviors 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 Behavioral 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 behavioral genetics—*a variety of research techniques that scientists use to learn about the genetic and environmental influences on human behavior by comparing the traits of biologically and nonbiologically related family members* (Baker, 2010). Behavioral 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 to 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 $12.3.6$ presents data on the correlations and heritability estimates for a variety of traits based on the results of behavioral genetics studies (Bouchard, Lykken, McGue, Segal, & Tellegen, 1990).

Table 12.3.6 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		

Sources: Långström, N., Rahman, Q., Carlström, E., & Lichtenstein, P. (2008). Genetic and environmental effects on same-sex sexual behavior: A population study of twins in Sweden. *Archives of Sexual Behavior*, doi:10.1007/s10508-008-9386-1; Loehlin, J. C. (1992). *Genes and environment in personality development*. Thousand Oaks, CA: Sage Publications, Inc; McGue, M., & Lykken, D. T. (1992). Genetic influence on risk of divorce. *Psychological Science, 3*(6), 368–373; Plomin, R., Fulker, D. W., Corley, R., & DeFries, J. C. (1997). Nature, nurture, and cognitive development from 1 to 16 years: A parent-offspring adoption study. *Psychological Science, 8*(6), 442–447; Tellegen, A., Lykken, D. T., Bouchard, T. J., Wilcox, K. J., Segal, N. L., & Rich, S. (1988). Personality similarity in twins reared apart and together. *Journal of Personality and Social Psychology, 54*(6), 1031–1039.

If you look in the second column of Table 12.3.6, 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 40–50%.

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 12.3.6 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 12.3.6, 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 behavior 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 12.3.6, 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 behavioral 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 occured 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)[1]. 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 12.3.13: These "knockout" mice are participating in studies in which some of their genes have been deactivated to determine the influence of the genes on behavior. Tatiana Bulyonkova – New rats – CC BY-SA 2.0.

One approach that can be used in animals, usually in laboratory mice, is the *knockout study*. 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 such 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 behavior 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.

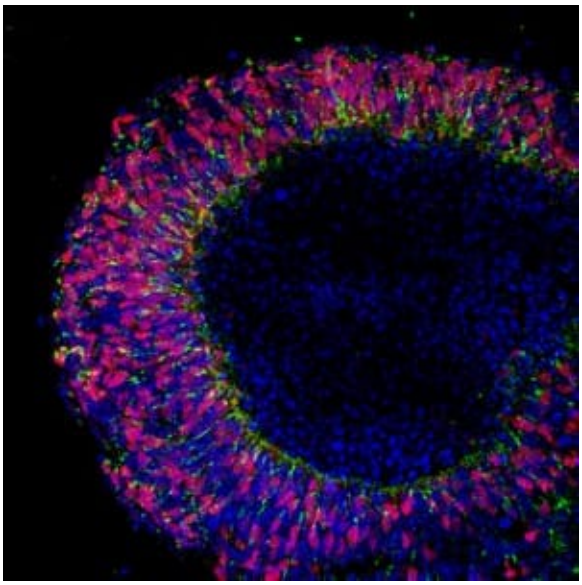


Figure 12.3.14: Researchers use dyes, such as these in a sample of stem cells, to determine the action of genes from DNA samples. UCL News – A nascent retina, generated from a 3D embryonic stem cell culture – CC BY-NC 2.0.

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 behavior (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 behavior. Behavioral 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 behavioral 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 behavior is entirely dependent upon 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.
- Behavioral genetics refers to a variety of research techniques that scientists use to learn about the genetic and environmental influences on human behavior.
- Behavioral genetics is based on the results of family studies, twin studies, and adoptive studies.
- Overall, genetics has more influence than do parents 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?

[1]Human Genome Project. (2010). Information. Retrieved from http://www.ornl.gov/sci/techresources/Human_Genome/home.shtml

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12.4: Personality (Summary)

Personality is defined as an individual's consistent patterns of feeling, thinking, and behaving. Early theories of personality, including phrenology and somatology, are now discredited, but there is at least some research evidence for physiognomy—the idea that it is possible to assess personality from facial characteristics.

Personalities are characterized in terms of traits, which are relatively enduring characteristics that influence our behavior across many situations. Psychologists have investigated hundreds of traits using the self-report approach.

The utility of self-report measures of personality depends on their reliability and construct validity. Some popular measures of personality, such as the Myers-Briggs Type Indicator (MBTI), do not have reliability or construct validity and therefore are not useful measures of personality.

The trait approach to personality was pioneered by early psychologists, including Allport, Cattell, and Eysenck, and their research helped produce the Five-Factor (Big Five) Model of Personality. The Big Five dimensions are cross-culturally valid and accurately predict behavior. The Big Five factors are also increasingly being used to help researchers understand the dimensions of psychological disorders.

A difficulty of the trait approach to personality is that there is often only a low correlation between the traits that a person expresses in one situation and those that he or she expresses in other situations. However, psychologists have also found that personality predicts behavior better when the behaviors are averaged across different situations.

People may believe in the existence of traits because they use their schemas to judge other people, leading them to believe that traits are more stable than they really are. An example is the Barnum effect—the observation that people tend to believe in descriptions of their personality that supposedly are descriptive of them but could in fact describe almost anyone.

An important personality test is the Minnesota Multiphasic Personality Inventory (MMPI) used to detect personality and psychological disorders. Another approach to measuring personality is to use projective measures, such as the Rorschach Inkblot Test and the Thematic Apperception Test (TAT). The advantage of projective tests is that they are less direct, but empirical evidence supporting their reliability and construct validity is mixed.

There are behaviorist, social-cognitive, psychodynamic, and humanist theories of personality.

The psychodynamic approach to understanding personality, begun by Sigmund Freud, is based on the idea that all behaviors are predetermined by motivations that lie outside our awareness, in the unconscious. Freud proposed that the mind is divided into three components: id, ego, and superego, and that the interactions and conflicts among the components create personality. Freud also believed that psychological disorders, and particularly the experience of anxiety, occur when there is conflict or imbalance among the motivations of the id, ego, and superego and that people use defense mechanisms to cope with this anxiety.

Freud argued that personality is developed through a series of psychosexual stages, each focusing on pleasure from a different part of the body, and that the appropriate resolution of each stage has implications for later personality development.

Freud has probably exerted a greater impact on the public's understanding of personality than any other thinker, but his theories have in many cases failed to pass the test of empiricism.

Freudian theory led to a number of followers known as the neo-Freudians, including Adler, Jung, Horney, and Fromm.

Humanistic theories of personality focus on the underlying motivations that they believed drive personality, focusing on the nature of the self-concept and the development of self-esteem. The idea of unconditional positive regard championed by Carl Rogers has led in part to the positive psychology movement, and it is a basis for almost all contemporary psychological therapy.

Personality traits of humans and animals are determined in large part by their genetic makeup. Personality is not determined by any single gene, but rather by the actions of many genes working together.

The role of nature and nurture in personality is studied by means of behavioral genetics studies including family studies, twin studies, and adoption studies. These studies partition variability in personality into the influence of genetics (known as heritability), shared environment, and nonshared environment. Although these studies find that many personality traits are highly

heritable, genetics does not determine everything. The major influence on personality is nonshared environmental influences.

In addition to the use of behavioral genetics, our understanding of the role of biology in personality recently has been dramatically increased through the use of molecular genetics, the study of which genes are associated with which personality traits in animals and humans.

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13.1: Development and Aging

Learning Objectives

- Define and distinguish between the three domains of development: physical, cognitive and psychosocial
- Discuss the normative approach to development
- Understand the three major issues in development: continuity and discontinuity, one common course of development or many unique courses of development, and nature versus nurture

My heart leaps up when I behold

A rainbow in the sky:

So was it when my life began;

So is it now I am a man;

So be it when I shall grow old,

Or let me die!

The Child is father of the Man;

I could wish my days to be

Bound each to each by natural piety. (Wordsworth, 1802)

In this poem, William Wordsworth writes, "the child is father of the man." What does this seemingly incongruous statement mean, and what does it have to do with lifespan development? Wordsworth might be suggesting that the person he is as an adult depends largely on the experiences he had in childhood. Consider the following questions: To what extent is the adult you are today influenced by the child you once were? To what extent is a child fundamentally different from the adult he grows up to be?

These are the types of questions developmental psychologists try to answer, by studying how humans change and grow from conception through childhood, adolescence, adulthood, and death. They view development as a lifelong process that can be studied scientifically across three developmental domains—physical, cognitive, and psychosocial development. **Physical development** involves growth and changes in the body and brain, the senses, motor skills, and health and wellness. **Cognitive development** involves learning, attention, memory, language, thinking, reasoning, and creativity. **Psychosocial development** involves emotions, personality, and social relationships. We refer to these domains throughout the chapter.

CONNECT THE CONCEPTS: Research Methods in Developmental Psychology

You've learned about a variety of research methods used by psychologists. Developmental psychologists use many of these approaches in order to better understand how individuals change mentally and physically over time. These methods include naturalistic observations, case studies, surveys, and experiments, among others.

Naturalistic observations involve observing behavior in its natural context. A developmental psychologist might observe how children behave on a playground, at a daycare center, or in the child's own home. While this research approach provides a glimpse into how children behave in their natural settings, researchers have very little control over the types and/or frequencies of displayed behavior.

In a case study, developmental psychologists collect a great deal of information from one individual in order to better understand physical and psychological changes over the lifespan. This particular approach is an excellent way to better understand individuals, who are exceptional in some way, but it is especially prone to researcher bias in interpretation, and it is difficult to generalize conclusions to the larger population.

In one classic example of this research method being applied to a study of lifespan development Sigmund Freud analyzed the development of a child known as "Little Hans" (Freud, 1909/1949). Freud's findings helped inform his theories of psychosexual development in children, which you will learn about later in this chapter. Little Genie, the subject of a case study discussed in the chapter on thinking and intelligence, provides another example of how psychologists examine developmental milestones through detailed research on a single individual. In Genie's case, her neglectful and abusive upbringing led to her being unable to speak until, at age 13, she was removed from that harmful environment. As she learned to use language, psychologists were able to compare how her language acquisition abilities differed when occurring in her late-stage development compared to the typical acquisition of those skills during the ages of infancy through early childhood (Fromkin, Krashen, Curtiss, Rigler, & Rigler, 1974; Curtiss, 1981).

The survey method asks individuals to self-report important information about their thoughts, experiences, and beliefs. This particular method can provide large amounts of information in relatively short amounts of time; however, validity of data collected in this way relies on honest self-reporting, and the data is relatively shallow when compared to the depth of information collected in a case study.

Experiments involve significant control over extraneous variables and manipulation of the independent variable. As such, experimental research allows developmental psychologists to make causal statements about certain variables that are important for the developmental process. Because experimental research must occur in a controlled environment, researchers must be cautious about whether behaviors observed in the laboratory translate to an individual's natural environment.

Later in this chapter, you will learn about several experiments in which toddlers and young children observe scenes or actions so that researchers can determine at what age specific cognitive abilities develop. For example, children may observe a quantity of liquid poured from a short, fat glass into a tall, skinny glass. As the experimenters question the children about what occurred, the subjects' answers help psychologists understand at what age a child begins to comprehend that the volume of liquid remained the same although the shapes of the containers differs.

Across these three domains—physical, cognitive, and psychosocial—the **normative approach** to development is also discussed. This approach asks, "What is normal development?" In the early decades of the 20th century, normative psychologists studied large numbers of children at various ages to determine norms (i.e., average ages) of when most children reach specific developmental milestones in each of the three domains (Gesell, 1933, 1939, 1940; Gesell & Ilg, 1946; Hall, 1904). Although children develop at slightly different rates, we can use these age-related averages as general guidelines to compare children with same-age peers to determine the approximate ages they should reach specific normative events called **developmental milestones** (e.g., crawling, walking, writing, dressing, naming colors, speaking in sentences, and starting puberty).

Not all normative events are universal, meaning they are not experienced by all individuals across all cultures. Biological milestones, such as puberty, tend to be universal, but social milestones, such as the age when children begin formal schooling, are not necessarily universal; instead, they affect most individuals in a particular **culture** (Gesell & Ilg, 1946). For example, in developed countries children begin school around 5 or 6 years old, but in developing countries, like Nigeria, children often enter school at an advanced age, if at all (Huebler, 2005; United Nations Educational, Scientific, and Cultural Organization [UNESCO], 2013).

To better understand the normative approach, imagine two new mothers, Louisa and Kimberly, who are close friends and have children around the same age. Louisa's daughter is 14 months old, and Kimberly's son is 12 months old. According to the normative approach, the average age a child starts to walk is 12 months. However, at 14 months Louisa's daughter still isn't walking. She tells Kimberly she is worried that something might be wrong with her baby. Kimberly is surprised because her son started walking when he was only 10 months old. Should Louisa be worried? Should she be concerned if her daughter is not walking by 15 months or 18 months?

LINK TO LEARNING

The Centers for Disease Control and Prevention (CDC) describes the developmental milestones for children from 2 months through 5 years old. After reviewing the information, take this Developmental Milestones Quiz to see how well you recall what you've learned. If you are a parent with concerns about your child's development, contact your pediatrician.

Issues in Developmental Psychology

There are many different theoretical approaches regarding human development. As we evaluate them in this chapter, recall that developmental psychology focuses on how people change, and keep in mind that all the approaches that we present in this chapter address questions of change: Is the change smooth or uneven (continuous versus discontinuous)? Is this pattern of change the same for everyone, or are there many different patterns of change (one course of development versus many courses)? How do genetics and environment interact to influence development (nature versus nurture)?

Is Development Continuous or Discontinuous?

Continuous development views development as a cumulative process, gradually improving on existing skills (See figure 9.2). With this type of development, there is gradual change. Consider, for example, a child's physical growth: adding inches to her height year by year. In contrast, theorists who view development as **discontinuous** believe that development takes place in unique stages: It occurs at specific times or ages. With this type of development, the change is more sudden, such as an infant's ability to conceive object permanence.

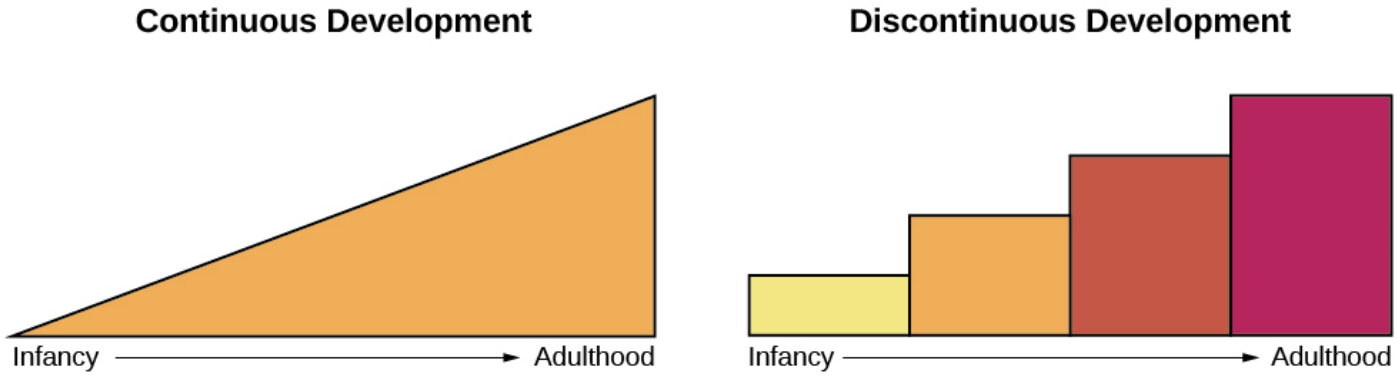


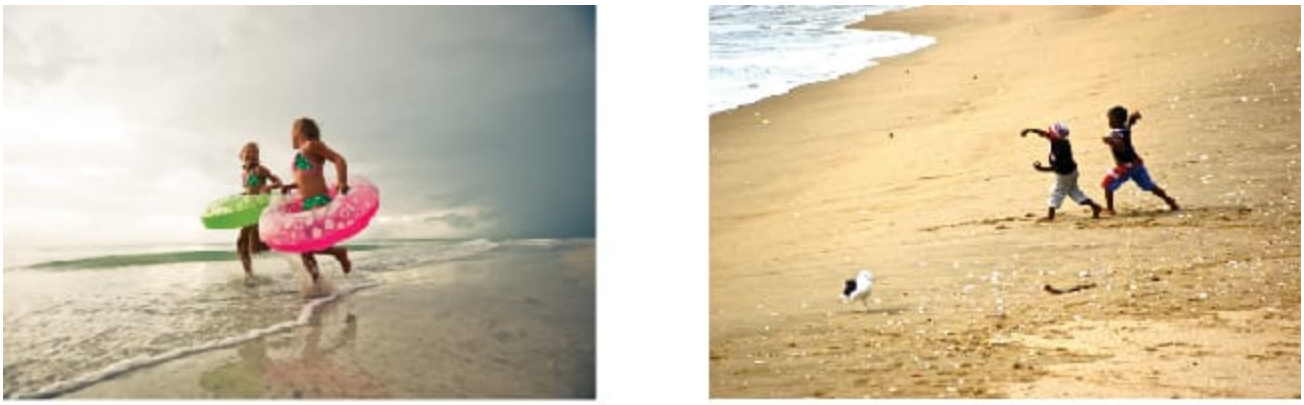
Figure 9.2 The concept of continuous development can be visualized as a smooth slope of progression, whereas discontinuous development sees growth in more discrete stages.

Is There One Course of Development or Many?

Is development essentially the same, or universal, for all children (i.e., there is one course of development) or does development follow a different course for each child, depending on the child's specific genetics and environment (i.e., there are many courses of development)? Do people across the world share more similarities or more differences in their development? How much do culture and genetics influence a child's behavior?

Stage theories hold that the sequence of development is universal. For example, in cross-cultural studies of language development, children from around the world reach language milestones in a similar sequence (Gleitman & Newport, 1995). Infants in all cultures coo before they babble. They begin babbling at about the same age and utter their first word around 12 months old. Yet we live in diverse contexts that have a unique effect on each of us. For example, researchers once believed that motor development follows one course for all children regardless of culture. However, child care practices vary by culture, and different practices have been found to accelerate or inhibit achievement of developmental milestones such as sitting, crawling, and walking (Karasik, Adolph, Tamis-LeMonda, & Bornstein, 2010).

For instance, let's look at the Aché society in Paraguay. They spend a significant amount of time foraging in forests. While foraging, Aché mothers carry their young children, rarely putting them down in order to protect them from getting hurt in the forest. Consequently, their children walk much later: They walk around $23-25$ months old, in comparison to infants in Western cultures who begin to walk around 12 months old. However, as Aché children become older, they are allowed more freedom to move about, and by about age 9, their motor skills surpass those of U.S. children of the same age: Aché children are able to climb trees up to 25 feet tall and use machetes to chop their way through the forest (Kaplan & Dove, 1987). As you can see, our development is influenced by multiple contexts, so the timing of basic motor functions may vary across cultures. However, the functions themselves are present in all societies (See figure below).



(a) (b)

Figure 9.3 All children across the world love to play. Whether in (a) Florida or (b) South Africa, children enjoy exploring sand, sunshine, and the sea. (credit a: modification of work by “Visit St. Pete/Clearwater”/Flickr; credit b: modification of work by "stringer_bel"/Flickr)

How Do Nature and Nurture Influence Development?

Are we who we are because of **nature** (biology and genetics), or are we who we are because of **nurture** (our environment and culture)? This longstanding question is known in psychology as the nature versus nurture debate. It seeks to understand how our personalities and traits are the product of our genetic makeup and biological factors, and how they are shaped by our environment, including our parents, peers, and culture. For instance, why do biological children sometimes act like their parents—is it because of genetics or because of early childhood environment and what the child has learned from the parents? What about children who are adopted—are they more like their biological families or more like their adoptive families? And how can siblings from the same family be so different?

We are all born with specific genetic traits inherited from our parents, such as eye color, height, and certain personality traits. Beyond our basic genotype, however, there is a deep interaction between our genes and our environment: Our unique experiences in our environment influence whether and how particular traits are expressed, and at the same time, our genes influence how we interact with our environment (Diamond, 2009; Lobo, 2008). This chapter will show that there is a reciprocal interaction between nature and nurture as they both shape who we become, but the debate continues as to the relative contributions of each.

DIG DEEPER:

The Achievement Gap - How Does Socioeconomic Status Affect Development?

The achievement gap refers to the persistent difference in grades, test scores, and graduation rates that exist among students of different ethnicities, races, and—in certain subjects—sexes (Winerman, 2011). Research suggests that these achievement gaps are strongly influenced by differences in socioeconomic factors that exist among the families of these children. While the researchers acknowledge that programs aimed at reducing such socioeconomic discrepancies would likely aid in equalizing the aptitude and performance of children from different backgrounds, they recognize that such large-scale interventions would be difficult to achieve. Therefore, it is recommended that programs aimed at fostering aptitude and achievement among disadvantaged children may be the best option for dealing with issues related to academic achievement gaps (Duncan & Magnuson, 2005).

Children from low-income households perform significantly more poorly than their middle- and high-income peers on a number of educational variables: They have significantly lower standardized test scores, graduation rates, and college entrance rates, and they have much higher school dropout rates. There have been attempts to correct the achievement gap through state and federal legislation, but what if the problems start before the children even enter school?

Psychologists Betty Hart and Todd Risley (2006) spent their careers looking at early language ability and progression of children in various income levels. In one longitudinal study, they found that although all the parents in the study engaged and interacted with their children, middle- and high-income parents interacted with their children differently than low-income parents. After analyzing $1,300$ hours of parent-child interactions, the researchers found that middle- and high-income parents

talk to their children significantly more, starting when the children are infants. By 3 years old, high-income children knew almost double the number of words known by their low-income counterparts, and they had heard an estimated total of 30 million more words than the low-income counterparts (Hart & Risley, 2003). And the gaps only become more pronounced. Before entering kindergarten, high-income children score 60% higher on achievement tests than their low-income peers (Lee & Burkam, 2002).

There are solutions to this problem. At the University of Chicago, experts are working with low-income families, visiting them at their homes, and encouraging them to speak more to their children on a daily and hourly basis. Other experts are designing preschools in which students from diverse economic backgrounds are placed in the same classroom. In this research, low-income children made significant gains in their language development, likely as a result of attending the specialized preschool (Schechter & Byeb, 2007). What other methods or interventions could be used to decrease the achievement gap? What types of activities could be implemented to help the children of your community or a neighboring community?

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13.2: Lifespan Theories

Learning Objectives

- Discuss Freud's theory of psychosexual development
- Describe the major tasks of child and adult psychosocial development according to Erikson
- Discuss Piaget's view of cognitive development and apply the stages to understanding childhood cognition
- Describe Kohlberg's theory of moral development
- Compare and contrast the strengths and weaknesses of major developmental theories

There are many theories regarding how babies and children grow and develop into happy, healthy adults. We explore several of these theories in this section.

Psychosexual Theory of Development

Sigmund **Freud** (1856–1939) believed that personality develops during early childhood. For Freud, childhood experiences shape our personalities and behavior as adults. Freud viewed development as discontinuous; he believed that each of us must pass through a serious of stages during childhood, and that if we lack proper nurturance and parenting during a stage, we may become stuck, or fixated, in that stage. Freud's stages are called the stages of **psychosexual development**. According to Freud, children's pleasure-seeking urges are focused on a different area of the body, called an erogenous zone, at each of the five stages of development: oral, anal, phallic, latency, and genital.

While most of Freud's ideas have not found support in modern research, we cannot discount the contributions that Freud has made to the field of psychology. Psychologists today dispute Freud's psychosexual stages as a legitimate explanation for how one's personality develops, but what we can take away from Freud's theory is that personality is shaped, in some part, by experiences we have in childhood. These stages are discussed in detail in the chapter on personality.

Psychosocial Theory of Development

Erik **Erikson** (1902–1994) (See Figure 9.4), another stage theorist, took Freud's theory and modified it as psychosocial theory. Erikson's **psychosocial development** theory emphasizes the social nature of our development rather than its sexual nature. While Freud believed that personality is shaped only in childhood, Erikson proposed that personality development takes place all through the lifespan. Erikson suggested that how we interact with others is what affects our sense of self, or what he called the ego identity.



Figure 9.4 Erik Erikson proposed the psychosocial theory of development. In each stage of Erikson's theory, there is a psychosocial task that we must master in order to feel a sense of competence.

Erikson proposed that we are motivated by a need to achieve competence in certain areas of our lives. According to psychosocial theory, we experience eight stages of development over our lifespan, from infancy through late adulthood. At each stage there is a conflict, or task, that we need to resolve. Successful completion of each developmental task results in a sense of competence and a healthy personality. Failure to master these tasks leads to feelings of inadequacy.

According to Erikson (1963), trust is the basis of our development during infancy (birth to 12 months). Therefore, the primary task of this stage is trust versus mistrust. Infants are dependent upon their caregivers, so caregivers who are responsive and sensitive to their infant's needs help their baby to develop a sense of trust; their baby will see the world as a safe, predictable place. Unresponsive caregivers who do not meet their baby's needs can engender feelings of anxiety, fear, and mistrust; their baby may see the world as unpredictable.

As toddlers (ages $1-3$ years) begin to explore their world, they learn that they can control their actions and act on the environment to get results. They begin to show clear preferences for certain elements of the environment, such as food, toys, and clothing. A toddler's main task is to resolve the issue of autonomy versus shame and doubt, by working to establish independence. This is the "me do it" stage. For example, we might observe a budding sense of autonomy in a \(2\0-year-old child who wants to choose her clothes and dress herself. Although her outfits might not be appropriate for the situation, her input in such basic decisions has an effect on her sense of independence. If denied the opportunity to act on her environment, she may begin to doubt her abilities, which could lead to low self-esteem and feelings of shame.

Once children reach the preschool stage (ages $3-6$ years), they are capable of initiating activities and asserting control over their world through social interactions and play. According to Erikson, preschool children must resolve the task of initiative versus guilt. By learning to plan and achieve goals while interacting with others, preschool children can master this task. Those who do will develop self-confidence and feel a sense of purpose. Those who are unsuccessful at this stage—with their initiative misfiring or stifled—may develop feelings of guilt. How might over-controlling parents stifle a child's initiative?

During the elementary school stage (ages $6-12$), children face the task of industry versus inferiority. Children begin to compare themselves to their peers to see how they measure up. They either develop a sense of pride and accomplishment in their schoolwork, sports, social activities, and family life, or they feel inferior and inadequate when they don't measure up. What are some things parents and teachers can do to help children develop a sense of competence and a belief in themselves and their abilities?

In adolescence (ages $12-18$), children face the task of identity versus role confusion. According to Erikson, an adolescent's main task is developing a sense of self. Adolescents struggle with questions such as "Who am I?" and "What do I want to do with my life?" Along the way, most adolescents try on many different selves to see which ones fit. Adolescents who are successful at this stage have a strong sense of identity and are able to remain true to their beliefs and values in the face of problems and other people's perspectives. What happens to apathetic adolescents, who do not make a conscious search for identity, or those who are pressured to conform to their parents' ideas for the future? These teens will have a weak sense of self and experience role

confusion. They are unsure of their identity and confused about the future.

People in early adulthood (i.e., $20s$ through early $40s$) are concerned with intimacy versus isolation. After we have developed a sense of self in adolescence, we are ready to share our life with others. Erikson said that we must have a strong sense of self before developing intimate relationships with others. Adults who do not develop a positive self-concept in adolescence may experience feelings of loneliness and emotional isolation.

When people reach their $40s$, they enter the time known as middle adulthood, which extends to the mid-60s. The social task of middle adulthood is generativity versus stagnation. Generativity involves finding your life's work and contributing to the development of others, through activities such as volunteering, mentoring, and raising children. Those who do not master this task may experience stagnation, having little connection with others and little interest in productivity and self-improvement.

From the mid-60s to the end of life, we are in the period of development known as late adulthood. Erikson's task at this stage is called integrity versus despair. He said that people in late adulthood reflect on their lives and feel either a sense of satisfaction or a sense of failure. People who feel proud of their accomplishments feel a sense of integrity, and they can look back on their lives with few regrets. However, people who are not successful at this stage may feel as if their life has been wasted. They focus on what "would have," "should have," and "could have" been. They face the end of their lives with feelings of bitterness, depression, and despair. The Table below summarizes the stages of Erikson's theory.

*Table **9**.1 Erikson's Psychosocial Stages of Development*

Stage	Age (years)	Developmental Task	Description
1	0–1	Trust vs. mistrust	Trust (or mistrust) that basic needs, such as nourishment and affection, will be met
2	1–3	Autonomy vs. shame/ doubt	Develop a sense of independence in many tasks
3	3–6	Initiative vs. guilt	Take initiative on some activities—may develop guilt when unsuccessful or boundaries overstepped
4	7–11	Industry vs. inferiority	Develop self-confidence in abilities when competent or sense of inferiority when not
5	12–18	Identity vs. confusion	Experiment with and develop identity and roles
6	19–29	Intimacy vs. isolation	Establish intimacy and relationships with others
7	30–64	Generativity vs. stagnation	Contribute to society and be part of a family
8	65–	Integrity vs. despair	Assess and make sense of life and meaning of contributions

Cognitive Theory of Development

Jean **Piaget** (1896–1980) is another stage theorist who studied childhood development (See Figure 9.5). Instead of approaching development from a psychoanalytical or psychosocial perspective, Piaget focused on children's cognitive growth. He believed that thinking is a central aspect of development and that children are naturally inquisitive. However, he said that children do not think and reason like adults (Piaget, 1930, 1932). His theory of cognitive development holds that our cognitive abilities develop through specific stages, which exemplifies the discontinuity approach to development. As we progress to a new stage, there is a distinct shift in how we think and reason.



Figure 9.5 Jean Piaget spent over 50 years studying children and how their minds develop.

Piaget said that children develop schemata to help them understand the world. **Schemata** are concepts (mental models) that are used to help us categorize and interpret information. By the time children have reached adulthood, they have created schemata for almost everything. When children learn new information, they adjust their schemata through two processes: assimilation and accommodation. First, they assimilate new information or experiences in terms of their current schemata: **assimilation** is when they take in information that is comparable to what they already know. **Accommodation** describes when they change their schemata based on new information. This process continues as children interact with their environment.

For example, 2-year-old Blake learned the schema for dogs because his family has a Labrador retriever. When Blake sees other dogs in his picture books, he says, "Look mommy, dog!" Thus, he has assimilated them into his schema for dogs. One day, Blake sees a sheep for the first time and says, "Look mommy, dog!" Having a basic schema that a dog is an animal with four legs and fur, Blake thinks all furry, four-legged creatures are dogs. When Blake's mom tells him that the animal he sees is a sheep, not a dog, Blake must accommodate his schema for dogs to include more information based on his new experiences. Blake's schema for dog was too broad, since not all furry, four-legged creatures are dogs. He now modifies his schema for dogs and forms a new one for sheep.

Like Freud and Erikson, Piaget thought development unfolds in a series of stages approximately associated with age ranges. He proposed a theory of cognitive development that unfolds in four stages: sensorimotor, preoperational, concrete operational, and formal operational.

Table 9.2 Piaget's Stages of Cognitive Development

Age (years)	Stage	Description	Developmental issues
0–2	Sensorimotor	World experienced through senses and actions	Object permanence Stranger anxiety
2–6	Preoperational	Use words and images to represent things, but lack logical reasoning	Pretend play Egocentrism Language development

Age (years)	Stage	Description	Developmental issues
7–11	Concrete operational	Understand concrete events and analogies logically; perform arithmetical operations	Conservation Mathematical transformations
12–	Formal operational	Formal operations Utilize abstract reasoning	Abstract logic Moral reasoning

The first stage is the **sensorimotor** stage, which lasts from birth to about 2 years old. During this stage, children learn about the world through their senses and motor behavior. Young children put objects in their mouths to see if the items are edible, and once they can grasp objects, they may shake or bang them to see if they make sounds. Between 5 and 8 months old, the child develops **object permanence**, which is the understanding that even if something is out of sight, it still exists (Bogartz, Shinskey, & Schilling, 2000). According to Piaget, young infants do not remember an object after it has been removed from sight. Piaget studied infants' reactions when a toy was first shown to an infant and then hidden under a blanket. Infants who had already developed object permanence would reach for the hidden toy, indicating that they knew it still existed, whereas infants who had not developed object permanence would appear confused.

Link to Learning

Please take a few minutes and view this brief video demonstrating different children's abilities to understand object permanence (http://openstax.org/l/piaget) to learn more.

In Piaget's view, around the same time children develop object permanence, they also begin to exhibit stranger anxiety, which is a fear of unfamiliar people. Babies may demonstrate this by crying and turning away from a stranger, by clinging to a caregiver, or by attempting to reach their arms toward familiar faces such as parents. Stranger anxiety results when a child is unable to assimilate the stranger into an existing schema; therefore, she can't predict what her experience with that stranger will be like, which results in a fear response.

Piaget's second stage is the **preoperational stage**, which is from approximately 2 to 7 years old. In this stage, children can use symbols to represent words, images, and ideas, which is why children in this stage engage in pretend play. A child's arms might become airplane wings as he zooms around the room, or a child with a stick might become a brave knight with a sword. Children also begin to use language in the preoperational stage, but they cannot understand adult logic or mentally manipulate information (the term *operational* refers to logical manipulation of information, so children at this stage are considered to be *pre*-operational). Children's logic is based on their own personal knowledge of the world so far, rather than on conventional knowledge. For example, dad gave a slice of pizza to 10-year-old Keiko and another slice to her 3-year-old brother, Kenny. Kenny's pizza slice was cut into five pieces, so Kenny told his sister that he got more pizza than she did. Children in this stage cannot perform mental operations because they have not developed an understanding of **conservation**, which is the idea that even if you change the appearance of something, it is still equal in size as long as nothing has been removed or added.

Link to Learning

Watch this video of a boy in the preoperational stage responding to Piaget's conservation tasks (http://openstax.org/l/piaget2) to learn more.

During this stage, we also expect children to display **egocentrism**, which means that the child is not able to take the perspective of others. A child at this stage thinks that everyone sees, thinks, and feels just as they do. Let's look at Kenny and Keiko again. Keiko's birthday is coming up, so their mom takes Kenny to the toy store to choose a present for his sister. He selects an Iron Man action figure for her, thinking that if he likes the toy, his sister will too. An egocentric child is not able to infer the perspective

of other people and instead attributes his own perspective.

Link to Learning

Piaget developed the Three-Mountain Task to determine the level of egocentrism displayed by children. Children view a 3-dimensional mountain scene from one viewpoint, and are asked what another person at a different viewpoint would see in the same scene. Watch this short video of the Three Mountain Task in action (http://openstax.org/l/WonderYears) from the University of Minnesota and the Science Museum of Minnesota.

Piaget's third stage is the **concrete operational stage**, which occurs from about 7 to 11 years old. In this stage, children can think logically about real (concrete) events; they have a firm grasp on the use of numbers and start to employ memory strategies. They can perform mathematical operations and understand transformations, such as addition is the opposite of subtraction, and multiplication is the opposite of division. In this stage, children also master the concept of conservation: Even if something changes shape, its mass, volume, and number stay the same. For example, if you pour water from a tall, thin glass to a short, fat glass, you still have the same amount of water. Remember Keiko and Kenny and the pizza? How did Keiko know that Kenny was wrong when he said that he had more pizza?

Children in the concrete operational stage also understand the principle of **reversibility**, which means that objects can be changed and then returned back to their original form or condition. Take, for example, water that you poured into the short, fat glass: You can pour water from the fat glass back to the thin glass and still have the same amount (minus a couple of drops).

The fourth, and last, stage in Piaget's theory is the **formal operational stage**, which is from about age 11 to adulthood. Whereas children in the concrete operational stage are able to think logically only about concrete events, children in the formal operational stage can also deal with abstract ideas and hypothetical situations. Children in this stage can use abstract thinking to problem solve, look at alternative solutions, and test these solutions. In adolescence, a renewed egocentrism occurs. For example, a 15 -year-old with a very small pimple on her face might think it is huge and incredibly visible, under the mistaken impression that others must share her perceptions.

Beyond Formal Operational Thought

As with other major contributors of theories of development, several of Piaget's ideas have come under criticism based on the results of further research. For example, several contemporary studies support a model of development that is more continuous than Piaget's discrete stages (Courage & Howe, 2002; Siegler, 2005, 2006). Many others suggest that children reach cognitive milestones earlier than Piaget describes (Baillargeon, 2004; de Hevia & Spelke, 2010).

According to Piaget, the highest level of cognitive development is formal operational thought, which develops between 11 and 20 years old. However, many developmental psychologists disagree with Piaget, suggesting a fifth stage of cognitive development, known as the postformal stage (Basseches, 1984; Commons & Bresette, 2006; Sinnott, 1998). In postformal thinking, decisions are made based on situations and circumstances, and logic is integrated with emotion as adults develop principles that depend on contexts. One way that we can see the difference between an adult in postformal thought and an adolescent in formal operations is in terms of how they handle emotionally charged issues.

It seems that once we reach adulthood our problem solving abilities change: As we attempt to solve problems, we tend to think more deeply about many areas of our lives, such as relationships, work, and politics (Labouvie-Vief & Diehl, 1999). Because of this, postformal thinkers are able to draw on past experiences to help them solve new problems. Problem-solving strategies using postformal thought vary, depending on the situation. What does this mean? Adults can recognize, for example, that what seems to be an ideal solution to a problem at work involving a disagreement with a colleague may not be the best solution to a disagreement with a significant other.

Connect The Concepts: Neuroconstructivism

The genetic environmental correlation you've learned about concerning the bidirectional influence of genes and the environment has been explored in more recent theories (Newcombe, 2011). One such theory, neuroconstructivism, suggests that neural brain development influences cognitive development. Experiences that a child encounters can impact or change

the way that neural pathways develop in response to the environment. An individual's behavior is based on how one understands the world. There is interaction between neural and cognitive networks at and between each level, consisting of these:

- genes
- neurons
- brain
- body
- social environment

These interactions shape mental representations in the brain and are dependent on context that individuals actively explore throughout their lifetimes (Westermann, Mareschal, Johnson, Sirois, Spratling, & Thomas, 2007).

An example of this would be a child who may be genetically predisposed to a difficult temperament. They may have parents who provide a social environment in which they are encouraged to express themselves in an optimal manner. The child's brain would form neural connections enhanced by that environment, thus influencing the brain.

The brain gives information to the body about how it will experience the environment. Thus, neural and cognitive networks work together to influence genes (i.e., attenuating temperament), body (i.e., may be less prone to high blood pressure), and social environment (i.e., may seek people who are similar to them).

SOCIOCULTURAL THEORY OF DEVELOPMENT

Lev Vygotsky was a Russian psychologist who proposed a sociocultural theory of development. He suggested that human development is rooted in one's culture. A child's social world, for example, forms the basis for the formation of language and thought. The language one speaks and the ways a person thinks about things is dependent on one's cultural background. Vygotsky also considered historical influences as key to one's development. He was interested in the process of development and the individual's interactions with their environment (John-Steiner & Mahn, 1996).

Moral Theory Of Development

A major task beginning in childhood and continuing into adolescence is discerning right from wrong. Psychologist Lawrence **Kohlberg** (1927–1987) extended upon the foundation that Piaget built regarding cognitive development. Kohlberg believed that moral development, like cognitive development, follows a series of stages. To develop this theory, Kohlberg posed moral dilemmas to people of all ages, and then he analyzed their answers to find evidence of their particular stage of moral development. Before reading about the stages, take a minute to consider how you would answer one of Kohlberg's best-known moral dilemmas, commonly known as the Heinz dilemma:

> *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 ten times what the drug cost him to make. He paid $200 for the radium and charged $2,000 for a small dose of the drug. The sick woman's husband, Heinz, went to everyone he knew to borrow the money, but he could only get together about $1,000, 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 Heinz got desperate and broke into the man's store to steal the drug for his wife. Should the husband have done that? (Kohlberg, 1969, p. 379)*

How would you answer this dilemma? Kohlberg was not interested in whether you answer yes or no to the dilemma: Instead, he was interested in the reasoning behind your answer.

After presenting people with this and various other moral dilemmas, Kohlberg reviewed people's responses and placed them in different **stages of moral reasoning** (Figure 9.6). According to Kohlberg, an individual progresses from the capacity for pre-conventional morality (before age 9) to the capacity for conventional morality (early adolescence), and toward attaining post-conventional morality (once formal operational thought is attained), which only a few fully achieve. Kohlberg placed in the highest stage responses that reflected the reasoning that Heinz should steal the drug because his wife's life is more important than the pharmacist making money. The value of a human life overrides the pharmacist's greed.

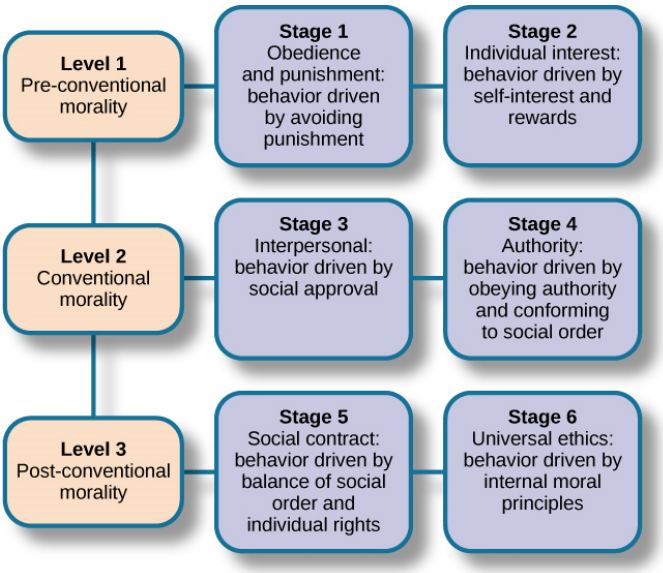


Figure 9.6 Kohlberg identified three levels of moral reasoning: pre-conventional, conventional, and post-conventional: Each level is associated with increasingly complex stages of moral development.

It is important to realize that even those people who have the most sophisticated, post-conventional reasons for some choices may make other choices for the simplest of pre-conventional reasons. Many psychologists agree with Kohlberg's theory of moral development but point out that moral reasoning is very different from moral behavior. Sometimes what we say we would do in a situation is not what we actually do in that situation. In other words, we might “talk the talk,” but not “walk the walk.”

How does this theory apply to males and females? Kohlberg (1969) felt that more males than females move past stage four in their moral development. He went on to note that women seem to be deficient in their moral reasoning abilities. These ideas were not well received by Carol Gilligan, a research assistant of Kohlberg, who consequently developed her own ideas of moral development. In her groundbreaking book, *In a Different Voice: Psychological Theory and Women's Development*, Gilligan (1982) criticized her former mentor's theory because it was based only on upper class White men and boys. She argued that women are not deficient in their moral reasoning—she proposed that males and females reason differently. Girls and women focus more on staying connected and the importance of interpersonal relationships. Therefore, in the Heinz dilemma, many girls and women respond that Heinz should not steal the medicine. Their reasoning is that if he steals the medicine, is arrested, and is put in jail, then he and his wife will be separated, and she could die while he is still in prison.

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CHAPTER 13: DEVELOPMENT AND AGING

13.1: Development and Aging
13.2: Lifespan Theories
13.3: Late Adulthood- Aging, Retiring, and Bereavement

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13.3: Late Adulthood- Aging, Retiring, and Bereavement

Learning Objectives

1. Review the physical, cognitive, and social changes that accompany late adulthood.
2. 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 or are happier than when they were younger, 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 as he pushes 70. 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 Buffet, U.S. Senator Frank Lautenberg, and actress Betty White, each in their 80s, all enjoy highly productive and energetic lives.

Figure 13.3.12



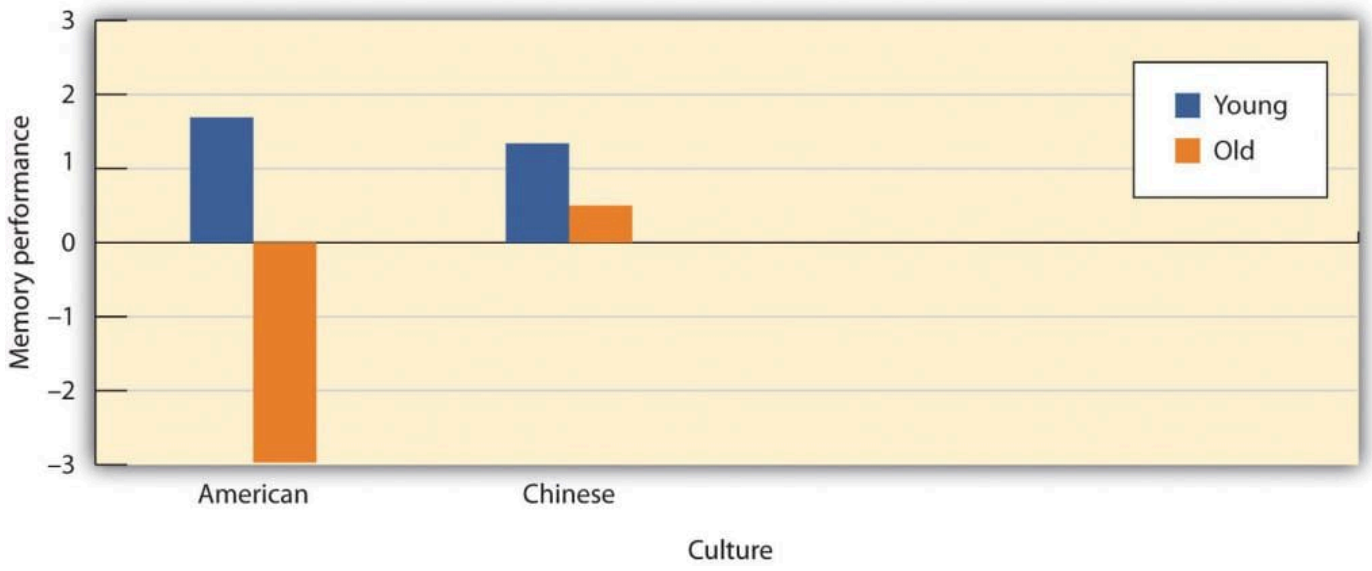
Aging does not affect everyone equally. All of these people—in their 60s, 70s, or 80s—still maintain active and productive lives.

Eva Rinaldi – Ringo Starr and all his band – CC BY-SA 2.0; Alan Light – Betty White – CC BY 2.0; xiquinhosilva – 56892-The-Rolling-Stones-14-On-Fire – CC BY 2.0.

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.

In one important study concerning the role of expectations on memory, Becca Levy and Ellen Langer (1994) found that, although young American and Chinese students performed equally well on cognitive tasks, older Americans performed significantly more poorly on those tasks than did their Chinese counterparts. Furthermore, this difference was explained by beliefs about aging—in both cultures, the older adults who believed that memory declined with age also showed more actual memory declines than did the older adults who believed that memory did not decline with age. In addition, more older Americans than older Chinese believed that memory declined with age, and as you can see in Figure 13.3.13, older Americans performed more poorly on the memory tasks.

Figure 13.3.13



Is Memory Influenced by Cultural Stereotypes? Levy and Langer (1994) found that although younger samples did not differ, older Americans performed significantly more poorly on memory tasks than did older Chinese, and that these differences were due to different expectations about memory in the two cultures.

Adapted from Levy, B., & Langer, E. (1994). Aging free from negative stereotypes: Successful memory in China among the American deaf. *Journal of Personality and Social Psychology,* 66(6), 989–997.

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 does 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

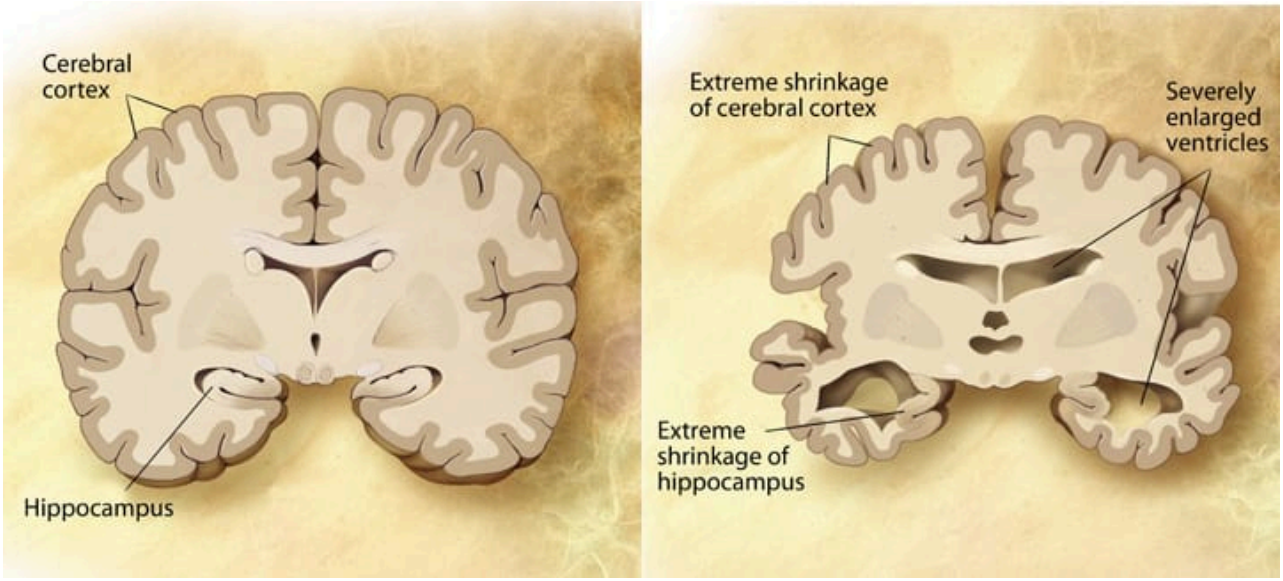
favor the young (Baltes, Staudinger, & Lindenberger, 1999; Scheibe, Kunzmann, & Baltes, 2009).

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 behaviors*, 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 which 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 5 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.

Figure 13.3.14 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 8-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 postemployment 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 early from an unsatisfying job 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), Elizabeth 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 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 7-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 or happier as when they were younger, 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 counseling 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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14.1: Social Influence

Chapter Outline

12.1 What Is Social Psychology?

12.2 Self-presentation

12.3 Attitudes and Persuasion

12.4 Conformity, Compliance, and Obedience

12.5 Prejudice and Discrimination

12.6 Aggression

12.7 Prosocial Behavior



Figure 12.1 Trayvon Martin, 17, was shot to death at the hands of George Zimmerman, a volunteer neighborhood watchman, in 2012. Was his death the result of self-defense or racial bias? That question drew hundreds of people to rally on each side of this heated debate. (credit “signs”: modification of work by David Shankbone; credit “walk”: modification of work by "Fibonacci Blue"/Flickr)

On the night of February 26, 2012, Trayvon Martin, a 17-year-old African American high school student, was shot by a neighborhood watch volunteer, George Zimmerman, in a predominantly White neighborhood. Zimmerman observed the boy dressed in a hoodie and pursued Martin. Zimmerman called the police to report a person acting suspiciously, which he had done on other occasions. According to the 911 call transcript, Zimmerman said on the call, "[expletive] punks. These [expletive], they always get away." The 911 operator told Zimmerman not to follow the teen, as was also stated in the police neighborhood watch guidelines that had been provided to Zimmerman. A physical altercation ended with Zimmerman fatally shooting Martin. Zimmerman claimed that he acted in self-defense. Martin was unarmed, and after his death, there was a nationwide outcry. A Florida jury found Zimmerman not guilty of second degree murder nor of manslaughter.

There have also been tragic situations with deadly consequences in which police officers have shot innocent civilians. In 2019, Atatiana Jefferson's neighbor used a non-emergency line to call the police because Jefferson's front door was open in the late hours of the night. The police arrived and an officer went to the back of the yard. Jefferson, not knowing that the police had been called, reached into her purse and got out her legally owned gun. The officer perceived a threat and fired upon Jefferson, killing her. Her 8-year-old nephew witnessed the incident, as he was playing video games with his aunt. Why did each of these nights end so tragically for those involved? What dynamics contributed to the outcomes? How can these deaths be prevented?

Social psychologists examine how the presence of others impacts how a person behaves and reacts, whether that person is an

athlete playing a game, a police officer on the job, or a worshiper attending a religious service. Social psychologists believe that a person's behavior is influenced by who else is present in a given situation and the composition of social groups.

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14.2: Conformity, Compliance, and Obedience

Learning Objectives

- Explain the Asch effect
- Define conformity and types of social influence
- Describe Stanley Milgram's experiment and its implications
- Define groupthink, social facilitation, and social loafing

In this section, we discuss additional ways in which people influence others. The topics of conformity, social influence, obedience, and group processes demonstrate the power of the social situation to change our thoughts, feelings, and behaviors. We begin this section with a discussion of a famous social psychology experiment that demonstrated how susceptible humans are to outside social pressures.

Conformity

Solomon **Asch** conducted several experiments in the 1950s to determine how people are affected by the thoughts and behaviors of other people. In one study, a group of participants was shown a series of printed line segments of different lengths: a, b, and c (See figure 12.17). Participants were then shown a fourth line segment: x. They were asked to identify which line segment from the first group (a, b, or c) most closely resembled the fourth line segment in length.

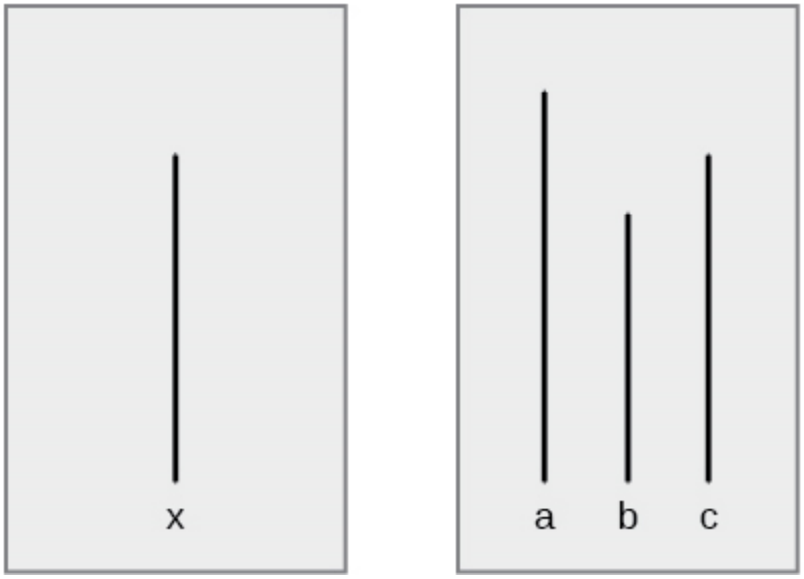


Figure 12.17 These line segments illustrate the judgment task in Asch's conformity study. Which line on the right—a, b, or c—is the same length as line x on the left?

Each group of participants had only one true, naïve subject. The remaining members of the group were confederates of the researcher. A **confederate** is a person who is aware of the experiment and works for the researcher. Confederates are used to manipulate social situations as part of the research design, and the true, naïve participants believe that confederates are, like them, uninformed participants in the experiment. In Asch's study, the confederates identified a line segment that was obviously shorter than the target line—a wrong answer. The naïve participant then had to identify aloud the line segment that best matched the target line segment.

How often do you think the true participant aligned with the confederates' response? That is, how often do you think the group influenced the participant, and the participant gave the wrong answer? Asch (1955) found that 76% of participants conformed to group pressure at least once by indicating the incorrect line. **Conformity** is the change in a person's behavior to go along with the group, even if he does not agree with the group. Why would people give the wrong answer? What factors would increase or

decrease someone giving in or conforming to group pressure?

The **Asch effect** is the influence of the group majority on an individual's judgment.

What factors make a person more likely to yield to group pressure? Research shows that the size of the majority, the presence of another dissenter, and the public or relatively private nature of responses are key influences on conformity.

- The size of the majority: The greater the number of people in the majority, the more likely an individual will conform. There is, however, an upper limit: a point where adding more members does not increase conformity. In Asch's study, conformity increased with the number of people in the majority—up to seven individuals. At numbers beyond seven, conformity leveled off and decreased slightly (Asch, 1955).
- The presence of another dissenter: If there is at least one dissenter, conformity rates drop to near zero (Asch, 1955).
- The public or private nature of the responses: When responses are made publicly (in front of others), conformity is more likely; however, when responses are made privately (e.g., writing down the response), conformity is less likely (Deutsch & Gerard, 1955).

The finding that conformity is more likely to occur when responses are public than when they are private is the reason government elections require voting in secret, so we are not coerced by others (See figure 12.18). The **Asch effect** can be easily seen in children when they have to publicly vote for something. For example, if the teacher asks whether the children would rather have extra recess, no homework, or candy, once a few children vote, the rest will comply and go with the majority. In a different classroom, the majority might vote differently, and most of the children would comply with that majority. When someone's vote changes if it is made in public versus private, this is known as compliance. Compliance can be a form of conformity. Compliance is going along with a request or demand, even if you do not agree with the request. In Asch's studies, the participants complied by giving the wrong answers, but privately did not accept that the obvious wrong answers were correct.



Figure 12.18 Voting for government officials in the United States is private to reduce the pressure of conformity. (credit: Nicole Klauss)

Now that you have learned about the Asch line experiments, why do you think the participants conformed? The correct answer to the line segment question was obvious, and it was an easy task. Researchers have categorized the motivation to conform into two types: normative social influence and informational social influence (Deutsch & Gerard, 1955).

In **normative social influence**, people conform to the group norm to fit in, to feel good, and to be accepted by the group. However, with **informational social influence**, people conform because they believe the group is competent and has the correct information, particularly when the task or situation is ambiguous. What type of social influence was operating in the Asch conformity studies? Since the line judgment task was unambiguous, participants did not need to rely on the group for information. Instead, participants complied to fit in and avoid ridicule, an instance of normative social influence.

An example of informational social influence may be what to do in an emergency situation. Imagine that you are in a movie theater watching a film and what seems to be smoke comes in the theater from under the emergency exit door. You are not certain that it is smoke—it might be a special effect for the movie, such as a fog machine. When you are uncertain you will tend

to look at the behavior of others in the theater. If other people show concern and get up to leave, you are likely to do the same. However, if others seem unconcerned, you are likely to stay put and continue watching the movie (See figure 12.19).



(a) (b)

Figure 12.19 People in crowds tend to take cues from others and act accordingly. (a) An audience is listening to a lecture and people are relatively quiet, still, and attentive to the speaker on the stage. (b) An audience is at a rock concert where people are dancing, singing, and possibly engaging in activities like crowd surfing. (credit a: modification of work by Matt Brown; credit b: modification of work by Christian Holmér)

How would you have behaved if you were a participant in Asch's study? Many students say they would not conform, that the study is outdated, and that people nowadays are more independent. To some extent this may be true. Research suggests that overall rates of conformity may have reduced since the time of Asch's research. Furthermore, efforts to replicate Asch's study have made it clear that many factors determine how likely it is that someone will demonstrate conformity to the group. These factors include the participant's age, gender, and socio-cultural background (Bond & Smith, 1996; Larsen, 1990; Walker & Andrade, 1996).

Link to Learning

Watch this video of a replication of the Asch experiment to learn more.

Stanley Milgram's Experiment

Conformity is one effect of the influence of others on our thoughts, feelings, and behaviors. Another form of social influence is obedience to authority. **Obedience** is the change of an individual's behavior to comply with a demand by an authority figure. People often comply with the request because they are concerned about a consequence if they do not comply. To demonstrate this phenomenon, we review another classic social psychology experiment.

Stanley **Milgram** was a social psychology professor at Yale who was influenced by the trial of Adolf Eichmann, a Nazi war criminal. Eichmann's defense for the atrocities he committed was that he was "just following orders." Milgram (1963) wanted to test the validity of this defense, so he designed an experiment and initially recruited 40 men for his experiment. The volunteer participants were led to believe that they were participating in a study to improve learning and memory. The participants were told that they were to teach other students (learners) correct answers to a series of test items. The participants were shown how to use a device that they were told delivered electric shocks of different intensities to the learners. The participants were told to shock the learners if they gave a wrong answer to a test item—that the shock would help them to learn. The participants gave (or believed they gave) the learners shocks, which increased in 15-volt increments, all the way up to 450 volts. The participants did not know that the learners were confederates and that the confederates did not actually receive shocks.

In response to a string of incorrect answers from the learners, the participants obediently and repeatedly shocked them. The confederate learners cried out for help, begged the participant teachers to stop, and even complained of heart trouble. Yet, when the researcher told the participant-teachers to continue the shock, 65% of the participants continued the shock to the maximum

voltage and to the point that the learner became unresponsive (See figure 12.20). What makes someone obey authority to the point of potentially causing serious harm to another person?

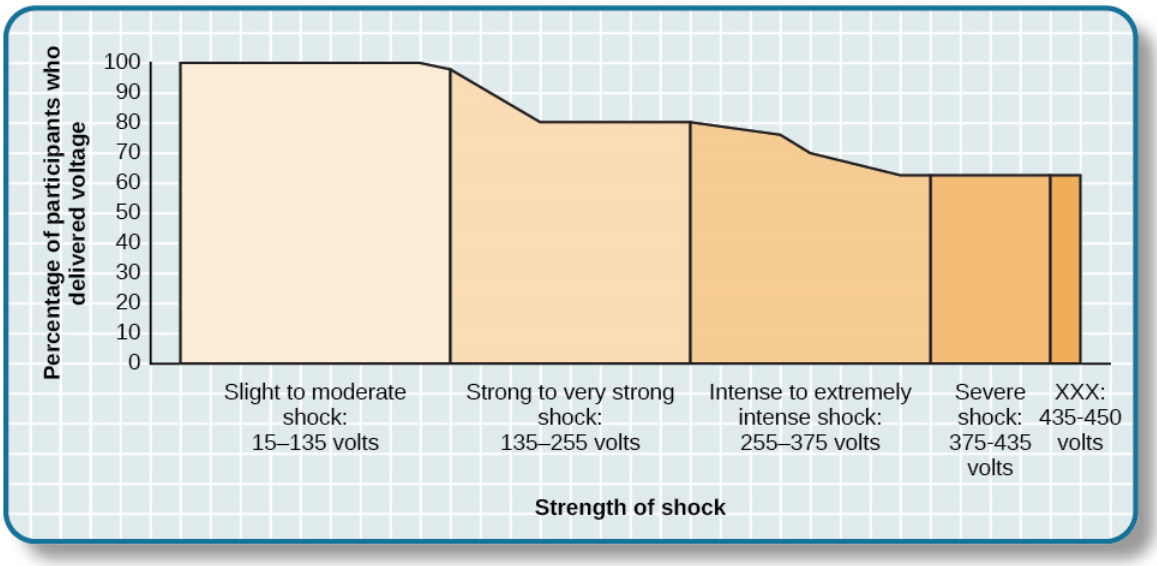


Figure 12.20 The Milgram experiment showed the surprising degree to which people obey authority. Two out of three (65%) participants continued to administer shocks to an unresponsive learner.

Several variations of the original **Milgram** experiment were conducted to test the boundaries of obedience. When certain features of the situation were changed, participants were less likely to continue to deliver shocks (Milgram, 1965). For example, when the setting of the experiment was moved to an office building, the percentage of participants who delivered the highest shock dropped to 48%. When the learner was in the same room as the teacher, the highest shock rate dropped to 40%. When the teachers' and learners' hands were touching, the highest shock rate dropped to 30%. When the researcher gave the orders by phone, the rate dropped to 23%. These variations show that when the humanity of the person being shocked was increased, obedience decreased. Similarly, when the authority of the experimenter decreased, so did obedience.

This case is still very applicable today. What does a person do if an authority figure orders something done? What if the person believes it is incorrect, or worse, unethical? In a study by Martin and Bull (2008), midwives privately filled out a questionnaire regarding best practices and expectations in delivering a baby. Then, a more senior midwife and supervisor asked the junior midwives to do something they had previously stated they were opposed to. Most of the junior midwives were obedient to authority, going against their own beliefs.

Groupthink

When in group settings, we are often influenced by the thoughts, feelings, and behaviors around us. Whether it is due to normative or informational social influence, groups have power to influence individuals. Another phenomenon of group conformity is groupthink. **Groupthink** is the modification of the opinions of members of a group to align with what they believe is the group consensus (Janis, 1972). In group situations, the group often takes action that individuals would not perform outside the group setting because groups make more extreme decisions than individuals do. Moreover, groupthink can hinder opposing trains of thought. This elimination of diverse opinions contributes to faulty decision by the group.

DIG DEEPER: Groupthink in the U.S. Government

There have been several instances of groupthink in the U.S. government. One example occurred when the United States led a small coalition of nations to invade Iraq in March 2003. This invasion occurred because a small group of advisors and former President George W. Bush were convinced that Iraq represented a significant terrorism threat with a large stockpile of weapons of mass destruction at its disposal. Although some of these individuals may have had some doubts about the credibility of the information available to them at the time, in the end, the group arrived at a consensus that Iraq had weapons of mass destruction and represented a significant threat to national security. It later came to light that Iraq did not have

> weapons of mass destruction, but not until the invasion was well underway. As a result, 6000 American soldiers were killed and many more civilians died. How did the Bush administration arrive at their conclusions? Here is a video of Colin Powell discussing the information he had, 10 years after his famous United Nations speech,
>
> https://www.youtube.com/watch?v=vU6KMYlDyWc ("Colin Powell regrets," 2011).
>
> Do you see evidence of groupthink?

Why does groupthink occur? There are several causes of groupthink, which makes it preventable. When the group is highly cohesive, or has a strong sense of connection, maintaining group harmony may become more important to the group than making sound decisions. If the group leader is directive and makes his opinions known, this may discourage group members from disagreeing with the leader. If the group is isolated from hearing alternative or new viewpoints, groupthink may be more likely. How do you know when groupthink is occurring?

There are several symptoms of groupthink including the following:

- perceiving the group as invulnerable or invincible—believing it can do no wrong
- believing the group is morally correct
- self-censorship by group members, such as withholding information to avoid disrupting the group consensus
- the quashing of dissenting group members' opinions
- the shielding of the group leader from dissenting views
- perceiving an illusion of unanimity among group members
- holding stereotypes or negative attitudes toward the out-group or others' with differing viewpoints (Janis, 1972)

Given the causes and symptoms of groupthink, how can it be avoided? There are several strategies that can improve group decision making including seeking outside opinions, voting in private, having the leader withhold position statements until all group members have voiced their views, conducting research on all viewpoints, weighing the costs and benefits of all options, and developing a contingency plan (Janis, 1972; Mitchell & Eckstein, 2009).

Group Polarization

Another phenomenon that occurs within group settings is group polarization. **Group polarization** (Teger & Pruitt, 1967) is the strengthening of an original group attitude after the discussion of views within a group. That is, if a group initially favors a viewpoint, after discussion the group consensus is likely a stronger endorsement of the viewpoint. Conversely, if the group was initially opposed to a viewpoint, group discussion would likely lead to stronger opposition. Group polarization explains many actions taken by groups that would not be undertaken by individuals. Group polarization can be observed at political conventions, when platforms of the party are supported by individuals who, when not in a group, would decline to support them. A more everyday example is a group's discussion of how attractive someone is. Does your opinion change if you find someone attractive, but your friends do not agree? If your friends vociferously agree, might you then find this person even more attractive?

Social traps refer to situations that arise when individuals or groups of individuals behave in ways that are not in their best interest and that may have negative, long-term consequences. However, once established, a social trap is very difficult to escape. For example, following World War II, the United States and the former Soviet Union engaged in a nuclear arms race. While the presence of nuclear weapons is not in either party's best interest, once the arms race began, each country felt the need to continue producing nuclear weapons to protect itself from the other.

Social Loafing

Imagine you were just assigned a group project with other students whom you barely know. Everyone in your group will get the same grade. Are you the type who will do most of the work, even though the final grade will be shared? Or are you more likely to do less work because you know others will pick up the slack? Social loafing involves a reduction in individual output on tasks where contributions are pooled. Because each individual's efforts are not evaluated, individuals can become less motivated to perform well. Karau and Williams (1993) and Simms and Nichols (2014) reviewed the research on social loafing and discerned when it was least likely to happen. The researchers noted that social loafing could be alleviated if, among other situations, individuals knew their work would be assessed by a manager (in a workplace setting) or instructor (in a classroom setting), or if a manager or instructor required group members to complete self-evaluations.

The likelihood of social loafing in student work groups increases as the size of the group increases (Shepperd & Taylor, 1999). According to Kamau and Williams (1993), college students were the population most likely to engage in social loafing. Their study also found that women and participants from collectivistic cultures were less likely to engage in social loafing, explaining that their group orientation may account for this.

College students could work around social loafing or "free-riding" by suggesting to their professors use of a flocking method to form groups. Harding (2018) compared groups of students who had self-selected into groups for class to those who had been formed by flocking, which involves assigning students to groups who have similar schedules and motivations. Not only did she find that students reported less "free riding," but that they also did better in the group assignments compared to those whose groups were self-selected.

Interestingly, the opposite of social loafing occurs when the task is complex and difficult (Bond & Titus, 1983; Geen, 1989). In a group setting, such as the student work group, if your individual performance cannot be evaluated, there is less pressure for you to do well, and thus less anxiety or physiological arousal (Latané, Williams, & Harkens, 1979). This puts you in a relaxed state in which you can perform your best, if you choose (Zajonc, 1965). If the task is a difficult one, many people feel motivated and believe that their group needs their input to do well on a challenging project (Jackson & Williams, 1985).

Deindividuation

Another way in which a group presence can affect our performance is social loafing. **Social loafing** is the exertion of less effort by a person working together with a group. Social loafing occurs when our individual performance cannot be evaluated separately from the group. Thus, group performance declines on easy tasks (Karau & Williams, 1993). Essentially individual group members loaf and let other group members pick up the slack. Because each individual's efforts cannot be evaluated, individuals become less motivated to perform well. For example, consider a group of people cooperating to clean litter from the roadside. Some people will exert a great amount of effort, while others will exert little effort. Yet the entire job gets done, and it may not be obvious who worked hard and who didn't.

The Table 12.2 below summarizes the types of social influence you have learned about in this chapter.

Table 12.2 Types of Social Influence

Type of Social Influence	Description
Conformity	Changing your behavior to go along with the group even if you do not agree with the group
Compliance	Going along with a request or demand
Normative social influence	Conformity to a group norm to fit in, feel good, and be accepted by the group
Informational social influence	Conformity to a group norm prompted by the belief that the group is competent and has the correct information
Obedience	Changing your behavior to please an authority figure or to avoid aversive consequences
Groupthink	Group members modify their opinions to match what they believe is the group consensus
Group polarization	Strengthening of the original group attitude after discussing views within a group
Social facilitation	Improved performance when an audience is watching versus when the individual performs the behavior alone
Social loafing	Exertion of less effort by a person working in a group because individual performance cannot be evaluated separately from the group, thus causing performance decline on easy tasks

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14.3: Working With Others- The Costs and Benefits of Social Groups

Learning Objectives

- Summarize the advantages and disadvantages of working together in groups to perform tasks and make decisions.
- Review the factors that can increase group productivity.

Just as our primitive ancestors lived together in small social groups, including families, tribes, and clans, people today still spend a great deal of time in groups. We study together in study groups, we work together on production lines, and we decide the fates of others in courtroom juries. We work in groups because groups can be beneficial. A rock band that is writing a new song or a surgical team in the middle of a complex operation may coordinate their efforts so well that it is clear that the same outcome could never have occurred if the individuals had worked alone. But group performance will only be better than individual performance to the extent that the group members are motivated to meet the group goals, effectively share information, and efficiently coordinate their efforts. Because these things do not always happen, group performance is almost never as good as we would expect, given the number of individuals in the group, and may even in some cases be inferior to that which could have been made by one or more members of the group working alone.



Figure 14.3.14: Working groups are used to perform tasks and make decisions, but are they effective? ResoluteSupportMedia – CC BY 2.0; Timothy Vollmer – CopyNight Washington DC at ALA office – CC BY 2.0.

Working in Front of Others: Social Facilitation and Social Inhibition

In an early social psychological study, Norman Triplett (1898) found that bicycle racers who were competing with other bicyclers on the same track rode significantly faster than bicyclers who were racing alone, against the clock. This led Triplett to hypothesize that people perform tasks better when there are other people present than they do when they are alone. Subsequent findings validated Triplett's results, and experiments have shown that the presence of others can increase performance on many types of tasks, including jogging, shooting pool, lifting weights, and solving problems (Bond & Titus, 1983). *The tendency to perform tasks better or faster in the presence of others* is known as social facilitation.

However, although people sometimes perform better when they are in groups than they do alone, the situation is not that simple. Perhaps you remember an experience when you performed a task (playing the piano, shooting basketball free throws, giving a public presentation) very well alone but poorly with, or in front of, others. Thus it seems that the conclusion that being with others increases performance cannot be entirely true. *The tendency to perform tasks more poorly or more slowly in the presence of*

others is known as social inhibition.

Robert Zajonc (1965) explained the observed influence of others on task performance using the concept of physiological arousal. According to Zajonc, when we are with others we experience more arousal than we do when we are alone, and this arousal increases the likelihood that we will perform the *dominant response*, the action that we are most likely to emit in any given situation (Figure 14.3.15).

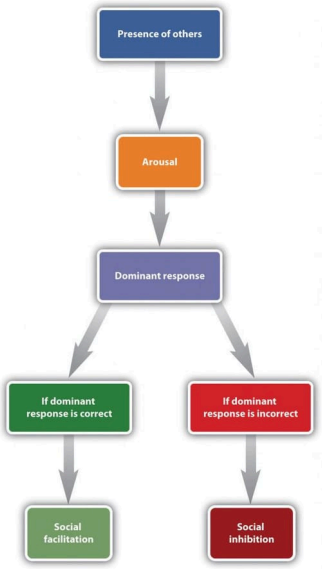


Figure 14.3.15: Drive-Arousal Model of Social Facilitation.

The most important aspect of Zajonc's theory was that the experience of arousal and the resulting increase in the occurrence of the dominant response could be used to predict whether the presence of others would produce social facilitation or social inhibition. Zajonc argued that when the task to be performed was relatively easy, or if the individual had learned to perform the task very well (a task such as pedaling a bicycle), the dominant response was likely to be the correct response, and the increase in arousal caused by the presence of others would create social facilitation. On the other hand, when the task was difficult or not well learned (a task such as giving a speech in front of others), the dominant response is likely to be the incorrect one, and thus, because the increase in arousal increases the occurrence of the (incorrect) dominant response, performance is hindered.

A great deal of experimental research has now confirmed these predictions. A meta-analysis by Bond and Titus (1983), which looked at the results of over 200 studies using over 20,000 research participants, found that the presence of others significantly increased the rate of performing on simple tasks, and also decreased both rate and quality of performance on complex tasks.

Although the arousal model proposed by Zajonc is perhaps the most elegant, other explanations have also been proposed to account for social facilitation and social inhibition. One modification argues that we are particularly influenced by others when we perceive that the others are evaluating us or competing with us (Baron, 1986). In one study supporting this idea, Strube, Miles, and Finch (1981) found that the presence of spectators increased joggers' speed only when the spectators were facing the joggers, so that the spectators could see the joggers and assess their performance. The presence of others did not influence joggers' performance when the joggers were facing in the other direction and thus could not see them.

Working Together in Groups

The ability of a group to perform well is determined by the characteristics of the group members (e.g., are they knowledgeable and skilled?) as well as by the *group process*—that is, the events that occur while the group is working on the task. When the outcome of group performance is better than we would expect given the individuals who form the group, we call the outcome a *group process gain,* and when the group outcome is worse than we would have expected given the individuals who form the group, we call the outcome a *group process loss.*

One group process loss that may occur in groups is that the group members may engage in social loafing, *a group process loss that occurs when people do not work as hard in a group as they do when they are working alone*. In one of the earliest social psychology experiments, Ringelmann (1913; reported in Kravitz & Martin, 1986) had individual men, as well as groups of various

numbers of men, pull as hard as they could on ropes while he measured the maximum amount that they were able to pull. As you can see in Figure 14.3.16, although larger groups pulled harder than any one individual, Ringelmann also found a substantial process loss. In fact, the loss was so large that groups of three men pulled at only 85% of their expected capability, whereas groups of eight pulled at only 37% of their expected capability. This type of process loss, in which group productivity decreases as the size of the group increases, has been found to occur on a wide variety of tasks.

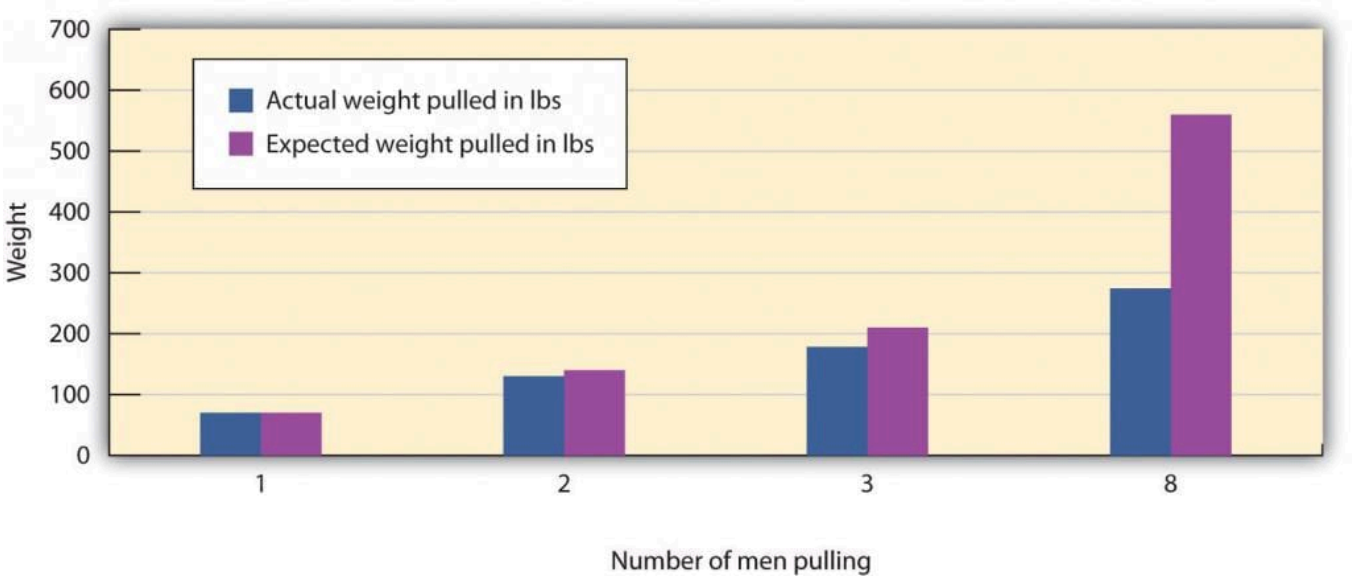


Figure 14.3.16: Group Process Loss. Ringlemann found that although more men pulled harder on a rope than fewer men did, there was a substantial process loss in comparison to what would have been expected on the basis of their individual performances.

Group process losses can also occur when group members conform to each other rather than expressing their own divergent ideas. Groupthink is *a phenomenon that occurs when a group made up of members who may be very competent and thus quite capable of making excellent decisions nevertheless ends up, as a result of a flawed group process and strong conformity pressures, making a poor decision* (Baron, 2005; Janis, 2007). Groupthink is more likely to occur in groups whose members feel a strong group identity, when there is a strong and directive leader, and when the group needs to make an important decision quickly. The problem is that groups suffering from groupthink become unwilling to seek out or discuss discrepant or unsettling information about the topic at hand, and the group members do not express contradictory opinions. Because the group members are afraid to express opinions that contradict those of the leader, or to bring in outsiders who have other information, the group is prevented from making a fully informed decision. Figure 14.3.17 summarizes the basic causes and outcomes of groupthink.

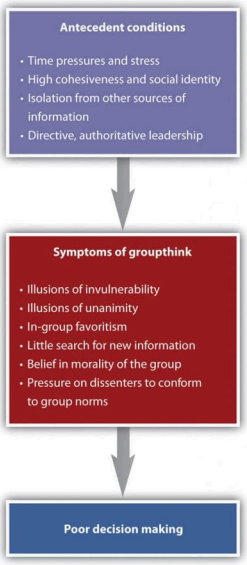


Figure 14.3.17: Causes and Outcomes of Groupthink

It has been suggested that groupthink was involved in a number of well-known and important, but very poor, decisions made by government and business groups, including the decision to invade Iraq made by President Bush and his advisors in 2002, the crashes of two Space Shuttle missions in 1986 and 2003, and the decision of President John Kennedy and his advisors to commit U.S. forces to help invade Cuba and overthrow Fidel Castro in 1962. Analyses of the decision-making processes in these cases have documented the role of conformity pressures.

As a result of the high levels of conformity in these groups, the group begins to see itself as extremely valuable and important, highly capable of making high-quality decisions, and invulnerable. The group members begin to feel that they are superior and do not need to seek outside information. Such a situation is conducive to terrible decision-making and resulting fiascoes.

Psychology in Everyday Life: Do Juries Make Good Decisions?

Although many other countries rely on judges to make judgments in civil and criminal trials, the jury is the foundation of the legal system in the United States. The notion of a "trial by one's peers" is based on the assumption that average individuals can make informed and fair decisions when they work together in groups. But given the potential for group process losses, are juries really the best way to approach these important decisions?

As a small working group, juries have the potential to produce either good or poor decisions, depending on the outcome of the characteristics of the individual members as well as the group process. In terms of individual group characteristics, people who have already served on juries are more likely to be seen as experts, are more likely to be chosen to be the jury foreman, and give more input during the deliberation. It has also been found that status matters; jury members with higher status occupations and education, males rather than females, and those who talk first are more likely be chosen as the foreman, and these individuals also contribute more to the jury discussion (Stasser, Kerr, & Bray, 1982).

However, although at least some member characteristics have an influence on jury decision making, group process plays a more important role in the outcome of jury decisions than do member characteristics. Like any group, juries develop their own individual norms, and these norms can have a profound impact on how they reach their decision. Analysis of group process within juries shows that different juries take very different approaches to reaching a verdict. Some spend a lot of time in initial planning, whereas others immediately jump into the deliberation. Some juries base their discussion around a review and reorganization of the evidence, waiting to make a vote until it has all been considered, whereas other juries first determine which decision is preferred in the group by taking a poll and then (if the first vote does not lead to a final verdict) organize their discussion around these opinions. These two approaches are used quite equally but may in some cases lead to different decisions (Davis, Stasson, Ono, & Zimmerman, 1988).

Perhaps most importantly, conformity pressures have a strong impact on jury decision making. As you can see in Figure 14.3.18, when there are a greater number of jury members who hold the majority position, it becomes more and more certain that their opinion will prevail during the discussion. This does not mean that minorities can never be persuasive, but it is very difficult for them to do so. The strong influence of the majority is probably due to both informational conformity (i.e., that there are more arguments supporting the favored position) and normative conformity (the people on the majority side have greater social influence).

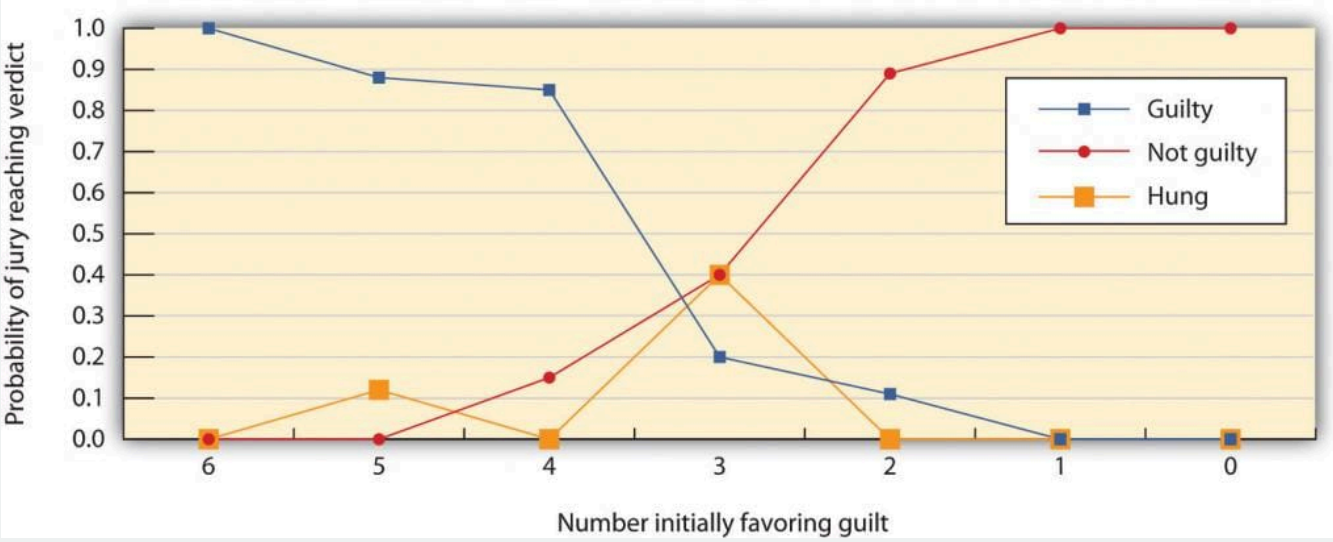


Figure 14.3.18: Results From Stasser, Kerr, and Bray, 1982. This figure shows the decisions of 6-member mock juries that made "majority rules" decisions. When the majority of the 6 initially favored voting guilty, the jury almost always voted guilty; when the majority of the 6 initially favored voting innocent, the jury almost always voted innocent. The juries were frequently hung (could not make a decision) when the initial split was 3–3. Adapted from Stasser, G., Kerr, N. L., & Bray, R. M. (1982). The social psychology of jury deliberations: Structure, process and product. In N. L. Kerr & R. M. Bray (Eds.), *The psychology of the courtroom* (pp. 221–256). New York, NY: Academic Press.

Given the potential difficulties that groups face in making good decisions, you might be worried that the verdicts rendered by juries may not be particularly effective, accurate, or fair. However, despite these concerns, the evidence suggests that juries may not do as badly as we would expect. The deliberation process seems to cancel out many individual juror biases, and the importance of the decision leads the jury members to carefully consider the evidence itself.

Using Groups Effectively

Taken together, working in groups has both positive and negative outcomes. On the positive side, it makes sense to use groups to make decisions because people can create outcomes working together that any one individual could not hope to accomplish alone. In addition, once a group makes a decision, the group will normally find it easier to get other people to implement it, because many people feel that decisions made by groups are fairer than are those made by individuals.

Yet groups frequently succumb to process losses, leading them to be less effective than they should be. Furthermore, group members often don't realize that the process losses are occurring around them. For instance, people who participate in brainstorming groups report that they have been more productive than those who work alone, even if the group has actually not done that well (Nijstad, Stroebe, Lodewijkx, 2006; Stroebe, Diehl, & Abakoumkin, 1992). *The tendency for group members to overvalue the productivity of the groups they work in* is known as the illusion of group productivity, and it seems to occur for several reasons. For one, the productivity of the group as a whole is highly accessible, and this productivity generally seems quite good, at least in comparison to the contributions of single individuals. The group members hear many ideas expressed by themselves and the other group members, and this gives the impression that the group is doing very well, even if objectively it is not. And, on the affective side, group members receive a lot of positive social identity from their group memberships. These positive feelings naturally lead them to believe that the group is strong and performing well.

What we need to do, then, is to recognize both the strengths and limitations of group performance and use whatever techniques we can to increase process gains and reduce process losses. Table 14.3.5 presents some of the techniques that are known to help groups achieve their goals.

Table 14.3.5: Techniques That Can Be Used to Improve Group Performance

Technique	Example
Provide rewards for performance.	Rewarding employees and team members with bonuses will increase their effort toward the group goal. People will also work harder in groups when they feel that they are contributing to the group goal than when they feel that their contributions are not important.

Technique	Example
Keep group member contributions identifiable.	Group members will work harder if they feel that their contributions to the group are known and potentially seen positively by the other group members than they will if their contributions are summed into the group total and thus unknown (Szymanski & Harkins, 1987).
Maintain distributive justice (equity).	Workers who feel that their rewards are proportional to their efforts in the group will be happier and work harder than will workers who feel that they are underpaid (Geurts, Buunk, & Schaufeli, 1994).
Keep groups small.	Larger groups are more likely to suffer from coordination problems and social loafing. The most effective working groups are of relatively small size—about four or five members.
Create positive group norms.	Group performance is increased when the group members care about the ability of the group to do a good job (e.g., a cohesive sports or military team). On the other hand, some groups develop norms that prohibit members from working to their full potential and thus encourage loafing.
Improve information sharing.	Leaders must work to be sure that each member of the group is encouraged to present the information that he or she has in group discussions. One approach to increasing full discussion of the issues is to have the group break up into smaller subgroups for discussion.
Allow plenty of time.	Groups take longer to reach consensus, and allowing plenty of time will help keep the group from coming to premature consensus and making an unwise choice. Time to consider the issues fully also allows the group to gain new knowledge by seeking information and analysis from outside experts.
Set specific and attainable goals.	Groups that set specific, difficult, yet attainable goals (e.g., “improve sales by 10% over the next 6 months”) are more effective than groups that are given goals that are not very clear (e.g., “let’s sell as much as we can!”; Locke & Latham, 2006).

Sources: Szymanski, K., & Harkins, S. G. (1987). Social loafing and self-evaluation with a social standard. *Journal of Personality & Social Psychology, 53*(5), 891–897; Geurts, S. A., Buunk, B. P., & Schaufeli, W. B. (1994). Social comparisons and absenteeism: A structural modeling approach. *Journal of Applied Social Psychology, 24*(21), 1871–1890; Locke, E. A., & Latham, G. P. (2006). New directions in goal-setting theory. *Current Directions in Psychological Science, 15*(5), 265–268.

Key Takeaways

- The performance of working groups is almost never as good as we would expect, given the number of individuals in the group, and in some cases may even be inferior to the performance of one or more members of the group working alone.
- The tendency to perform tasks better or faster in the presence of others is known as social facilitation. The tendency to perform tasks more poorly or more slowly in the presence of others is known as social inhibition.
- The ability of a group to perform well is determined by the characteristics of the group members as well as by the events that occur in the group itself—the group process.
- One group process loss that may occur in groups is that the group members may engage in social loafing. Group process losses can also occur as a result of groupthink, when group members conform to each other rather than expressing their own divergent ideas.
- Taken together, working in groups has both positive and negative outcomes. It is important to recognize both the strengths and limitations of group performance and use whatever techniques we can to increase process gains and reduce process losses.

Exercise and Critical Thinking

1. Consider a time when you worked together with others in a group. Do you think the group experienced group process gains or group process losses? If the latter, what might you do now in a group to encourage effective group performance?

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14.4: Types Of Power

One of the most influential theories of power was developed by Bertram Raven and John French (French & Raven, 1959; Raven, 1992). Raven identified five different types of power— *reward power*, *coercive power*, *legitimate power*, *referent power*, and *expert power* (shown in Table 14.4.1), arguing that each type of power involves a different type of social influence and that the different types vary in terms of whether their use will create public conformity or private acceptance. Understanding the types of power is important because it allows us to see more clearly the many ways that people can influence others. Let's consider these five types of power, beginning with those that are most likely to produce public conformity only and moving on to those that are more likely to produce private acceptance.

Table 14.4.1: Types of Power

Note. French and Raven (1959) proposed five types of power, which differ in their likelihood of producing public conformity or private acceptance.

Reward power	The ability to distribute positive or negative rewards
Coercive power	The ability to dispense punishments
Legitimate power	Authority that comes from a belief on the part of those being influenced that the person has a legitimate right to demand conformity.
Referent power	Influence based on identification with, attraction to, or respect for the power-holder
Expert power	Power that comes from other's beliefs that the power-holder possesses superior skills and abilities

Reward Power

Reward power occurs when one person is able to influence others by providing them with positive outcomes. Bosses have reward power over employees because they are able to increase employees' salary and job benefits, and teachers have reward power over students because they can assign high marks. The variety of rewards that can be used by the powerful is almost endless and includes verbal praise or approval, the awarding of status or prestige, and even direct financial payment.

The ability to wield reward power over those we want to influence is contingent on the needs of the person being influenced. Power is greater when the person being influenced has a strong desire to obtain the reward, and power is weaker when the individual does not need the reward. A boss will have more influence on an employee who has no other job prospects than on one who is being sought after by other corporations, and expensive presents will be more effective in persuading those who cannot buy the items with their own money. Because the change in behavior that results from reward power is driven by the reward itself, its use is usually more likely to produce public conformity than private acceptance.

Coercive Power

Coercive power is power that is based on the ability to create negative outcomes for others, for instance by bullying, intimidating, or otherwise punishing. Bosses have coercive power over employees if they are able (and willing) to punish employees by reducing

their salary, demoting them to a lower position, embarrassing them, or firing them. And friends can coerce each other through teasing, humiliation, and ostracism. As with reward power, coercive power is effective only when the person being influenced is dependent upon the power-holder. Furthermore, coercion works only if the person being influenced does not leave the group entirely—people who are punished too much are likely to look for other situations that provide more positive outcomes.

In many cases power-holders use reward and coercive power at the same time—for instance, by increasing salaries as a result of positive performance but also threatening to reduce them if the performance drops. Because the use of coercion has such negative consequences, authorities are generally more likely to use reward than coercive power (Molm, 1997). Coercion is usually more difficult to use, since it often requires energy to keep the person from avoiding the punishment by leaving the situation altogether. And coercive power is less desirable for both the power-holder and the person being influenced because it creates an environment of negative feelings and distrust that is likely to make interactions difficult, undermine satisfaction, and lead to retaliation against the power-holder (Tepper et al., 2009).

As with reward power, coercive power is more likely to produce public conformity than private acceptance. Further- more, in both cases the effective use of the power requires that the power-holder continually monitor the behavior of the target to be sure that he or she is complying. This monitoring may itself lead to a sense of mistrust between the two individuals in the relationship. The power-holder feels (perhaps unjustly) that the target is only complying due to the monitoring, whereas the target feels (again perhaps unjustly) that the power-holder does not trust him or her.

Legitimate Power

Whereas reward and coercive power are likely to produce conformity, other types of power, which are not so highly focused around reward and punishment, are more likely to create changes in attitudes as well as behavior (private acceptance). In many ways, then, these sources of power are stronger because they produce real belief change. **Legitimate power** is power vested in those who are appointed or elected to positions of authority, such as teachers, politicians, policemen, and judges, and their power is successful because members of the group accept it as appropriate. We accept that governments can levy taxes and that judges can decide the outcomes of court cases because we see these groups and individuals as valid parts of our society. Individuals with legitimate power can exert substantial influence on their followers. Those with legitimate power may not only create changes in the behavior of others but also have the power to create and change the social norms of the group.

In some cases legitimate power is given to the authority figure as a result of laws or elections, or as part of the norms, traditions, and values of the society. The power that the experimenter had over the research participants in Milgram's study on obedience seems to have been primarily the result of his legitimate power as a respected scientist at an important university. In other cases, legitimate power comes more informally, as a result of being a respected group member. People who contribute to the group process and follow group norms gain status within the group and therefore earn legitimate power.

In some cases, legitimate power can even be used successfully by those who do not seem to have much power. You may recall that after Hurricane Katrina hit the city of New Orleans in 2005, the people there demanded that the federal government help them rebuild the city. Although these people did not have much reward or coercive power, they were nevertheless perceived as good and respected citizens of the United States. Many U.S. citizens tend to believe that people who do not have as much as others (for instance, those who are very poor) should be treated fairly and that these people may legitimately demand resources from those who have more. This might not always work, but to the extent that it does it represents a type of legitimate power—power that comes from a belief in the appropriateness or obligation to respond to the requests of others with legitimate standing.

RESEARCH FOCUS

Does Power Corrupt?

Having power provides some benefits for those who have it. In comparison to those with less power, people who have more power over others are more confident and more attuned to potential opportunities in their environment (Anderson & Berdahl, 2002). They are also more likely than are people with less power to take action to meet their goals (Anderson & Galinsky, 2006; Galinsky et al., 2003).

Despite these advantages of having power, a little power goes a long way and having too much can be dangerous, for both the targets of the power and the powerholder himself or herself. In an experiment by David kipnis (1972), college students played the role of "supervisors" who were supposedly working on a task with other students (the "workers"). According to random

assignment to experimental conditions, one half of the supervisors were able to influence the workers through legitimate power only, by sending them messages attempting to persuade them to work harder. The other half of the supervisors were given increased power. In addition to being able to persuade the workers to increase their out- put through the messages, they were also given both reward power (the ability to give small monetary rewards) and coercive power (the ability to take away earlier rewards).

Although the workers (who were actually preprogrammed) performed equally well in both conditions, the participants who were given more power took advantage of it by more frequently contacting the workers and more frequently threatening them. The students in this condition relied almost exclusively on coercive power rather than attempting to use their legitimate power to develop positive relations with the subordinates.

Although it did not increase the workers' performance, having the extra power had a negative effect on the powerholders' images of the workers. At the end of the study, the supervisors who had been given extra power rated the workers more negatively, were less interested in meeting them, and felt that the only reason the workers did well was to obtain the rewards.

The conclusion of these researchers is clear: Having power may lead people to use it, even though it may not be necessary, which may then lead them to believe that their subordinates are performing only because of the threats. Although using excess power may be successful in the short run, power that is based exclusively on reward and coercion is not likely to produce a positive environment for either the power-holder or the subordinate. People with power may also be more likely to stereotype people with less power than they have (Dépret & Fiske, 1999) and may be less likely to help other people who are in need (van kleef et al.,2008).

Although this research suggests that people may use power when it is available to them, other research has found that this is not equally true for all people—still another case of a person-situation interaction. Serena Chen and her colleagues (2001) found that students who had been classified as more self-oriented (in the sense that they considered relationships in terms of what they could and should get out of them for themselves) were more likely to misuse their power, whereas students who were classified as other-oriented were more likely to use their power to help others. ■

Referent Power

People with **referent power** have an ability to influence others because they can lead those others to identify with them. In this case, the person who provides the influence is (a) a member of an important reference group—someone we personally admire and attempt to emulate; (b) a charismatic, dynamic, and persuasive leader; or (c) a person who is particularly attractive or famous (Heath et al., 1994; Henrich & Gil-White, 2001; Kamins, 1989; Wilson & Sherrell, 1993). A young child who mimics the opinions or behaviors of an older sibling or a famous baseball player, or a churchgoer who follows the advice of a respected church leader, is influenced by referent power. Referent power generally produces private acceptance rather than public conformity (Kelman, 1961).

The influence brought on by referent power may occur in a passive sense because the person being emulated does not necessarily attempt to influence others, and the person who is being influenced may not even realize that the influence is occurring. In other cases, however, the person with referent power (such as the leader of a cult) may make full use of his or her status as the target of identification or respect to produce change. In either case, referent power is a particularly strong source of influence because it is likely to result in the acceptance of the opinions of the important other.

Expert Power

French and Raven's final source of power is **expert power**. Experts have knowledge or information, and conforming to those whom we perceive to be experts is useful for making decisions about issues for which we have insufficient expertise. Expert power thus represents a type of informational influence based on the fundamental desire to obtain valid and accurate information, and where the outcome is likely to be private acceptance. Conformity to the beliefs or instructions of doctors, teachers, lawyers, and computer experts is an example of expert influence; we assume that these individuals have valid information about their areas of expertise, and we accept their opinions based on this perceived expertise (particularly if their advice seems to be successful in solving problems). Indeed, one method of increasing one's power is to become an expert in a domain. Expert power is increased for those who possess more information about a relevant topic than others do because the others must turn to this individual to gain the information. You can see, then, that if you want to influence others, it can be useful to gain as much information about the topic as you can.

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15.1: Introduction

Human conflict can result in crime, war, and mass murder, such as genocide. Prejudice and discrimination often are root causes of human conflict, which explains how strangers come to hate one another to the extreme of causing others harm. Prejudice and discrimination affect everyone. In this section we will examine the definitions of prejudice and discrimination, examples of these concepts, and causes of these biases.

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CHAPTER 14: SOCIAL INFLUENCE

14.1: Social Influence
14.2: Conformity, Compliance, and Obedience
14.3: Working With Others- The Costs and Benefits of Social Groups
14.4: Types Of Power

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CHAPTER 15: PREJUDICE AND DISCRIMINATION

15.1: Introduction
15.2: Understanding Prejudice And Discrimination
15.3: Types Of Prejudice And Discrimination
15.4: Why Do Prejudice And Discrimination Exist?
15.5: Stereotypes And Self-fulfilling Prophecy
15.6: In-groups And Out-groups

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15.2: Understanding Prejudice And Discrimination

Humans are very diverse, and although we share many similarities, we also have many differences. The social groups we belong to help form our identities (Tajfel, 1974). These differences may be difficult for some people to reconcile, which may lead to prejudice toward people who are different. **Prejudice** is a negative attitude and feeling toward an individual based solely on one's membership in a particular social group (Allport, 1954; Brown, 2010). Prejudice is common against people who are members of an unfamiliar cultural group. Thus, certain types of education, contact, interactions, and building relationships with members of different cultural groups can reduce the tendency toward prejudice. In fact, simply imagining interacting with members of different cultural groups might affect prejudice. Indeed, when experimental participants were asked to imagine themselves positively interacting with someone from a different group, this led to an increased positive attitude toward the other group and an increase in positive traits associated with the other group. Furthermore, imagined social interaction can reduce anxiety associated with inter-group interactions (Crisp & Turner, 2009).



Figure 15.2.1: Prejudice and discrimination occur across the globe. (a) A 1939 sign in German-occupied Poland warns "No Entrance for Poles!" (b) An African American male drinks from a designated "colored" water fountain in Oklahoma in 1939 during the era of racial segregation as a practice of discrimination. (c) Members of the Westboro Baptist Church, widely identified as a hate group, engage in discrimination based on religion and sexual orientation. [(a) "No entrance for poles1"/Wikimedia Commons is in the public domain; (b) "Negro drinking at 'Colored' water cooler in streetcar terminal, Oklahoma City, Oklahoma" by Russell Lee/U.S. Farm Security Administration/Wikimedia Commons is in the public domain; (c) "Westboro BC 03022010 RichmondVa" by JCWilmore/Wikimedia Commons is licensed under CC BY 3.0.]

What are some examples of social groups that you belong to that contribute to your identity? Social groups can include gender, race, ethnicity, nationality, social class, religion, sexual orientation, profession, and many more. And, as is true for social roles, you can simultaneously be a member of more than one social group. An example of prejudice is having a negative attitude toward people who are not born in the United States. Although people holding this prejudiced attitude do not know all people who were not born in the United States, they dislike them due to their status as foreigners.

Can you think of a prejudiced attitude you have held toward a group of people? How did your prejudice develop? Prejudice often begins in the form of a **stereotype**—that is, a specific belief or assumption about individuals based solely on their membership in a group, regardless of their individual characteristics. Stereotypes become overgeneralized and applied to all members of a group. For example, someone holding prejudiced attitudes toward older adults may believe that older adults are slow and incompetent (Cuddy et al., 2005; Nelson, 2004). We cannot possibly know each individual person of advanced age to know that all older adults are slow and incompetent. Therefore, this negative belief is overgeneralized to all members of the group, even though many of the individual group members may in fact be spry and intelligent.

Another example of a well-known stereotype involves beliefs about racial differences among athletes. As Hodge et al. (2008) point out, Black male athletes are often believed to be more athletic, yet less intelligent, than their White male counterparts. These beliefs persist despite a number of high-profile examples to the contrary. Sadly, such beliefs often influence how these athletes are treated by others and how they view themselves and their own capabilities. Whether or not you agree with a stereotype, stereotypes are generally well-known within a given culture (Devine, 1989).

Sometimes people will act on their prejudiced attitudes toward a group of people, and this behavior is known as discrimination. **Discrimination** is negative action toward an individual as a result of the individual's membership in a particular group (Allport, 1954; Dovidio & Gaertner, 2004). As a result of holding negative beliefs (stereotypes) and negative attitudes (prejudice) about a particular group, people often treat the target of prejudice poorly, such as excluding older adults from their circle of friends.

Table 15.2.1 summarizes the characteristics of stereotypes, prejudice, and discrimination. Have you ever been the target of discrimination? If so, how did this negative treatment make you feel?

Table 15.2.1: Connecting Stereotypes, Prejudice, and Discrimination

Item	Function	Connection	Example
Stereotype	Cognitive; thoughts about people	Overgeneralized beliefs about people may lead to prejudice.	"Yankees fans are arrogant and obnoxious."
Prejudice	Affective; feelings about people, both positive and negative	Feelings may influence treatment of others, leading to discrimination.	"I hate Yankees fans; they make me angry."
Discrimination	Behavioral; positive or negative treatment of others	Holding stereotypes and harboring prejudice may lead to excluding, avoiding, and biased treatment of group members.	"I would never hire or become friends with a person if I knew he or she were a Yankees fan."

So far, we've discussed stereotypes, prejudice, and discrimination as negative thoughts, feelings, and behaviors because these are typically the most problematic. However, it is important to also point out that people can hold positive thoughts, feelings, and behaviors toward individuals based on group membership; for example, they would show preferential treatment for people who are like themselves—that is, who share the same gender, race, or favorite sports team.

LINK TO LEARNING

This video demonstrates the concepts of prejudice, stereotypes, and discrimination. In the video, a social experiment is conducted in a park where three people try to steal a bike out in the open. The race and gender of the thief is varied: a White male teenager, a Black male teenager, and a White female. Does anyone try to stop them? The treatment of the teenagers in the video demonstrates the concept of racism.

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15.3: Types Of Prejudice And Discrimination

When we meet strangers we automatically process three pieces of information about them: race, gender, and age (Ito & Urland, 2003). Why are these aspects of an unfamiliar person so important? Why don't we instead notice whether their eyes are friendly, whether they are smiling, their height, the type of clothes they are wearing? Although these secondary characteristics are important in forming a first impression of a stranger, the social categories of race, gender, and age pro- vide a wealth of information about an individual. This information, however, often is based on stereotypes. We may have different expectations of strangers depending on their race, gender, and age. What stereotypes and prejudices do you hold about people who are from a race, gender, and age group different from your own?

Racism

Racism is prejudice and discrimination against an individual based solely on the individual's membership in a specific racial group (such as toward African Americans, Asian Americans, Latinos, Native Americans, European Americans). What are some stereotypes of various racial or ethnic groups? Research suggests cultural stereotypes for Asian Americans include cold, sly, and intelligent; for Latinos, cold and unintelligent; for European Americans, cold and intelligent; and for African Americans, aggressive, athletic, and more likely to be law breakers (Devine & Elliot, 1995; Dixon & Linz, 2000; Fiske et al., 2002; Sommers & Ellsworth, 2000).

Racism exists for many racial and ethnic groups. For example, Blacks are significantly more likely to have their vehicles searched during traffic stops than Whites, particularly when Blacks are driving in predominately White neighborhoods, a phenomenon often termed "DWB," or "driving while Black" (Rojek et al., 2012). Mexican Americans and other Latino groups also are targets of racism from the police and other members of the community. For example, when purchasing items with a personal check, Latino shoppers are more likely than White shoppers to be asked to show formal identification (Dovidio et al., 2010).

In one case of alleged harassment by the police, several East Haven, Connecticut, police officers were arrested on federal charges due to reportedly continued harassment and brutalization of Latinos. When the accusations came out, the mayor of East Haven was asked, "What are you doing for the Latino community today?" The Mayor responded, "I might have tacos when I go home, I'm not quite sure yet" (Latino Rebels, 2012). This statement undermines the important issue of racial profiling and police harassment of Latinos, while belittling Latino culture by emphasizing an interest in a food product stereotypically associated with Latinos.

Racism is prevalent toward many other groups in the United States, including Native Americans, Arab Americans, Jewish Americans, and Asian Americans. Have you witnessed racism toward any of these racial or ethnic groups? Are you aware of racism in your community?

One reason modern forms of racism, and prejudice in general, are hard to detect is related to the dual attitudes model (Wilson et al., 2000). Humans have two forms of attitudes: explicit attitudes, which are conscious and controllable, and implicit attitudes, which are unconscious and uncontrollable (Devine, 1989; Olson & Fazio, 2003). Because holding egalitarian views is socially desirable (Plant & Devine, 1998), most people do not show extreme racial bias or other prejudices on measures of their explicit attitudes. However, measures of implicit attitudes often show evidence of mild to strong racial bias or other prejudices (Greenwald et al., 1998; Olson & Fazio, 2003).

Sexism

Sexism is prejudice and discrimination toward individuals based on their sex. Typically, sexism takes the form of men holding biases against women, but either sex can show sexism toward their own or their opposite sex. Like racism, sexism may be subtle and difficult to detect. Common forms of sexism in modern society include gender role expectations, such as expecting women to be the caretakers of the household. Sexism also includes people's expectations for how members of a gender group should behave. For example, women are expected to be friendly, passive, and nurturing, and when women behave in an unfriendly, assertive, or neglectful manner they often are disliked for violating their gender role (Rudman, 1998). Research by Laurie Rudman (1998) finds that when female job applicants self-promote, they are likely to be viewed as competent, but they may be disliked and are less likely to be hired because they violated gender expectations for modesty. Sexism can exist on a societal level such as in hiring, employment opportunities, and education. Women are less likely to be hired or promoted in male-dominated professions such as engineering, aviation, and construction (Figure 15.3.1) (Blau et al., 2010; Ceci & Williams, 2011). Have you ever experienced

or witnessed sexism? Think about your family members' jobs or careers. Why do you think there are differences in the jobs women and men have, such as more women nurses but more male surgeons (Betz, 2008)?



Figure 15.3.1: Women now have many jobs that were previously closed to them, although they still face challenges in male- dominated occupations. ["Female IDF Soldier Shooting Practice" by Alex/ Flickr is licensed under CC BY 2.0.]

Ageism

People often form judgments and hold expectations about people based on their age. These judgments and expectations can lead to **ageism**, or prejudice and discrimination toward individuals based solely on their age. Typically, ageism occurs against older adults, but ageism also can occur toward younger adults. Think of expectations you hold for older adults. How could someone's expectations influence the feelings they hold toward individuals from older age groups? Ageism is wide- spread in U.S. culture (Nosek, 2005), and a common ageist attitude toward older adults is that they are incompetent, physically weak, and slow (Greenberg et al., 2002), and some people consider older adults less attractive. Some cultures, however, including some Asian, Latino, and African American cultures, both outside and within the United States, afford older adults respect and honor.

Ageism can also occur toward younger adults. What expectations do you hold toward younger people? Does society expect younger adults to be immature and irresponsible? How might these two forms of ageism affect a younger and older adult who are applying for a sales clerk position?

Homophobia

Another form of prejudice is **homophobia**: prejudice and discrimination of individuals based solely on their sexual orientation. Like ageism, homophobia is a widespread prejudice in U.S. society that is tolerated by many people (Herek & McLemore, 2013; Nosek, 2005). Negative feelings often result in discrimination, such as the exclusion of lesbian, gay, bisexual, and transgender (LGBT) people from social groups and the avoidance of LGBT neighbors and co-workers. This discrimination also extends to employers deliberately declining to hire qualified LGBT job applicants. Have you experienced or witnessed homophobia? If so, what stereotypes, prejudiced attitudes, and discrimination were evident?

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15.4: Why Do Prejudice And Discrimination Exist?

Prejudice and discrimination persist in society due to social learning and conformity to social norms. Children learn prejudiced attitudes and beliefs from society: their parents, teachers, friends, the media, and other sources of socialization, such as Facebook (O'Keeffe & Clarke-Pearson, 2011). If certain types of prejudice and discrimination are acceptable in a society, there may be normative pressures to conform and share those prejudiced beliefs, attitudes, and behaviors. For example, public and private schools are still some- what segregated by social class. Historically, only children from wealthy families could afford to attend private schools, whereas children from middle- and low-income families typically attended public schools. If a child from a low-income family received a merit scholarship to attend a private school, how might the child be treated by classmates? Can you recall a time when you held prejudiced attitudes or beliefs or acted in a discriminatory manner because your group of friends expected you to?

DIG DEEPER

Research into Homophobia

Some people are quite passionate in their hatred for non-heterosexuals in our society. In some cases, people have been tortured and/or murdered simply because they were not heterosexual. This passionate response has led some researchers to question what motives might exist for homophobic people. Adams et al. (1996) conducted a study investigating this issue, and their results were quite an eye-opener.

In this experiment, male college students were given a scale that assessed how homophobic they were; those with extreme scores were recruited to participate in the experiment. In the end, 64 men agreed to participate and were split into 2 groups: homophobic men and non-homophobic men. Both groups of men were fitted with a penile plethysmograph, an instrument that measures changes in blood flow to the penis and serves as an objective measurement of sexual arousal.

All men were shown segments of sexually explicit videos. One of these videos involved a sexual interaction between a man and a woman (heterosexual clip). One video displayed two females engaged in a sexual interaction (homosexual female clip), and the final video displayed two men engaged in a sexual interaction (homosexual male clip). Changes in penile tumescence were recorded during all three clips, and a subjective measurement of sexual arousal was also obtained. While both groups of men became sexually aroused to the heterosexual and female homosexual video clips, only those men who were identified as homophobic showed sexual arousal to the homosexual male video clip. While all men reported that their erections indicated arousal for the heterosexual and female homosexual clips, the homophobic men indicated that they were not sexually aroused (despite their erections) to the male homo- sexual clips. Adams et al. (1996) suggest that these findings may indicate that homophobia is related to homosexual arousal that the homophobic individuals either deny or are unaware of. ■

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15.5: Stereotypes And Self-fulfilling Prophecy

When we hold a stereotype about a person, we have expectations that he or she will fulfill that stereotype. A **self-fulfilling prophecy** is an expectation held by a person that alters his or her behavior in a way that tends to make it true. When we hold stereotypes about a person, we tend to treat the person according to our expectations. This treatment can influence the person to act according to our stereotypic expectations, thus confirming our stereotypic beliefs. Research by Rosenthal and Jacobson (1968) found that disadvantaged students whose teachers expected them to perform well had higher grades than disadvantaged students whose teachers expected them to do poorly.

Consider this example of cause and effect in a self-fulfilling prophecy: If an employer expects an openly gay male job applicant to be incompetent, the potential employer might treat the applicant negatively during the interview by engaging in less conversation, making little eye contact, and generally behaving coldly toward the applicant (Hebl et al., 2002). In turn, the job applicant will perceive that the potential employer dislikes him, and he will respond by giving shorter responses to interview questions, making less eye contact, and generally disengaging from the interview. After the inter- view, the employer will reflect on the applicant's behavior, which seemed cold and distant, and the employer will conclude, based on the applicant's poor performance during the interview, that the applicant was in fact incompetent. Thus, the employer's stereotype—gay men are incompetent and do not make good employees—is reinforced. Do you think this job applicant is likely to be hired? Treating individuals according to stereotypic beliefs can lead to prejudice and discrimination.

Another dynamic that can reinforce stereotypes is confirmation bias. When interacting with the target of our prejudice, we tend to pay attention to information that is consistent with our stereotypic expectations and ignore information that is inconsistent with our expectations. In this process, known as **confirmation bias**, we seek out information that supports our stereotypes and ignore information that is inconsistent with our stereotypes (Wason & Johnson-Laird, 1972). In the job interview example, the employer may not have noticed that the job applicant was friendly and engaging, and that he provided competent responses to the interview questions in the beginning of the interview. Instead, the employer focused on the job applicant's performance in the later part of the interview, after the applicant changed his demeanor and behavior to match the interviewer's negative treatment.

Have you ever fallen prey to the self-fulfilling prophecy or confirmation bias, either as the source or target of such bias? How might we stop the cycle of the self-fulfilling prophecy? Social class stereotypes of individuals tend to arise when information about the individual is ambiguous. If information is unambiguous, stereotypes do not tend to arise (Baron et al., 1995).

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15.6: In-groups And Out-groups

As discussed previously in this section, we all belong to a gender, race, age, and socioeconomic group. These groups provide a powerful source of our identity and self-esteem (Tajfel & Turner, 1979). These groups serve as our in-groups. An **in-group** is a group that we identify with or see ourselves as belonging to. A group that we don't belong to, or an **out- group**, is a group that we view as fundamentally different from us. For example, if you are female, your gender in-group includes all females, and your gender out-group includes all males (Figure 15.6.1). People often view gender groups as being fundamentally different from each other in personality traits, characteristics, social roles, and interests. Because we often feel a strong sense of belonging and emotional connection to our in-groups, we develop **in-group bias**: a preference for our own group over other groups. This in-group bias can result in prejudice and discrimination because the out-group is perceived as different and is less preferred than our in-group.



Figure 15.6.1: These children are very young, but they are already aware of their gender in-group and out-group. ["Celio Azzurro" by Simone Ramella/Flickr is licensed under CC BY 2.0.]

Despite the group dynamics that seem only to push groups toward conflict, there are forces that promote reconciliation between groups: the expression of empathy, the acknowledgment of past suffering on both sides, and the halt of destructive behaviors.

One function of prejudice is to help us feel good about ourselves and maintain a positive self-concept. This need to feel good about ourselves extends to our in-groups: We want to feel good and protect our in-groups. We seek to resolve threats individually and at the in-group level. This often happens by blaming an out-group for the problem. Scapegoating is the act of blaming an out-group when the in-group experiences frustration or is blocked from obtaining a goal (Allport, 1954).

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16.1: Latané And Darley's Model Of Helping

Two social psychologists, Bibb Latané and John Darley, found themselves particularly interested in, and concerned about, the Kitty Genovese case. As they thought about the stories that they had read about it, they considered the nature of emergency situations such as this one. They realized that emergencies are unusual and that people frequently do not really know what to do when they encounter one. Furthermore, emergencies are potentially dangerous to the helper, and it is therefore probably pretty amazing that anyone helps at all.

To better understand the processes of helping in an emergency, Latané and Darley developed a model of helping that took into consideration the important role of the social situation. Their model, which is shown in Figure 16.1.1, has been extensively tested in many studies, and there is substantial support for it.

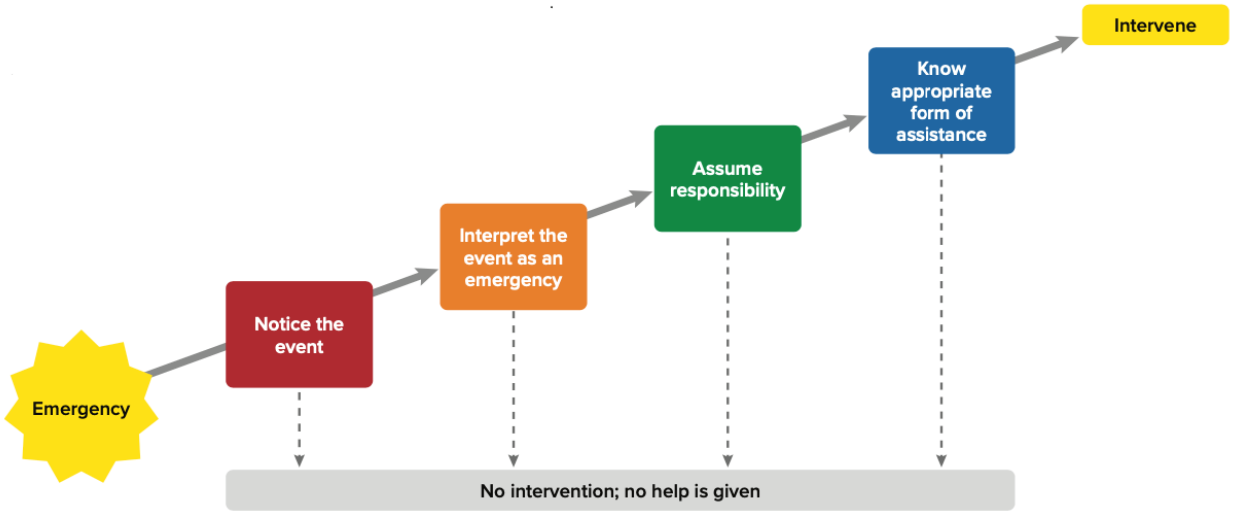


Figure 16.1.1: latané and Darley's stages of helping. [This work, "Stages of Helping," is licensed under CC BY-NC-SA 4.0 by Judy Schmitt. It is a derivative of "Latané and Darley's Stages of Helping" by University of Minnesota, which is licensed under CC BY-NC-SA 4.0.]

Noticing

Latané and Darley thought the first thing that had to happen in order for people to help is that they had to notice the emergency. This seems pretty obvious, but it turns out that the social situation has a big impact on noticing an emergency. Consider, for instance, people who live in a large city such as New York City, Bangkok, or Beijing. These cities are big, noisy, and crowded—it seems like there are a million things going at once. How could people living in such a city even notice, let alone respond to, the needs of all the people around them? They are simply too overloaded by the stimuli in the city (Milgram, 1970).

Many studies have found that people who live in smaller and less dense rural towns are more likely to help than those who live in large, crowded, urban cities (Amato, 1983; Levine et al., 1994). Although there are a lot of reasons for such differences, just noticing the emergency is critical. When there are more people around, it is less likely that people notice the needs of others.

You may have had an experience that demonstrates the influence of the social situation on noticing. Imagine that you have lived with a family or a roommate for a while, but one night you find yourself alone in your house or apartment because your housemates are staying somewhere else that night. If you are like me, I bet you find yourself hearing sounds that you never heard before—and they might make you pretty nervous. Of course the sounds have always been there, but when other people are around you, you are simply less alert to them. The presence of others can divert our attention from the environment—it's as if we are unconsciously, and probably quite mistakenly, counting on the others to take care of things for us.

Latané and Darley (1968) wondered if they could examine this phenomenon experimentally. To do so, they simply asked their research participants to complete a questionnaire in a small room. Some of the participants completed the questionnaire alone,

while others completed the questionnaire in small groups in which two other participants were also working on questionnaires.

A few minutes after the participants had begun the questionnaires, the experimenters started to release some white smoke into the room through a vent in the wall while they watched through a one-way mirror. The smoke got thicker as time went on, until it filled the room. The experimenters timed how long it took before the first person in the room looked up and noticed the smoke. The people who were working alone noticed the smoke in about 5 seconds, and within 4 minutes most of the participants who were working alone had taken some action. But what about the participants working in groups of three? Although we would certainly expect that having more people around would increase the likelihood that someone would notice the smoke, on average, the first person in the group conditions did not notice the smoke until over 20 seconds had elapsed. And although 75% of the participants who were working alone reported the smoke within 4 minutes, the smoke was reported in only 12% of the three-person groups by that time. In fact, in only three of the eight three-person groups did anyone report the smoke at all, even after it had entirely filled the room!

Interpreting

Even if we notice an emergency, we might not interpret it as one. The problem is that events are frequently ambiguous, and we must interpret them to understand what they really mean. Furthermore, we often don't see the whole event unfolding, so it is difficult to get a good handle on it. Is a man holding an iPod and running away from a group of pursuers a criminal who needs to be apprehended, or is this just a harmless prank? Were the cries of Kitty Genovese really calls for help, or were they simply an argument with a boyfriend? It's hard for us to tell when we haven't seen the whole event (Piliavin et al., 1976). Moreover, because emergencies are rare and because we generally tend to assume that events are benign, we may be likely to treat ambiguous cases as not being emergencies.

The problem is compounded when others are present because when we are unsure how to interpret events we normally look to others to help us understand them (this is informational social influence). However, the people we are looking toward for understanding are themselves unsure how to interpret the situation, and they are looking to us for information at the same time we are looking to them.

When we look to others for information we may assume that they know something we do not know. This is often a mistake, because all the people in the situation are doing the same thing. None of us really know what to think, but at the same time we assume that the others do know. **Pluralistic ignorance** occurs when people think others in their environment have information they do not have and when they base their judgments on what they think the others are thinking.

Pluralistic ignorance seems to have been occurring in Latané and Darley's studies, because even when the smoke became really heavy in the room, many people in the group conditions did not react to it. Rather, they looked at each other, and because nobody else in the room seemed very concerned, they each assumed that the others thought that every- thing was all right. You can see the problem—each bystander thinks that other people aren't acting because they don't see an emergency. Of course, everyone is confused, but believing that the others know something that they don't, each observer concludes that help is not required.

Pluralistic ignorance is not restricted to emergency situations (Miller et al., 1988; Suls & Green, 2003). Maybe you have had the following experience: You are in one of your classes and the instructor has just finished a complicated explanation. He is unsure whether the students are up to speed and asks, "Are there any questions?" All the class members are of course completely confused, but when they look at each other, nobody raises a hand in response. So everybody in the class (including the instructor) assumes that everyone under- stands the topic perfectly. This is pluralistic ignorance at its worst—we are all assuming that others know something that we don't, and so we don't act. The moral to instructors in this situation is clear: Wait until at least one student asks a question. The moral for students is also clear: Ask your question! Don't think that you will look stupid for doing so—the other students will probably thank you.

Taking Responsibility

Even if we have noticed the emergency and interpret it as being one, this does not necessarily mean that we will come to the rescue of the other person. We still need to decide that it is our responsibility to do something. The problem is that when we see others around, it is easy to assume that they are going to do something and that we don't need to do anything. **Diffusion of responsibility** occurs when we assume that others will take action and therefore we do not take action ourselves. The irony of course is that people are more likely to help when they are the only ones in the situation than they are when there are others around.

Darley and Latané (1968) had study participants work on a communication task in which they were sharing ideas about how to best adjust to college life with other people in different rooms using an intercom. According to random assignment to conditions, each participant believed that he or she was communicating with either one, two, or five other people, who were in either one, two, or five other rooms. Each participant had an initial chance to give his opinions over the inter- com, and on the first round one of the other people (actually a confederate of the experimenter) indicated that he had an "epileptic-like" condition that had made the adjustment process very difficult for him. After a few minutes, the subject heard the experimental confederate say,

> I-er-um-I think I-I need-er-if-if could-er-er-somebody er-er-er- er-er-er-er give me a liltle-er-give me a little help here because-er- I-er-I'm-er-er having a-a-a real problcm-er-right now and I-er-if somebody could help me out it would-it would-er-er s-s-sure be-sure be good . . . because there-er-er-a cause I-er-I-uh-I've got a-a one of the-er-sei er-er-things coming on and-and-and I could really-er-use some help so if somebody would-er-give me a little h-help-uh-er-er-er-er-er c-could somebody-er-er-help- er-uh-uh-uh (choking sounds). . . . I'm gonna die-er-er-I'm . . . gonna die-er-help-er-er-seizure-er- (chokes, then quiet). (Dar- ley & Latané, 1968, p. 379)

As you can see in Table 16.1.1, the participants who thought that they were the only ones who knew about the emergency (because they were only working with one other person) left the room quickly to try to get help. In the larger groups, how- ever, participants were less likely to intervene and slower to respond when they did. Only 31% of the participants in the largest groups responded by the end of the 6-minute session.

Table 16.1.1: Effects of Group Size on likelihood and Speed of Helping

Source: Darley and Latané (1968).

Group Size	**verage Helping (%)**	**Average Time to Help (in seconds)**
2 (participant and victim)	85	52
3 (participant, victim, and 1 other)	62	93
6 (participant, victim, and 4 others)	31	166

You can see that the social situation has a powerful influence on helping. We simply don't help as much when other people are with us.

Perhaps you have noticed diffusion of responsibility if you have participated in an Internet users group where people asked questions of the other users. Did you find that it was easier to get help if you directed your request to a smaller set of users than when you directed it to a larger number of people? Consider the following: In 1998, Larry Froistad, a 29-year-old computer programmer, sent the following message to the members of an Internet self-help group that had about 200 members. "Amanda I murdered because her mother stood between us . . . when she was asleep, I got wickedly drunk, set the house on fire, went to bed, listened to her scream twice, climbed out the window and set about putting on a show of shock and surprise." Despite this clear online confession to a murder, only three of the 200 newsgroup members reported the confession to the authorities (Markey, 2000).

To study the possibility that this lack of response was due to the presence of others, the researchers (Markey, 2000) con- ducted a field study in which they observed about 5,000 participants in about 400 different chat groups. The experimenters sent a message to the group, from either a male (JakeHarmen) or female (SuzyHarmen) screen name. Help was sought by either asking all the participants in the chat group, "Can any- one tell me how to look at someone's profile?" or by randomly selecting one participant and asking "[name of selected participant], can you tell me how to look at someone's profile?" The experimenters recorded the number of people present in the chat room, which ranged from 2 to 19, and then waited to see how long it took before a response was given.

It turned out that the gender of the person requesting help made no difference, but that addressing to a single per- son did. Assistance was received more quickly when help was asked for by specifying a participant's name (in only about 37 seconds) than when no name was specified (51 seconds). Furthermore, a correlational analysis found that when help was requested without specifying a participant's name, there was a significant negative correlation between the number of people currently logged on in the group and the time it took to respond to the request.

Garcia et al. (2002) found that the presence of others can promote diffusion of responsibility even if those other people are only imagined. In these studies, the researchers had participants read one of three possible scenarios that manipulated whether participants thought about dining out with 10 friends at a restaurant (*group condition*) or whether they thought about dining at a restaurant with only one other friend (*one-person condition*). Participants in the group condition were asked to "Imagine you won a dinner for yourself and 10 of your friends at your favorite restaurant." Participants in the one-person condition were asked to "Imagine you won a dinner for yourself and a friend at your favorite restaurant."

After reading one of the scenarios, the participants were then asked to help with another experiment supposedly being conducted in another room. Specifically, they were asked: "How much time are you willing to spend on this other experiment?" At this point, participants checked off one of the following minute intervals: *0 minutes*, *2 minutes*, *5 minutes*, *10 minutes*, *15 minutes*, *20 minutes*, *25 minutes*, and *30 minutes*.

As you can see in Figure 16.1.2, simply imagining that they were in a group or alone had a significant effect on helping, such that those who imagined being with only one other per- son volunteered to help for more minutes than did those who imagined being in a larger group.

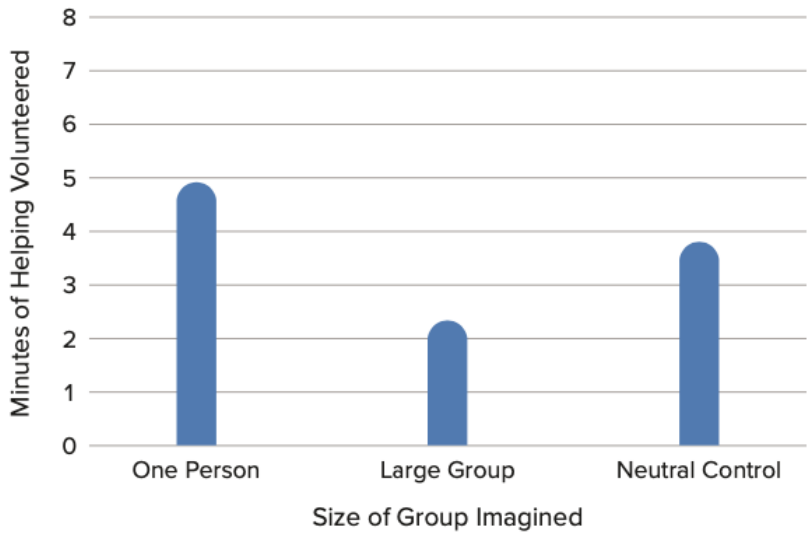


Figure 16.1.2: Helping as a function of imagined social context. Garcia et al. (2002) found that the presence of others reduced helping, even when those others were only imagined. [This work, "Helping and Imagined Social Context," is licensed under CC BY-NC-SA 4.0 by Judy Schmitt. It is a derivative of "Helping as a Function of Imagined Social Context" by University of Minnesota, which is licensed under CC BY-NC-SA 4.0.]

Implementing Action

The fourth step in the helping model is knowing how to help. Of course, for many of us the ways to best help another person in an emergency are not that clear; we are not professionals and we have little training in how to help in emergencies. People who do have training in how to act in emergencies are more likely to help, whereas the rest of us just don't know what to do and therefore may simply walk by. On the other hand, today most people have cell phones, and we can do a lot with a quick call. In fact, a phone call made in time might have saved Kitty Genovese's life. The moral: You might not know exactly what to do, but you may well be able to contact someone else who does.

Latané and Darley's decision model of bystander intervention has represented an important theoretical framework for helping us understand the role of situational variables on helping. Whether or not we help depends on the outcomes of a series of decisions that involve noticing the event, interpreting the situation as one requiring assistance, deciding to take personal responsibility, and

deciding how to help.

Fischer et al. (2011) analyzed data from over 105 studies using over 7,500 participants who had been observed helping (or not helping) in situations in which they were alone or with others. The researchers found significant support for the idea that people helped more when fewer others were present.

And, supporting the important role of interpretation, they also found that the differences were smaller when the need for helping was clear and dangerous and thus required little interpretation. They also found that there were at least some situations (such as when bystanders were able to help provide needed physical assistance) in which having other people around increased helping.

Although the Latané and Darley model was initially developed to understand how people respond in emergencies requiring immediate assistance, aspects of the model have been successfully applied to many other situations, ranging from preventing someone from driving drunk to making a decision about whether to donate a kidney to a relative (Schroeder et al., 1995).

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CHAPTER 16: HELPING AND CONFLICT

16.1: Latané And Darley's Model Of Helping
16.2: Reactions To Receiving Help
16.3: Interacting With Others- Helping, Hurting, and Conforming
16.4: Aggression
16.5: Handling Conflict

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16.2: Reactions To Receiving Help

To this point in the chapter we have proceeded as if helping is always a good thing—that people need to receive help and that they are appreciative of and thankful to the people who help them. But perhaps this is not always true. We haven't yet considered the cognitive and affective reactions of the people who are *receiving* the help. Can you remember a time when somebody tried to help you make a decision or perform a task, but you didn't really want the help? How did that make you think and feel about yourself? Maybe there are costs involved in receiving help, just as there are in giving it.

Although people who receive help often really need the help and may indeed feel appreciative and grateful to those who help them, receiving help may also have some negative consequences. When we help another person, it indicates that we have enough resources that we can afford to give some of them to the recipient; it also indicates that the recipient is dependent on our goodwill. Thus, helping creates a status disparity in the sense that the helper is seen as having higher status than the person being helped. This inequality makes giving help an indication of high status and power, and receiving help a potentially self-threatening experience for the recipient (Nadler, 2002; Nadler & Halabi, 2006). There are a variety of emotions that help recipients might feel in these cases, including embarrassment and worry that they are, or are seen as, incompetent or dependent (DePaulo et al., 1981; Nadler et al., 1983). Research has found that people frequently respond negatively when they receive help and may in some cases even prefer to endure hardships rather than to seek out help (Nadler, 1991). Receiving help, then, can be a potential blow to our self-esteem.

The negative feelings that we experience when receiving help are likely to be particularly strong when the recipient feels that the implication of the helping is that they are unable to care for themselves. In these cases, the help is perceived as being *dependency oriented* (Nadler et al., 1983). When the helper takes control of the situation and solves the problem facing the individual, leaving little left for the individual to accomplish on his or her own, the behavior may be seen as indicating that the individual cannot help herself. The potential recipients of help are likely to reject offers of dependency oriented help, refrain from seeking it, and react negatively when it is offered.

Another situation in which people may not appreciate the help they are receiving is when that help comes on the basis of one's presumed need. For instance Blaine et al. (1995) found that people who imagined that they had been hired for a job because they were disabled experienced lower self-esteem and felt that they were less likely to work hard on the job than those who imagined that they were hired on the basis of their job qualifications. You can see that government programs, such as those based on affirmative action, although likely to be helpful for the people who receive them, may also lead those people to feel dependent on others.

In contrast to dependency-oriented help, *autonomy-oriented help* is partial and temporary and provides information to the other, for instance, by giving instructions or guidance or providing ideas about how to help oneself. Autonomy-oriented help reflects the helper's view that, given the appropriate tools, recipients can help themselves (Brickman et al., 1982). Autonomy-oriented help allows help recipients to retain their independence despite their reliance on the more resourceful helper. This type of help is less likely to clash with help recipients' view of themselves as capable people who can help themselves.

There are also observed gender differences in the willingness to seek help. Boys and men are less likely to ask for help overall, perhaps in part because they feel that asking for help indicates to others that they are less capable of handling their own affairs or that they have low status (Addis & Mahalik, 2003; Mansfield et al., 2003).

In short, when we help others we must be careful that we do it in a way that allows them to maintain their independence and that reminds them that they are still able to help themselves. This type of help will be more easily accepted and more beneficial in the long run.

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16.3: Interacting With Others- Helping, Hurting, and Conforming

Learning Objectives

- Summarize the genetic and environmental factors that contribute to human altruism.
- Provide an overview of the causes of human aggression.
- Explain the situations under which people conform to others and their motivations for doing so.

Humans have developed a variety of social skills that enhance our ability to successfully interact with others. We are often helpful, even when that helping comes at some cost to ourselves, and we often change our opinions and beliefs to fit in with the opinions of those whom we care about. Yet we also are able to be aggressive if we feel the situation warrants it.

Helping Others: Altruism Helps Create Harmonious Relationships

Altruism refers to *any behavior that is designed to increase another person's welfare, and particularly those actions that do not seem to provide a direct reward to the person who performs them* (Dovidio, Piliavin, Schroeder, & Penner, 2006). Altruism occurs when we stop to help a stranger who has been stranded on the highway, when we volunteer at a homeless shelter, or when we donate to a charity. According to a survey given by an established coalition that studies and encourages volunteering (http://www.independentsector.org), in 2001 over 83 million American adults reported that they helped others by volunteering, and did so an average of 3.6 hours per week. The survey estimated that the value of the volunteer time that was given was over 239 billion dollars.

Why Are We Altruistic?

Because altruism is costly, you might wonder why we engage in it at all. There are a variety of explanations for the occurrence of altruism, and Table 16.3.3 summarizes some of the variables that are known to increase helping.

Table 16.3.3: Some of the Variables Known to Increase Helping

Positive moods	We help more when we are in a good mood (Guéguen & De Gail, 2003).
Similarity	We help people who we see as similar to us, for instance, those who mimic our behaviors (van Baaren, Holland, Kawakami, & van Knippenberg, 2004).
Guilt	If we are experiencing guilt, we may help relieve those negative feelings.
Empathy	We help more when we feel empathy for the other person (Batson, O'Quin, Fultz, Varnderplas, & Isen, 1983).
Benefits	We are more likely to help if we can feel good about ourselves by doing so (Snyder, Omoto, & Lindsay, 2004).
Personal responsibility	We are more likely to help if it is clear that others are not helping.
Self-presentation	We may help in order to show others that we are good people (Hardy & Van Vugt, 2006).

Guéguen, N., & De Gail, M.-A. (2003). The effect of smiling on helping behavior: Smiling and Good Samaritan behavior. *Communication Reports, 16*(2), 133–140; van Baaren, R. B., Holland, R. W., Kawakami, K., & van Knippenberg, A. (2004). Mimicry and prosocial behavior. *Psychological Science, 15*(1), 71–74; Batson, C. D., O'Quin, K., Fultz, J., Varnderplas, M., & Isen, A. M. (1983). Influence of self-reported distress and empathy on egoistic versus altruistic motivation to help. *Journal of Personality and Social Psychology, 45*(3), 706–718; Snyder, M., Omoto, A. M., & Lindsay, J. J. (Eds.). (2004). *Sacrificing time and effort for the good of others: The benefits and costs of volunteerism*. New York, NY: Guilford Press; Hardy, C. L., & Van Vugt, M. (2006). Nice guys finish first: The competitive altruism hypothesis. *Personality and Social Psychology Bulletin, 32*(10), 1402–1413.

The tendency to help others in need is in part a functional evolutionary adaptation. Although helping others can be costly to us as individuals, helping people who are related to us can perpetuate our own genes (Madsen et al., 2007; McAndrew, 2002; Stewart-Williams, 2007). Burnstein, Crandall, and Kitayama (1994) found that students indicated they would be more likely to help a person who was closely related to them (e.g., a sibling, parent, or child) than they would be to help a person who was more distantly related (e.g., a niece, nephew, uncle, or grandmother). People are more likely to donate kidneys to relatives than to strangers (Borgida, Conner, & Manteufel, 1992), and even children indicate that they are more likely to help their siblings than they are to help a friend (Tisak & Tisak, 1996).



Figure 16.3.8: We help in part to make ourselves feel good, but also because we care about the welfare of others. Harsha K R – Friend In Need – CC BY-SA 2.0.

Although it makes evolutionary sense that we would help people who we are related to, why would we help people to whom we not related? One explanation for such behavior is based on the principle of *reciprocal altruism* (Krebs & Davies, 1987; Trivers, 1971). Reciprocal altruism is *the principle that, if we help other people now, those others will return the favor should we need their help in the future*. By helping others, we both increase our chances of survival and reproductive success and help others increase their survival too. Over the course of evolution, those who engage in reciprocal altruism should be able to reproduce more often than those who do not, thus enabling this kind of altruism to continue.

We also learn to help by modeling the helpful behavior of others. Although people frequently worry about the negative impact of the violence that is seen on TV, there is also a great deal of helping behavior shown on television. Smith et al. (2006) found that 73% of TV shows had some altruism, and that about three altruistic behaviors were shown every hour. Furthermore, the prevalence of altruism was particularly high in children's shows. But just as viewing altruism can increase helping, modeling of behavior that is not altruistic can decrease altruism. For instance, Anderson and Bushman (2001) found that playing violent video games led to a decrease in helping.

We are more likely to help when we receive rewards for doing so and less likely to help when helping is costly. Parents praise their children who share their toys with others, and may reprimand children who are selfish. We are more likely to help when we have plenty of time than when we are in a hurry (Darley and Batson 1973). Another potential reward is the status we gain as a result of helping. When we act altruistically, we gain a reputation as a person with high status who is able and willing to help others, and this status makes us more desirable in the eyes of others (Hardy & Van Vugt, 2006).

The outcome of the reinforcement and modeling of altruism is the development of social norms about helping—standards of behavior that we see as appropriate and desirable regarding helping. The *reciprocity norm* reminds us that we should follow the principles of reciprocal altruism. If someone helps us, then we should help them in the future, and we should help people now with the expectation that they will help us later if we need it. The reciprocity norm is found in everyday adages such as "Scratch my back and I'll scratch yours" and in religious and philosophical teachings such as the "Golden Rule": "Do unto other as you would have them do unto you."

Because helping based on the reciprocity norm is based on the return of earlier help and the expectation of a future return from others, it might not seem like true altruism. We might hope that our children internalize another relevant social norm that seems more altruistic: the *social responsibility norm*. The social responsibility norm tells us that we should try to help others who need assistance, even without any expectation of future paybacks. The teachings of many religions are based on the social responsibility norm; that we should, as good human beings, reach out and help other people whenever we can.

How the Presence of Others Can Reduce Helping

Late at night on March 13, 1964, 28-year-old Kitty Genovese was murdered within a few yards of her apartment building in New York City after a violent fight with her killer in which she struggled and screamed. When the police interviewed Kitty's neighbors about the crime, they discovered that 38 of the neighbors indicated that they had seen or heard the fight occurring but not one of them had bothered to intervene, and only one person had called the police.

YouTube Video

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View this YouTube Video online

Video Clip: The Case of Kitty Genovese. Was Kitty Genovese murdered because there were too many people who heard her cries? Watch this video for an analysis. https://youtu.be/JozmWS6xYEw

Two social psychologists, Bibb Latané and John Darley, were interested in the factors that influenced people to help (or to not help) in such situations (Latané & Darley, 1968). They developed a model (Figure 16.3.9) that took into consideration the important role of the social situation in determining helping. The model has been extensively tested in many studies, and there is substantial support for it. Social psychologists have discovered that it was the 38 people themselves that contributed to the tragedy, because people are less likely to notice, interpret, and respond to the needs of others when they are with others than they are when they are alone.

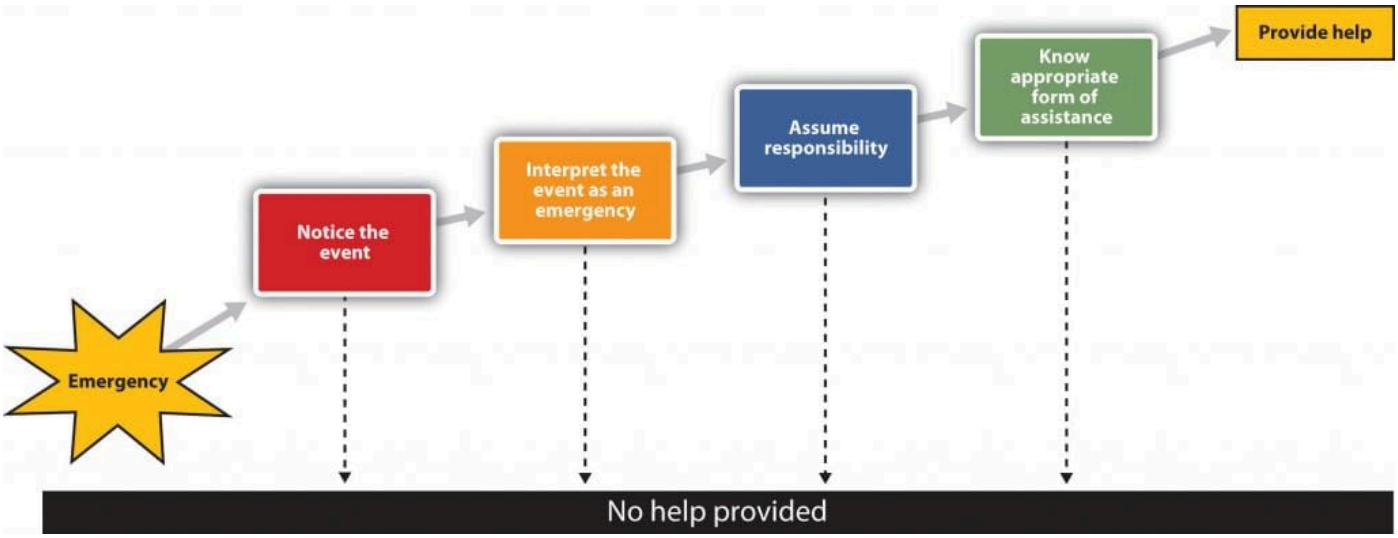


Figure 16.3.9: The Latané and Darley model of helping is based on the idea that a variety of situational factors can influence whether or not we help.

The first step in the model is noticing the event. Latané and Darley (1968) demonstrated the important role of the social situation in noticing by asking research participants to complete a questionnaire in a small room. Some of the participants completed the questionnaire alone, whereas others completed the questionnaire in small groups in which two other participants were also working on questionnaires. A few minutes after the participants had begun the questionnaires, the experimenters started to let some white smoke come into the room through a vent in the wall. The experimenters timed how long it took before the first person in the room looked up and noticed the smoke.

The people who were working alone noticed the smoke in about 5 seconds, and within 4 minutes most of the participants who were working alone had taken some action. On the other hand, on average, the first person in the group conditions did not notice the smoke until over 20 seconds had elapsed. And, although 75% of the participants who were working alone reported the smoke

within 4 minutes, the smoke was reported in only 12% of the groups by that time. In fact, in only 3 of the 8 groups did anyone report the smoke, even after it had filled the room. You can see that the social situation has a powerful influence on noticing; we simply don't see emergencies when other people are with us.

Even if we notice an emergency, we might not interpret it as one. Were the cries of Kitty Genovese really calls for help, or were they simply an argument with a boyfriend? The problem is compounded when others are present, because when we are unsure how to interpret events we normally look to others to help us understand them, and at the same time they are looking to us for information. The problem is that each bystander thinks that other people aren't acting because they don't see an emergency. Believing that the others know something that they don't, each observer concludes that help is not required.

Even if we have noticed the emergency and interpret it as being one, this does not necessarily mean that we will come to the rescue of the other person. We still need to decide that it is our responsibility to do something. The problem is that when we see others around, it is easy to assume that they are going to do something, and that we don't need to do anything ourselves. Diffusion of responsibility occurs *when we assume that others will take action and therefore we do not take action ourselves*. The irony again, of course, is that people are more likely to help when they are the only ones in the situation than when there are others around.

Perhaps you have noticed diffusion of responsibility if you participated in an Internet users group where people asked questions of the other users. Did you find that it was easier to get help if you directed your request to a smaller set of users than when you directed it to a larger number of people? Markey (2000) found that people received help more quickly (in about 37 seconds) when they asked for help by specifying a participant's name than when no name was specified (51 seconds).

The final step in the helping model is knowing how to help. Of course, for many of us the ways to best help another person in an emergency are not that clear; we are not professionals and we have little training in how to help in emergencies. People who do have training in how to act in emergencies are more likely to help, whereas the rest of us just don't know what to do, and therefore we may simply walk by. On the other hand, today many people have cell phones, and we can do a lot with a quick call; in fact, a phone call made in time might have saved Kitty Genovese's life.

Human Aggression: An Adaptive yet Potentially Damaging Behavior

Aggression is *behavior that is intended to harm another individual*. Aggression may occur in the heat of the moment, for instance, when a jealous lover strikes out in rage or the sports fans at a university light fires and destroy cars after an important basketball game. Or it may occur in a more cognitive, deliberate, and planned way, such as the aggression of a bully who steals another child's toys, a terrorist who kills civilians to gain political exposure, or a hired assassin who kills for money.

Not all aggression is physical. Aggression also occurs in nonphysical ways, as when children exclude others from activities, call them names, or spread rumors about them. Paquette and Underwood (1999) found that both boys and girls rated nonphysical aggression such as name-calling as making them feel more "sad and bad" than did physical aggression.

The Ability to Aggress Is Part of Human Nature

We may aggress against others in part because it allows us to gain access to valuable resources such as food, territory, and desirable mates, or to protect ourselves from direct attack by others. If aggression helps in the survival of our genes, then the process of natural selection may well have caused humans, as it would any other animal, to be aggressive (Buss & Duntley, 2006).

There is evidence for the genetics of aggression. Aggression is controlled in large part by the amygdala. One of the primary functions of the amygdala is to help us learn to associate stimuli with the rewards and the punishment that they may provide. The amygdala is particularly activated in our responses to stimuli that we see as threatening and fear-arousing. When the amygdala is stimulated, in either humans or in animals, the organism becomes more aggressive.

But just because we *can* aggress does not mean that we *will* aggress. It is not necessarily evolutionarily adaptive to aggress in all situations. Neither people nor animals are always aggressive; they rely on aggression only when they feel that they absolutely need to (Berkowitz, 1993). The prefrontal cortex serves as a control center on aggression; when it is more highly activated, we are more able to control our aggressive impulses. Research has found that the cerebral cortex is less active in murderers and death row inmates, suggesting that violent crime may be caused at least in part by a failure or reduced ability to regulate aggression (Davidson, Putnam, & Larson, 2000).

Hormones are also important in regulating aggression. Most important in this regard is the male sex hormone *testosterone*, which

is associated with increased aggression in both males and females. Research conducted on a variety of animals has found a positive correlation between levels of testosterone and aggression. This relationship seems to be weaker among humans than among animals, yet it is still significant (Dabbs, Hargrove, & Heusel, 1996).

Consuming alcohol increases the likelihood that people will respond aggressively to provocations, and even people who are not normally aggressive may react with aggression when they are intoxicated (Graham, Osgood, Wells, & Stockwell, 2006). Alcohol reduces the ability of people who have consumed it to inhibit their aggression because when people are intoxicated, they become more self-focused and less aware of the social constraints that normally prevent them from engaging aggressively (Bushman & Cooper, 1990; Steele & Southwick, 1985).

Negative Experiences Increase Aggression

If I were to ask you about the times that you have been aggressive, I bet that you would tell me that many of them occurred when you were angry, in a bad mood, tired, in pain, sick, or frustrated. And you would be right—we are much more likely to aggress when we are experiencing negative emotions. One important determinant of aggression is frustration. When we are frustrated we may lash out at others, even at people who did not cause the frustration. In some cases the aggression is *displaced aggression*, which is aggression that is directed at an object or person other than the person who caused the frustration.

Other negative emotions also increase aggression. Griffit and Veitch (1971) had students complete questionnaires in rooms in which the heat was at a normal temperature or in which the temperature was over 90 degrees Fahrenheit. The students in the latter conditions expressed significantly more hostility. Aggression is greater on hot days than it is on cooler days and during hot years than during cooler years, and most violent riots occur during the hottest days of the year (Bushman, Wang, & Anderson, 2005). Pain also increases aggression (Berkowitz, 1993).

If we are aware that we are feeling negative emotions, we might think that we could release those emotions in a relatively harmless way, such as by punching a pillow or kicking something, with the hopes that doing so will release our aggressive tendencies. Catharsis—*the idea that observing or engaging in less harmful aggressive actions will reduce the tendency to aggress later in a more harmful way*—has been considered by many as a way of decreasing violence, and it was an important part of the theories of Sigmund Freud.

As far as social psychologists have been able to determine, however, catharsis simply does not work. Rather than decreasing aggression, engaging in aggressive behaviors of any type increases the likelihood of later aggression. Bushman, Baumeister, and Stack (1999) first angered their research participants by having another student insult them. Then half of the participants were allowed to engage in a cathartic behavior: They were given boxing gloves and then got a chance to hit a punching bag for 2 minutes. Then all the participants played a game with the person who had insulted them earlier in which they had a chance to blast the other person with a painful blast of white noise. Contrary to the catharsis hypothesis, the students who had punched the punching bag set a higher noise level and delivered longer bursts of noise than the participants who did not get a chance to hit the punching bag. It seems that if we hit a punching bag, punch a pillow, or scream as loud as we can to release our frustration, the opposite may occur—rather than decreasing aggression, these behaviors in fact increase it.

Viewing Violent Media Increases Aggression

The average American watches over 4 hours of television every day, and these programs contain a substantial amount of aggression. At the same time, children are also exposed to violence in movies and video games, as well as in popular music and music videos that include violent lyrics and imagery. Research evidence makes it very clear that, on average, people who watch violent behavior become more aggressive. The evidence supporting this relationship comes from many studies conducted over many years using both correlational designs as well as laboratory studies in which people have been randomly assigned to view either violent or nonviolent material (Anderson et al., 2003). Viewing violent behavior also increases aggression in part through observational learning. Children who witness violence are more likely to be aggressive. One example is in the studies of Albert Bandura, as shown below.

YouTube Video

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Video Clip. This video shows Professor Albert Bandura describing his studies on the observational learning of aggression in children. https://youtu.be/jWsxfoJEwQQ

Another outcome of viewing large amounts of violent material is desensitization, which is *the tendency over time to show weaker emotional responses to emotional stimuli*. When we first see violence, we are likely to be shocked, aroused, and even repulsed by it. However, over time, as we see more and more violence, we become habituated to it, such that the subsequent exposures produce fewer and fewer negative emotional responses. Continually viewing violence also makes us more distrustful and more likely to behave aggressively (Bartholow, Bushman, & Sestir, 2006; Nabi & Sullivan, 2001).

Of course, not everyone who views violent material becomes aggressive; individual differences also matter. People who experience a lot of negative affect and who feel that they are frequently rejected by others whom they care about are more aggressive (Downey, Irwin, Ramsay, & Ayduk, 2004). People with inflated or unstable self-esteem are more prone to anger and are highly aggressive when their high self-image is threatened (Baumeister, Smart, & Boden, 1996). For instance, classroom bullies are those children who always want to be the center of attention, who think a lot of themselves, and who cannot take criticism (Salmivalli & Nieminen, 2002). Bullies are highly motivated to protect their inflated self-concepts, and they react with anger and aggression when it is threatened.

There is a culturally universal tendency for men to be more physically violent than women (Archer & Coyne, 2005; Crick & Nelson, 2002). Worldwide, about 99% of rapes and about 90% of robberies, assaults, and murders are committed by men (Graham & Wells, 2001). These sex differences do not imply that women are never aggressive. Both men and women respond to insults and provocation with aggression; the differences between men and women are smaller after they have been frustrated, insulted, or threatened (Bettencourt & Miller, 1996).

Research Focus: The Culture of Honor

In addition to differences across cultures, there are also regional differences in the incidence of violence in different parts of the United States. As one example, the homicide rate is significantly higher in the southern and the western states but lower in the eastern and northern states. One explanation for these differences is variation in cultural norms about the appropriate reactions to threats against one's social status. These cultural differences apply primarily to men. In short, some men react more violently than others when they believe that others are threatening them.

The social norm that condones and even encourages responding to insults with aggression is known as the culture of honor. The culture of honor leads people to view even relatively minor conflicts or disputes as challenges to one's social status and reputation and can therefore trigger aggressive responses. Beliefs in culture of honor norms are stronger among men who live or who were raised in the South and West than among men who are from or living in the North and East.

In one series of experiments, Cohen, Nisbett, Bosdle, and Schwarz (1996) investigated how white male students who had grown up either in the northern or in the southern regions of the United States responded to insults. The experiments, which were conducted at the University of Michigan, involved an encounter in which the research participant was walking down a narrow hallway. The experimenters enlisted the help of a confederate who did not give way to the participant but rather bumped into him and insulted him. Compared with Northerners, students from the South who had been bumped were more likely to think that their masculine reputations had been threatened, exhibited greater physiological signs of being upset, had higher testosterone levels, engaged in more aggressive and dominant behavior (gave firmer handshakes), and were less willing to yield to a subsequent confederate (Figure 16.3.10).

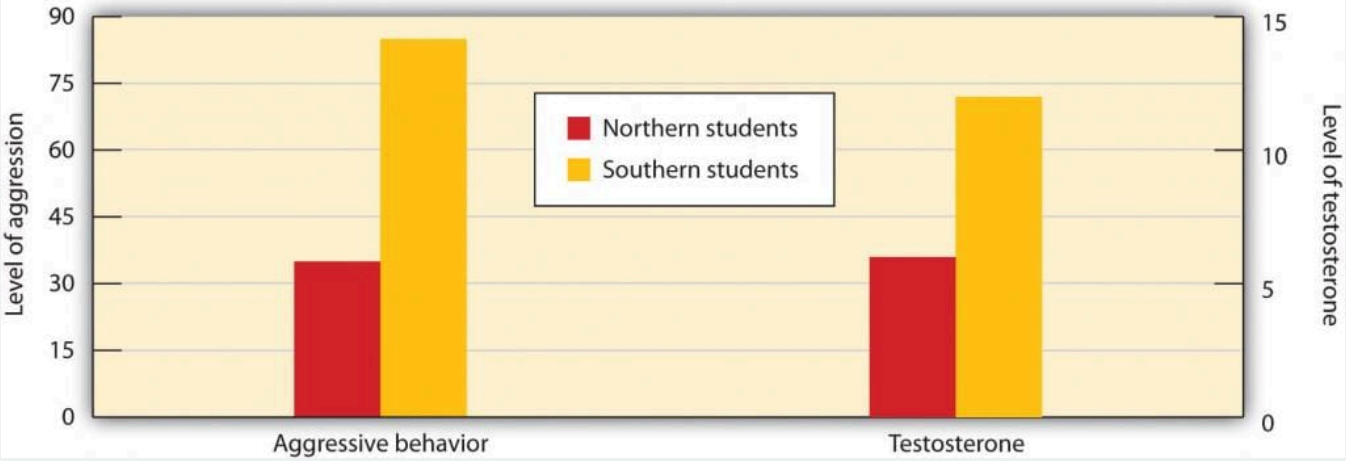


Figure 16.3.10: Results From Cohen, Nisbett, Bosdle, and Schwarz, 1996. Students from southern U.S. states expressed more anger and had greater levels of testosterone after being insulted than did students from northern states. Adapted from Cohen, D., Nisbett, R. E., Bosdle, B., & Schwarz, N. (1996). Insult, aggression, and the southern culture of honor: An "experimental ethnography." *Journal of Personality and Social Psychology, 70*, 945–960.

In another test of the impact of culture of honor, Cohen and Nisbett (1997) sent letters to employers across the United States from a fictitious job applicant who admitted having been convicted of a felony. To half the employers, the applicant reported that he had impulsively killed a man who had been having an affair with his fiancée and then taunted him about it in a crowded bar. To the other half, the applicant reported that he had stolen a car because he needed the money to pay off debts. Employers from the South and the West, places in which the culture of honor is strong, were more likely than employers in the North and East to respond in an understanding and cooperative way to the letter from the convicted killer, but there were no cultural differences for the letter from the auto thief.

One possible explanation for regional differences in the culture of honor involves the kind of activities typically engaged in by men in the different regions. While people in the northern parts of the United States were usually farmers who grew crops, people from southern climates were more likely to raise livestock. Unlike the crops grown by the northerners, the herds were mobile and vulnerable to theft, and it was difficult for law enforcement officials to protect them. To be successful in an environment where theft was common, a man had to build a reputation for strength and toughness, and this was accomplished by a willingness to use swift, and sometimes violent, punishment against thieves.

Conformity and Obedience: How Social Influence Creates Social Norms

When we decide on what courses to enroll in by asking for advice from our friends, change our beliefs or behaviors as a result of the ideas that we hear from others, or binge drink because our friends are doing it, we are engaging in conformity, *a change in beliefs or behavior that occurs as the result of the presence of the other people around us*. We conform not only because we believe that other people have accurate information and we want to have knowledge (*informational conformity*) but also because we want to be liked by others (*normative conformity*).

The typical outcome of conformity is that our beliefs and behaviors become more similar to those of others around us. But some situations create more conformity than others, and some of the factors that contribute to conformity are shown in Table 16.3.4.

Table 16.3.4: Variables That Increase Conformity

Variable	Description	Example
Number in majority	As the number of people who are engaging in a behavior increases, the tendency to conform to those people also increases.	People are more likely to stop and look up in the air when many, rather than few, people are also looking up (Milgram, Bickman, & Berkowitz, 1969).
Unanimity	Conformity reduces sharply when any one person deviates from the norm.	In Solomon Asch's line-matching research, when any one person gave a different answer, conformity was eliminated.

Variable	Description	Example
Status and authority	People who have higher status, such as those in authority, create more conformity.	Milgram (1974) found that conformity in his obedience studies was greatly reduced when the person giving the command to shock was described as an “ordinary man” rather than a scientist at Yale University.

Milgram, S., Bickman, L., & Berkowitz, L. (1969). Note on the drawing power of crowds of different size. *Journal of Personality and Social Psychology, 13*, 79–82; Milgram, S. (1974). *Obedience to authority: An experimental view*. New York, NY: Harper and Row.

At times conformity occurs in a relatively spontaneous and unconscious way, without any obvious intent of one person to change the other, or an awareness that the conformity is occurring. Robert Cialdini and his colleagues (Cialdini, Reno, & Kallgren, 1990) found that college students were more likely to throw litter on the ground themselves when they had just seen another person throw some paper on the ground, and Cheng and Chartrand (2003) found that people unconsciously mimicked the behaviors of others, such as by rubbing their face or shaking their foot, and that that mimicry was greater when the other person was of high versus low social status.

Muzafer Sherif (1936) studied how norms develop in ambiguous situations. In his studies, college students were placed in a dark room with a single point of light and were asked to indicate, each time the light was turned on, how much it appeared to move. (The movement, which is not actually real, occurs because of the saccadic movement of the eyes.) Each group member gave his or her response on each trial aloud and each time in a different random order. As you can see in Figure 16.3.11, Sherif found a conformity effect: Over time, the responses of the group members became more and more similar to each other such that after four days they converged on a common norm. When the participants were interviewed after the study, they indicated that they had not realized that they were conforming.

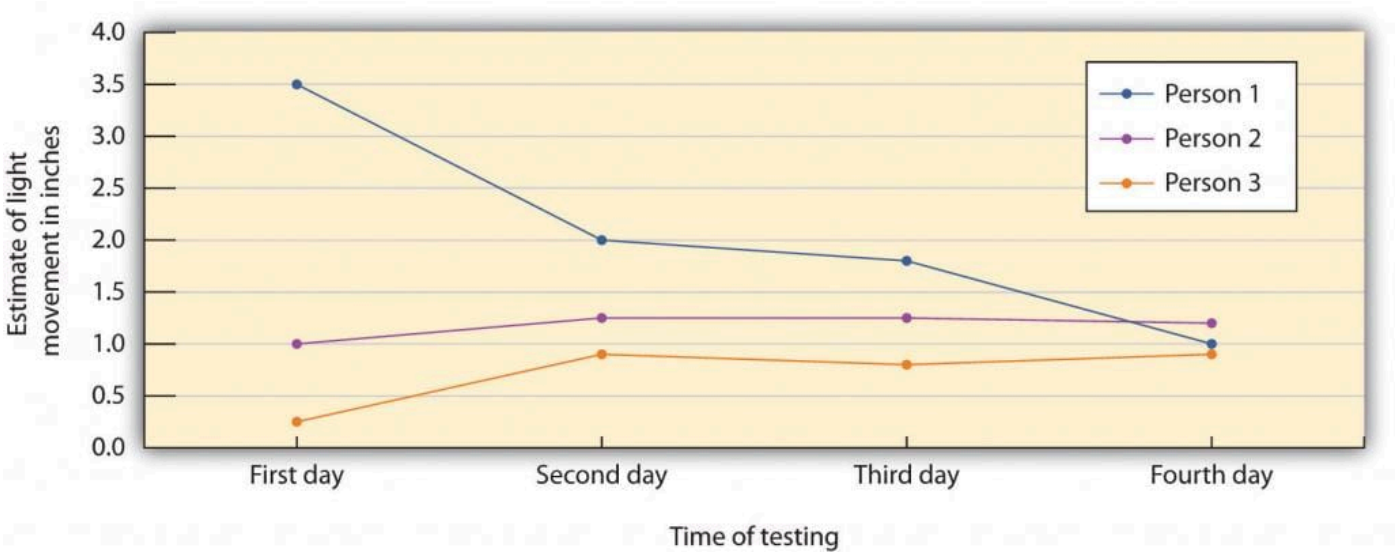


Figure 16.3.11: Sherif’s (1936) Studies on Conformity. The participants in the studies by Muzafer Sherif initially had different beliefs about the degree to which a point of light appeared to be moving. (You can see these differences as expressed on Day 1.) However, as they shared their beliefs with other group members over several days, a common group norm developed. Shown here are the estimates made by a group of three participants who met together on four different days. Adapted from Sherif, M. (1936). *The psychology of social norms*. New York, NY: Harper and Row.

Not all conformity is passive. In the research of Solomon Asch (1955) the judgments that group members were asked to make were entirely unambiguous, and the influence of the other people on judgments was apparent. The research participants were male college students who were told that they were to be participating in a test of visual abilities. The men were seated in front of a board that displayed the visual stimuli that they were going to judge. The men were told that there would be 18 trials during the experiment, and on each trial they would see two cards. The standard card had a single line that was to be judged, and the test card had three lines that varied in length between about 2 and 10 inches.

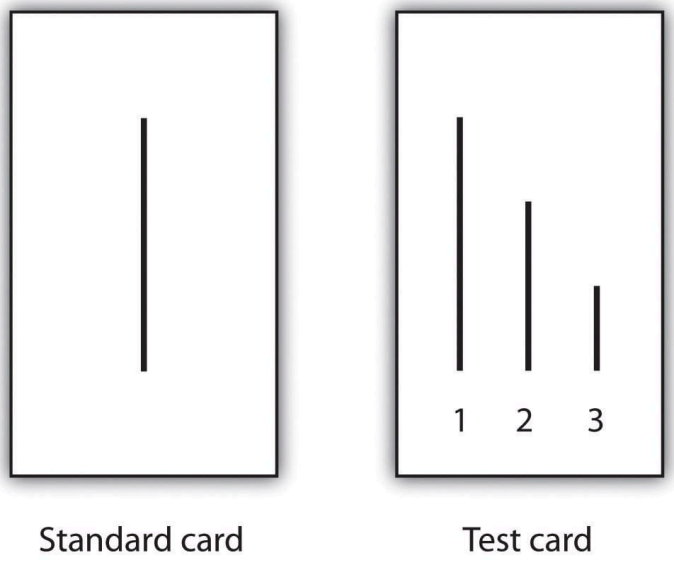


Figure 16.3.12

On each trial, each person in the group answered out loud, beginning with one end of the group and moving toward the other end. Although the real research participant did not know it, the other group members were actually not participants but experimental confederates who gave predetermined answers on each trial. Because the real participant was seated next to last in the row, he always made his judgment following most of the other group members. Although on the first two trials the confederates each gave the correct answer, on the third trial, and on 11 of the subsequent trials, they all had been instructed to give the same wrong choice. For instance, even though the correct answer was Line 1, they would all say it was Line 2. Thus when it became the participant's turn to answer, he could either give the clearly correct answer or conform to the incorrect responses of the confederates.

Remarkably, in this study about 76% of the 123 men who were tested gave at least one incorrect response when it was their turn, and 37% of the responses, overall, were conforming. This is indeed evidence for the power of conformity because the participants were making clearly incorrect responses in public. However, conformity was not absolute; in addition to the 24% of the men who never conformed, only 5% of the men conformed on all 12 of the critical trials.

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Video Clip: Asch's Line Matching Studies.Watch this video to see a demonstration of Asch's line studies. https://youtu.be/iRh5qy09nNw

The tendency to conform to those in authority, known as obedience, was demonstrated in a remarkable set of studies performed by Stanley Milgram (1974). Milgram designed a study in which he could observe the extent to which a person who presented himself as an authority would be able to produce obedience, even to the extent of leading people to cause harm to others. Like many other researchers who were interested in conformity, Milgram's interest stemmed in part from his desire to understand how the presence of a powerful social situation—in this case the directives of Adolph Hitler, the German dictator who ordered the killing of millions of Jews and other "undesirable" people during World War II—could produce obedience.

Milgram used newspaper ads to recruit men (and in one study, women) from a wide variety of backgrounds to participate in his research. When the research participant arrived at the lab, he or she was introduced to a man who was ostensibly another research participant but who actually was a confederate working with the experimenter as part of the experimental team. The experimenter explained that the goal of the research was to study the effects of punishment on learning. After the participant

and the confederate both consented to be in the study, the researcher explained that one of them would be the teacher, and the other the learner. They were each given a slip of paper and asked to open it and indicate what it said. In fact both papers read "teacher," which allowed the confederate to pretend that he had been assigned to be the learner and thus to assure that the actual participant was always the teacher.

While the research participant (now the teacher) looked on, the learner was taken into the adjoining shock room and strapped to an electrode that was to deliver the punishment. The experimenter explained that the teacher's job would be to sit in the control room and read a list of word pairs to the learner. After the teacher read the list once, it would be the learner's job to remember which words went together. For instance, if the word pair was "blue sofa," the teacher would say the word "blue" on the testing trials, and the learner would have to indicate which of four possible words ("house," "sofa," "cat," or "carpet") was the correct answer by pressing one of four buttons in front of him.

After the experimenter gave the "teacher" a mild shock to demonstrate that the shocks really were painful, the experiment began. The research participant first read the list of words to the learner and then began testing him on his learning. The shock apparatus (Figure 16.3.13) was in front of the teacher, and the learner was not visible in the shock room. The experimenter sat behind the teacher and explained to him that each time the learner made a mistake he was to press one of the shock switches to administer the shock. Moreover, the switch that was to be pressed increased by one level with each mistake, so that each mistake required a stronger shock.

Once the learner (who was, of course, actually the experimental confederate) was alone in the shock room, he unstrapped himself from the shock machine and brought out a tape recorder that he used to play a prerecorded series of responses that the teacher could hear through the wall of the room.

The teacher heard the learner say "ugh!" after the first few shocks. After the next few mistakes, when the shock level reached 150 V, the learner was heard to exclaim, "Let me out of here. I have heart trouble!" As the shock reached about 270 V, the protests of the learner became more vehement, and after 300 V the learner proclaimed that he was not going to answer any more questions. From 330 V and up, the learner was silent. At this point the experimenter responded to participants' questions, if any, with a scripted response indicating that they should continue reading the questions and applying increasing shock when the learner did not respond.

The results of Milgram's research were themselves quite shocking. Although all the participants gave the initial mild levels of shock, responses varied after that. Some refused to continue after about 150 V, despite the insistence of the experimenter to continue to increase the shock level. Still others, however, continued to present the questions and to administer the shocks, under the pressure of the experimenter, who demanded that they continue. In the end, 65% of the participants continued giving the shock to the learner all the way up to the 450 V maximum, even though that shock was marked as "danger: severe shock" and no response had been heard from the participant for several trials. In other words, well over half of the men who participated had, as far as they knew, shocked another person to death, all as part of a supposed experiment on learning.

In case you are thinking that such high levels of obedience would not be observed in today's modern culture, there is fact evidence that they would. Milgram's findings were almost exactly replicated, using men and women from a wide variety of ethnic groups, in a study conducted this decade at Santa Clara University (Burger, 2009). In this replication of the Milgram experiment, 67% of the men and 73% of the women agreed to administer increasingly painful electric shocks when an authority figure ordered them to. The participants in this study were not, however, allowed to go beyond the 150 V shock switch.

Although it might be tempting to conclude that Burger's and Milgram's experiments demonstrate that people are innately bad creatures who are ready to shock others to death, this is not in fact the case. Rather it is the social situation, and not the people themselves, that is responsible for the behavior. When Milgram created variations on his original procedure, he found that changes in the situation dramatically influenced the amount of conformity. Conformity was significantly reduced when people were allowed to choose their own shock level rather than being ordered to use the level required by the experimenter, when the experimenter communicated by phone rather than from within the experimental room, and when other research participants refused to give the shock. These findings are consistent with a basic principle of social psychology: The situation in which people find themselves has a major influence on their behavior.

Do We Always Conform?

The research that we have discussed to this point suggests that most people conform to the opinions and desires of others. But it is not always the case that we blindly conform. For one, there are individual differences in conformity. People with lower self-esteem are more likely to conform than are those with higher self-esteem, and people who are dependent on and who have

a strong need for approval from others are also more conforming (Bornstein, 1993). People who highly identify with or who have a high degree of commitment to a group are also more likely to conform to group norms than those who care less about the group (Jetten, Spears, & Manstead, 1997). Despite these individual differences among people in terms of their tendency to conform, however, research has generally found that the impact of individual difference variables on conformity is smaller than the influence of situational variables, such as the number and unanimity of the majority.

We have seen that conformity usually occurs such that the opinions and behaviors of individuals become more similar to the opinions and behaviors of the majority of the people in the group. However, and although it is much more unusual, there are cases *in which a smaller number of individuals is able to influence the opinions or behaviors of the larger group*—a phenomenon known as minority influence. Minorities who are consistent and confident in their opinions may in some cases be able to be persuasive (Moscovici, Mugny, & Van Avermaet, 1985).

Persuasion that comes from minorities has another, and potentially even more important, effect on the opinions of majority group members: It can lead majorities to engage in fuller, as well as more divergent, innovative, and creative thinking about the topics being discussed (Martin, Hewstone, Martin, & Gardikiotis, 2008). Nemeth and Kwan (1987) found that participants working together in groups solved problems more creatively when only one person gave a different and unusual response than the other members did (minority influence) in comparison to when three people gave the same unusual response.

It is a good thing that minorities can be influential; otherwise, the world would be pretty boring indeed. When we look back on history, we find that it is the unusual, divergent, innovative minority groups or individuals, who—although frequently ridiculed at the time for their unusual ideas—end up being respected for producing positive changes.

Another case where conformity does not occur is when people feel that their freedom is being threatened by influence attempts, yet they also have the ability to resist that persuasion. In these cases they may develop *a strong emotional reaction that leads people to resist pressures to conform* known as psychological reactance (Miron & Brehm, 2006). Reactance is aroused when our ability to choose which behaviors to engage in is eliminated or threatened with elimination. The outcome of the experience of reactance is that people may not conform at all, in fact moving their opinions or behaviors away from the desires of the influencer. Consider an experiment conducted by Pennebaker and Sanders (1976), who attempted to get people to stop writing graffiti on the walls of campus restrooms. In the first group of restrooms they put a sign that read “Do not write on these walls under any circumstances!” whereas in the second group they placed a sign that simply said “Please don’t write on these walls.” Two weeks later, the researchers returned to the restrooms to see if the signs had made a difference. They found that there was significantly less graffiti in the second group of restrooms than in the first one. It seems as if people who were given strong pressures to not engage in the behavior were more likely to react against those directives than were people who were given a weaker message.

Reactance represents a desire to restore freedom that is being threatened. A child who feels that his or her parents are forcing him to eat his asparagus may react quite vehemently with a strong refusal to touch the plate. And an adult who feels that she is being pressured by a car salesman might feel the same way and leave the showroom entirely, resulting in the opposite of the salesman’s intended outcome.

Key Takeaways

- Altruism is behavior that is designed to increase another person’s welfare, and particularly those actions that do not seem to provide a direct reward to the person who performs them. The tendency to help others in need is in part a functional evolutionary adaptation and in part determined by environmental factors.
- Although helping others can be costly to us as individuals, helping people who are related to us can perpetuate our own genes. Some helping is based on reciprocal altruism, the principle that if we help other people now, those others will return the favor should we need their help in the future.
- We also learn to help through modeling and reinforcement. The result of this learning is norms about helping, including the reciprocity norm and the social responsibility norm.
- Research testing the Latané and Darley model of helping has shown the importance of the social situation in noticing, interpreting, and acting in emergency situations.
- Aggression is physical or nonphysical behavior that is intended to harm another individual. Aggression has both genetic and environmental causes. The experience of negative emotions tends to increase aggression.
- Viewing violence tends to increase aggression.
- The social norm that condones and even encourages responding to insults with aggression is known as the culture of honor.
- Conformity, the change in beliefs or behavior that occurs as the result of the presence of the other people around us, can occur in both active and passive ways. The typical outcome of conformity is that our beliefs and behaviors become more similar to those of others around us.

- The situation is the most powerful determinant of conformity, but individual differences may also matter. The important influence of the social situation on conformity was demonstrated in the research by Sherif, Asch, Milgram, and others.
- Minority influence can change attitudes and change how majorities process information.

Exercises and Critical Thinking

1. Consider a time when you were helpful. Was the behavior truly altruistic, or did you help for selfish reasons?
2. Consider a time when you or someone you know was aggressive. What do you think caused the aggression?
3. Should parents limit the amount of violent TV shows and video games that their children are exposed to? Why or why not?
4. Is conformity a “good thing” or a “bad thing” for society? What determines whether it is good or bad? What role do you think conformity played in Sam Spady’s death?

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16.4: Aggression

Learning Objectives

- Define aggression
- Define cyberbullying
- Describe the bystander effect

Throughout this chapter we have discussed how people interact and influence one another's thoughts, feelings, and behaviors in both positive and negative ways. People can work together to achieve great things, such as helping each other in emergencies: recall the heroism displayed during the $9/11$ terrorist attacks. People also can do great harm to one another, such as conforming to group norms that are immoral and obeying authority to the point of murder: consider the mass conformity of Nazis during WWII. In this section we will discuss a negative side of human behavior—aggression.

A number of researchers have explored ways to reduce prejudice. One of the earliest was a study by Sherif et al. (1961) known as the Robbers Cave experiment. They found that when two opposing groups at a camp worked together toward a common goal, prejudicial attitudes between the groups decreased (Gaertner, Dovidio, Banker, Houlette, Johnson, & McGlynn, 2000). Focusing on superordinate goals was the key to attitude change in the research. Another study examined the jigsaw classroom, a technique designed by Aronson and Bridgeman in an effort to increase success in desegregated classrooms. In this technique, students work on an assignment in groups inclusive of various races and abilities. They are assigned tasks within their group, then collaborate with peers from other groups who were assigned the same task, and then report back to their original group. Walker and Crogan (1998) noted that the jigsaw classroom reduced potential for prejudice in Australia, as diverse students worked together on projects needing all of the pieces to succeed. This research suggests that anything that can allow individuals to work together toward common goals can decrease prejudicial attitudes. Obviously, the application of such strategies in real-world settings would enhance opportunities for conflict resolution.

Aggression

Humans engage in **aggression** when they seek to cause harm or pain to another person. Aggression takes two forms depending on one's motives: hostile or instrumental. **Hostile aggression** is motivated by feelings of anger with intent to cause pain; a fight in a bar with a stranger is an example of hostile aggression. In contrast, **instrumental aggression** is motivated by achieving a goal and does not necessarily involve intent to cause pain (Berkowitz, 1993); a contract killer who murders for hire displays instrumental aggression.

There are many different theories as to why aggression exists. Some researchers argue that aggression serves an evolutionary function (Buss, 2004). Men are more likely than women to show aggression (Wilson & Daly, 1985). From the perspective of evolutionary psychology, human male aggression, like that in nonhuman primates, likely serves to display dominance over other males, both to protect a mate and to perpetuate the male's genes (See figure 12.24). Sexual jealousy is part of male aggression; males endeavor to make sure their mates are not copulating with other males, thus ensuring their own paternity of the female's offspring. Although aggression provides an obvious evolutionary advantage for men, women also engage in aggression. Women typically display instrumental forms of aggression, with their aggression serving as a means to an end (Dodge & Schwartz, 1997). For example, women may express their aggression covertly, for example, by communication that impairs the social standing of another person. Another theory that explains one of the functions of human aggression is **frustration aggression theory** (Dollard, Doob, Miller, Mowrer, & Sears, 1939). This theory states that when humans are prevented from achieving an important goal, they become frustrated and aggressive.



Figure 12.24 Human males and nonhuman male primates endeavor to gain and display dominance over other males, as demonstrated in the behavior of these monkeys. (credit: “Arcadiuš”/Flickr)

Bullying

A modern form of aggression is bullying. As you learn in your study of child development, socializing and playing with other children is beneficial for children’s psychological development. However, as you may have experienced as a child, not all play behavior has positive outcomes. Some children are aggressive and want to play roughly. Other children are selfish and do not want to share toys. One form of negative social interactions among children that has become a national concern is bullying. **Bullying** is repeated negative treatment of another person, often an adolescent, over time (Olweus, 1993). A one-time incident in which one child hits another child on the playground would not be considered bullying: Bullying is repeated behavior. The negative treatment typical in bullying is the attempt to inflict harm, injury, or humiliation, and bullying can include physical or verbal attacks. However, bullying doesn’t have to be physical or verbal, it can be psychological. Research finds gender differences in how girls and boys bully others (American Psychological Association, 2010; Olweus, 1993). Boys tend to engage in direct, physical aggression such as physically harming others. Girls tend to engage in indirect, social forms of aggression such as spreading rumors, ignoring, or socially isolating others. Based on what you have learned about child development and social roles, why do you think boys and girls display different types of bullying behavior?

Bullying involves three parties: the bully, the victim, and witnesses or bystanders. The act of bullying involves an imbalance of power with the bully holding more power—physically, emotionally, and/or socially over the victim. The experience of bullying can be positive for the bully, who may enjoy a boost to self-esteem. However, there are several negative consequences of bullying for the victim, and also for the bystanders. How do you think bullying negatively impacts adolescents? Being the victim of bullying is associated with decreased mental health, including experiencing anxiety and depression (APA, 2010). Victims of bullying may underperform in schoolwork (Bowen, 2011). Bullying also can result in the victim committing suicide (APA, 2010). How might bullying negatively affect witnesses?

Although there is not one single personality profile for who becomes a bully and who becomes a victim of **bullying** (APA, 2010), researchers have identified some patterns in children who are at a greater risk of being bullied (Olweus, 1993):

- Children who are emotionally reactive are at a greater risk for being bullied. Bullies may be attracted to children who get upset easily because the bully can quickly get an emotional reaction from them.
- Children who are different from others are likely to be targeted for bullying. Children who are overweight, cognitively impaired, or racially or ethnically different from their peer group may be at higher risk.
- Gay, lesbian, bisexual, and transgender teens are at very high risk of being bullied and hurt due to their sexual orientation.

Cyberbullying

With the rapid growth of technology, and widely available mobile technology and social networking media, a new form of bullying has emerged: cyberbullying (Hoff & Mitchell, 2009). **Cyberbullying**, like bullying, is repeated behavior that is intended to cause psychological or emotional harm to another person. What is unique about cyberbullying is that it is typically covert, concealed, done in private, and the bully can remain anonymous. This anonymity gives the bully power, and the victim may feel helpless, unable to escape the harassment, and unable to retaliate (Spears, Slee, Owens, & Johnson, 2009).

Cyberbullying can take many forms, including harassing a victim by spreading rumors, creating a website defaming the victim, and ignoring, insulting, laughing at, or teasing the victim (Spears et al., 2009). In cyberbullying, it is more common for girls to be the bullies and victims because cyberbullying is nonphysical and is a less direct form of bullying (Figure) (Hoff & Mitchell, 2009). Interestingly, girls who become cyberbullies often have been the victims of cyberbullying at one time (Vandebosch & Van Cleemput, 2009). The effects of cyberbullying are just as harmful as traditional bullying and include the victim feeling frustration, anger, sadness, helplessness, powerlessness, and fear. Victims will also experience lower self-esteem (Hoff & Mitchell, 2009; Spears et al., 2009). Furthermore, recent research suggests that both cyberbullying victims and perpetrators are more likely to experience suicidal ideation, and they are more likely to attempt suicide than individuals who have no experience with cyberbullying (Hinduja & Patchin, 2010). What features of technology make cyberbullying easier and perhaps more accessible to young adults? What can parents, teachers, and social networking websites, like Facebook, do to prevent cyberbullying?

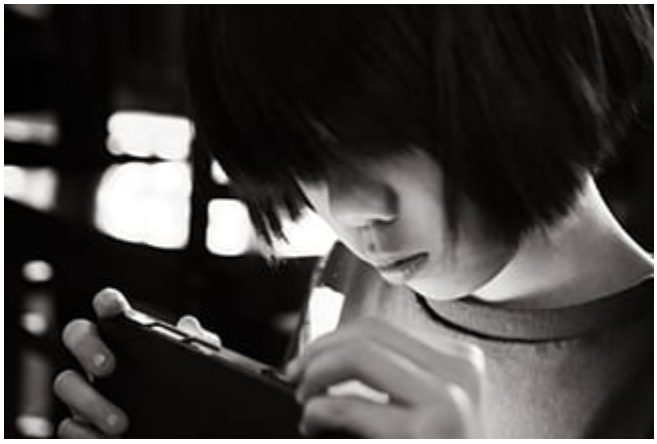


Figure 12.25 Because cyberbullying is not physical in nature, cyberbullies and their victims are most often female; however, there is much evidence that male homosexuals are frequently victims of cyberbullying as well (Hinduja & Patchin, 2011). (credit: Steven Depolo)

The Bystander Effect

The discussion of bullying highlights the problem of witnesses not intervening to help a victim. Researchers Latané and Darley (1968) described a phenomenon called the bystander effect. The bystander effect is a phenomenon in which a witness or bystander does not volunteer to help a victim or person in distress. Instead, they just watch what is happening. Social psychologists hold that we make these decisions based on the social situation, not our own personality variables. The impetus behind the bystander effect was the murder of a young woman named Kitty Genovese in 1964. The story of her tragic death took on a life of its own when it was reported that none of her neighbors helped her or called the police when she was being attacked. However, Kassin (2017) noted that her killer was apprehended due to neighbors who called the police when they saw him committing a burglary days later. Not only did bystanders indeed intervene in her murder (one man who shouted at the killer, a woman who said she called the police, and a friend who comforted her in her last moments), but other bystanders intervened in the capture of the murderer. Social psychologists claim that diffusion of responsibility is the likely explanation. Diffusion of responsibility is the tendency for no one in a group to help because the responsibility to help is spread throughout the group (Bandura, 1999). Because there were many witnesses to the attack on Genovese, as evidenced by the number of lit apartment windows in the building, individuals assumed someone else must have already called the police. The responsibility to call the police was diffused across the number of witnesses to the crime. Have you ever passed an accident on the freeway and assumed that a victim or certainly another motorist has already reported the accident? In general, the greater the number of bystanders, the less likely any one person will help.

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16.5: Handling Conflict

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UNIT V: HOW TO BE HEALTHY AND THRIVE

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CHAPTER 17: EMOTIONS

17.1: Emotions
17.2: Emotion
17.3: Positive Emotions - The Power of Happiness

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17.1: Emotions

By Hyisung Hwang and David Matsumoto

San Francisco State University

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

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.



Emotions help us navigate the complex social landscape of our lives. [Image: Gwenaël Piase, https://goo.gl/d4EDKS, CC BY-NC-SA 2.0, goo.gl/hSpkVI]

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



The emotion of disgust serves to protect us from toxins and contamination, of the physical and moral variety. [Image: Runs with Scissors, https://goo.gl/FQRxGa, CC BY-NC 2.0, goo.gl/tgFydH]

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



Emotions can act as signals to our friends and partners, conveying information about the quality of the relationship. [Image: mynameisharsha, https://goo.gl/HY2XgV, CC BY-SA 2.0, goo.gl/rxiUsF]

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



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. [Image: vgm8383, https://goo.gl/jgfRDN, CC BY-NC 2.0, goo.gl/VnKlK8]

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.

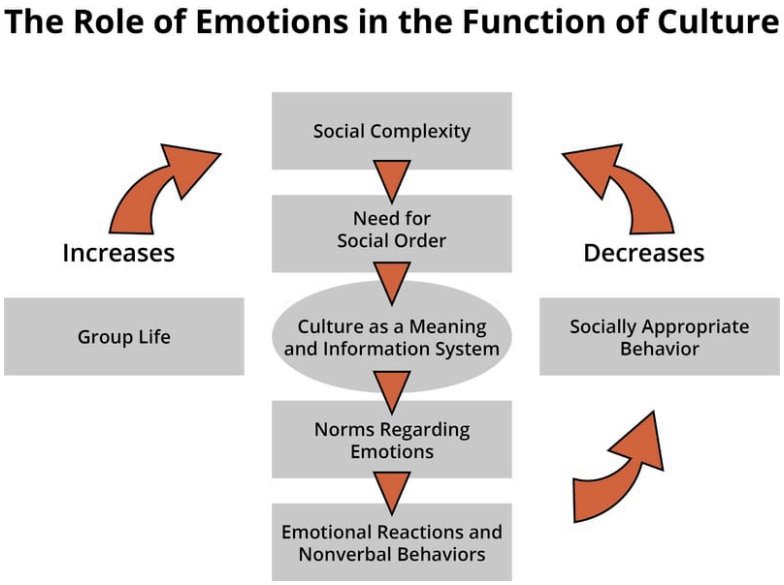


Figure 4.2.1: The Role of Emotions in the Function of Culture

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).



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. [Image: john.gillespie, https://goo.gl/gTdPYb, CC BY-SA 3.0, goo.gl/eLCn2O]

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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www.npr.org/sections/health-s...emotions-right

Online Psychology Laboratory: Motivation and Emotion resources
opl.apa.org/Resources.aspx#Motivation

Web: See how well you can read other people's facial expressions of emotion
http://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?

Vocabulary

Cultural display rules
These are rules that are learned early in life that specify the management and modification of emotional expressions according to social circumstances. Cultural display rules can work in a number of different ways. For

example, they can require individuals to express emotions “as is” (i.e., as they feel them), to exaggerate their expressions to show more than what is actually felt, to tone down their expressions to show less than what is actually felt, to conceal their feelings by expressing something else, or to show nothing at all.

Interpersonal
This refers to the relationship or interaction between two or more individuals in a group. Thus, the interpersonal functions of emotion refer to the effects of one’s emotion on others, or to the relationship between oneself and others.

Intrapersonal
This refers to what occurs within oneself. Thus, the intrapersonal functions of emotion refer to the effects of emotion to individuals that occur physically inside their bodies and psychologically inside their minds.

Social and cultural
Society refers to a system of relationships between individuals and groups of individuals; culture refers to the meaning and information afforded to that system that is transmitted across generations. Thus, the social and cultural functions of emotion refer to the effects that emotions have on the functioning and maintenance of societies and cultures.

Social referencing
This refers to the process whereby individuals look for information from others to clarify a situation, and then use that information to act. Thus, individuals will often use the emotional expressions of others as a source of information to make decisions about their own behavior.

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17.2: Emotion

Learning Objectives

- Explain the major theories of emotion
- Describe the role that limbic structures play in emotional processing
- Understand the ubiquitous nature of producing and recognizing emotional expression

As we move through our daily lives, we experience a variety of emotions. An **emotion** is a subjective state of being that we often describe as our feelings. Emotions result from the combination of subjective experience, expression, cognitive appraisal, and physiological responses (Levenson, Carstensen, Friesen, & Ekman, 1991). However, as discussed later in the chapter, the exact order in which the components occur is not clear, and some parts may happen at the same time. An emotion often begins with a subjective (individual) experience, which is a stimulus. Often the stimulus is external, but it does not have to be from the outside world. For example, it might be that one thinks about war and becomes sad, even though they never experienced war. Emotional expression refers to the way one displays an emotion and includes nonverbal and verbal behaviors (Gross, 1999). One also performs a cognitive appraisal in which a person tries to determine the way they will be impacted by a situation (Roseman & Smith, 2001). In addition, emotions include physiological responses, such as possible changes in heart rate, sweating, etc. (Soussignan, 2002).

The words emotion and mood are sometimes used interchangeably, but psychologists use these words to refer to two different things. Typically, the word emotion indicates a subjective, affective state that is relatively intense and that occurs in response to something we experience (See figure 10.20). Emotions are often thought to be consciously experienced and intentional. **Mood**, on the other hand, refers to a prolonged, less intense, affective state that does not occur in response to something we experience. Mood states may not be consciously recognized and do not carry the intentionality that is associated with emotion (Beedie, Terry, Lane, & Devonport, 2011). Here we will focus on emotion, and you will learn more about mood in the chapter that covers psychological disorders.

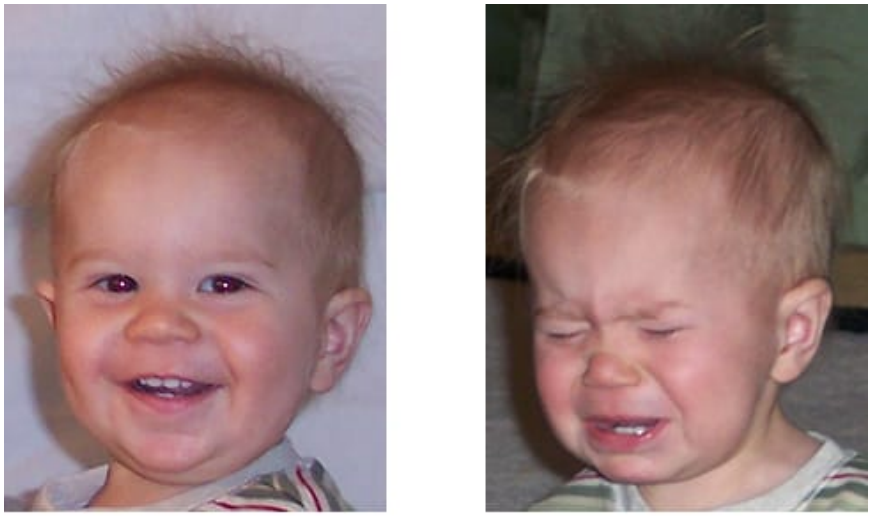


Figure 10.20 Toddlers can cycle through emotions quickly, being (a) extremely happy one moment and (b) extremely sad the next. (credit a: modification of work by Kerry Ceszyk; credit b: modification of work by Kerry Ceszyk)

We can be at the heights of joy or in the depths of despair or. We might feel angry when we are betrayed, fear when we are threatened, and surprised when something unexpected happens. This section will outline some of the most well-known theories explaining our emotional experience and provide insight into the biological bases of emotion. This section closes with a discussion of the ubiquitous nature of facial expressions of emotion and our abilities to recognize those expressions in others.

Theories of Emotion

Our emotional states are combinations of physiological arousal, psychological appraisal, and subjective experiences. Together, these are known as the **components of emotion**. These appraisals are informed by our experiences, backgrounds, and cultures. Therefore, different people may have different emotional experiences even when faced with similar circumstances. Over time, several different theories of emotion, shown in figure 10.21, have been proposed to explain how the various components of emotion interact with one another.

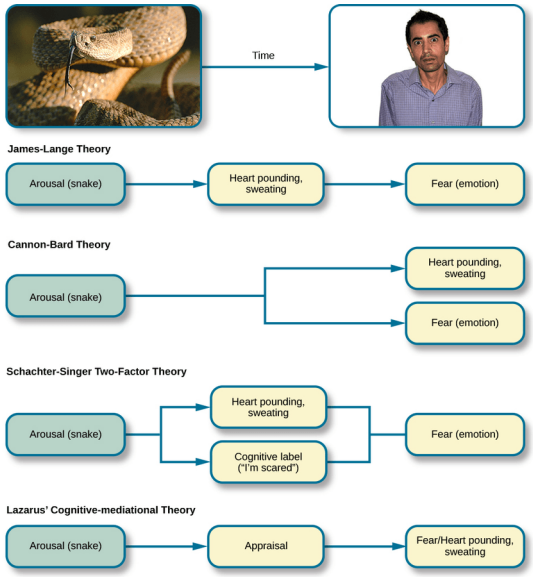


Figure 10.21 This figure illustrates the major assertions of the James-Lange, Cannon-Bard, and Schachter-Singer two-factor theories of emotion. (credit "snake": modification of work by "tableatny"/Flickr; credit "face": modification of work by Cory Zanker)

The **James-Lange theory** of emotion asserts that emotions arise from physiological arousal. Recall what you have learned about the sympathetic nervous system and our fight or flight response when threatened. If you were to encounter some threat in your environment, like a venomous snake in your backyard, your sympathetic nervous system would initiate significant physiological arousal, which would make your heart race and increase your respiration rate. According to the James-Lange theory of emotion, you would only experience a feeling of fear after this physiological arousal had taken place. Furthermore, different arousal patterns would be associated with different feelings.

Other theorists, however, doubted that the physiological arousal that occurs with different types of emotions is distinct enough to result in the wide variety of emotions that we experience. Thus, the **Cannon-Bard theory** of emotion was developed. According to this view, physiological arousal and emotional experience occur simultaneously, yet independently (Lang, 1994). So, when you see the venomous snake, you feel fear at exactly the same time that your body mounts its fight or flight response. This emotional reaction would be separate and independent of the physiological arousal, even though they co-occur.

Does smiling make you happy? Alternatively, does being happy make you smile? The facial feedback hypothesis proposes that your facial expression can actually affect your emotional experience (Adelman & Zajonc, 1989; Boiger & Mesquita, 2012; Buck, 1980; Capella, 1993; Soussignan, 2001). Research investigating the facial feedback hypothesis suggested that suppression of facial expression of emotion lowered the intensity of some emotions experienced by participants (Davis, Senghas, & Ochsner, 2009). Havas, Glenberg, Gutowski, Lucarelli, and Davidson (2010) used Botox injections to paralyze facial muscles and limit facial expressions, including frowning, and they found that depressed people reported less depression after their frowning muscles were paralyzed. Other research found that the intensities of facial expressions affected the emotional reactions (Soussignan, 2002). In other words, if something insignificant occurs and you smile as if you just won lottery, you will actually be happier about the little thing than you would be if you only had a tiny smile. Conversely, if you walk around frowning all the time, it might cause you to have less positive emotions than you would if you had smiled. Interestingly, Soussignan (2002) also reported physiological arousal differences associated with the intensities of one type of smile.

G. Marañon Posadillo was a Spanish physician who studied the psychological effects of adrenaline to create a model for the experience of emotion. Marañon's model preceded Schachter's two-factor or arousal-cognition theory of emotion (Cornelius, 1991). The Schachter-Singer two-factor theory of emotion is another variation on theories of emotions that takes into account

both physiological arousal and the emotional experience. According to this theory, emotions are composed of two factors: physiological and cognitive. In other words, physiological arousal is interpreted in context to produce the emotional experience. In revisiting our example involving the venomous snake in your backyard, the two-factor theory maintains that the snake elicits sympathetic nervous system activation that is labeled as fear given the context, and our experience is that of fear. If you had labeled your sympathetic nervous system activation as joy, you would have experienced joy. The Schachter-Singer two-factor theory depends on labeling the physiological experience, which is a type of cognitive appraisal.

Magda Arnold was the first theorist to offer an exploration of the meaning of appraisal, and to present an outline of what the appraisal process might be and how it relates to emotion (Roseman & Smith, 2001). The key idea of appraisal theory is that you have thoughts (a cognitive appraisal) before you experience an emotion, and the emotion you experience depends on the thoughts you had (Frijda, 1988; Lazarus, 1991). If you think something is positive, you will have more positive emotions about it than if your appraisal was negative, and the opposite is true. Appraisal theory explains the way two people can have two completely different emotions regarding the same event. For example, suppose your psychology instructor selected you to lecture on emotion; you might see that as positive, because it represents an opportunity to be the center of attention, and you would experience happiness. However, if you dislike speaking in public, you could have a negative appraisal and experience discomfort.

Schachter and Singer believed that physiological arousal is very similar across the different types of emotions that we experience, and therefore, the cognitive appraisal of the situation is critical to the actual emotion experienced. In fact, it might be possible to misattribute arousal to an emotional experience if the circumstances were right (Schachter & Singer, 1962). They performed a clever experiment to test their idea. A group of men participating in the experiment were randomly assigned to one of several groups. Some of the participants received injections of epinephrine that caused bodily changes that mimicked the fight-or-flight response of the sympathetic nervous system; however, only some of these men were told to expect these reactions as side effects of the injection. The other men that received injections of epinephrine were told either that the injection would have no side effects or that it would result in a side effect unrelated to a sympathetic response, such as itching feet or headache. After receiving these injections, participants waited in a room with someone else they thought was another subject in the research project. In reality, the other person was a confederate (someone working on behalf of) of the researcher. The confederate engaged in scripted displays of euphoric or angry behavior (Schachter & Singer, 1962).

When those participants who were told that they should expect to feel symptoms of physiological arousal were asked about any emotional changes that they had experienced related to either euphoria or anger (depending on the way the confederate behaved), they reported none. However, the men who weren't expecting physiological arousal as a function of the injection were more likely to report that they experienced euphoria or anger as a function of their assigned confederate's behavior. While everyone who received an injection of epinephrine experienced the same physiological arousal, only those who were not expecting the arousal used context to interpret the arousal as a change in emotional state (Schachter & Singer, 1962).

Strong emotional responses are associated with strong physiological arousal, which caused some theorists to suggest that the signs of physiological arousal, including increased heart rate, respiration rate, and sweating, might be used to determine whether someone is telling the truth or not. The assumption is that most of us would show signs of physiological arousal if we were being dishonest with someone. A polygraph, or lie detector test, measures the physiological arousal of an individual responding to a series of questions. Someone trained in reading these tests would look for answers to questions that are associated with increased levels of arousal as potential signs that the respondent may have been dishonest on those answers. While polygraphs are still commonly used, their validity and accuracy are highly questionable because there is no evidence that lying is associated with any particular pattern of physiological arousal (Saxe & Ben-Shakhar, 1999).

The relationship between our experiencing of emotions and our cognitive processing of them, and the order in which these occur, remains a topic of research and debate. Lazarus (1991) developed the cognitive-mediational theory that asserts our emotions are determined by our appraisal of the stimulus. This appraisal mediates between the stimulus and the emotional response, and it is immediate and often unconscious. In contrast to the Schachter-Singer model, the appraisal precedes a cognitive label. You will learn more about Lazarus's appraisal concept when you study stress, health, and lifestyle. However, there are other views of emotions that also emphasize the cognitive processes.

Return to the example of being asked to lecture by your professor. Even if you do not enjoy speaking in public, you probably could manage to do it. You would purposefully control your emotions, which would allow you to speak, but we constantly regulate our emotions, and much of our emotion regulation occurs without us actively thinking about it. Mauss and her colleagues studied automatic emotion regulation (AER), which refers to the non-deliberate control of emotions. It is simply not reacting with your emotions, and AER can affect all aspects of emotional processes. AER can influence the things you attend to, your appraisal, your choice to engage in an emotional experience, and your behaviors after an emotion is experienced (Mauss, Bunge, & Gross, 2007; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). AER is similar to other automatic cognitive processes in which sensations activate knowledge structures that affect functioning. These knowledge structures can include concepts, schemas, or scripts.

The idea of AER is that people develop an automatic process that works like a script or schema, and the process does not require deliberate thought to regulate emotions. AER works like riding a bicycle. Once you develop the process, you just do it without thinking about it. AER can be adaptive or maladaptive and has important health implications (Hopp, Troy, & Mauss, 2011). Adaptive AER leads to better health outcomes than maladaptive AER, primarily due to experiencing or mitigating stressors better than people with maladaptive AERs (Hopp, Troy, & Mauss, 2011). Alternatively, maladaptive AERs may be critical for maintaining some psychological disorders (Hopp, Troy, & Mauss, 2011). Mauss and her colleagues found that strategies could reduce negative emotions, which in turn should increase psychological health (Mauss, Cook, Cheng, & Gross, 2007; Mauss, Cook, & Gross, 2007; Shallcross, Troy, Boland, & Mauss, 2010; Troy, Shallcross, & Mauss, 2013; Troy, Wilhelm, Shallcross, & Mauss, 2010). Mauss has also suggested there are problems with the way emotions are measured, but she believes most of the aspects of emotions that are typically measured are useful (Mauss, et al., 2005; Mauss & Robinson, 2009). However, another way of considering emotions challenges our entire understanding of emotions.

After about three decades of interdisciplinary research, Barrett argued that we do not understand emotions. She proposed that emotions were not built into your brain at birth, but rather they were constructed based on your experiences. Emotions in the constructivist theory are predictions that construct your experience of the world. In chapter 7 you learned that concepts are categories or groupings of linguistic information, images, ideas, or memories, such as life experiences. Barrett extended that to include emotions as concepts that are predictions (Barrett, 2017). Two identical physiological states can result in different emotional states depending on your predictions. For example, your brain predicting a churning stomach in a bakery could lead to you constructing hunger. However, your brain predicting a churning stomach while you were waiting for medical test results could lead your brain to construct worry. Thus, you can construct two different emotions from the same physiological sensations. Rather than emotions being something over which you have no control, you can control and influence your emotions.

Note

Watch this video in which Dr. Barrett explains constructed emotions to learn more.

Two other prominent views arise from the work of Robert Zajonc and Joseph LeDoux. Zajonc asserted that some emotions occur separately from or prior to our cognitive interpretation of them, such as feeling fear in response to an unexpected loud sound (Zajonc, 1998). He also believed in what we might casually refer to as a gut feeling—that we can experience an instantaneous and unexplainable like or dislike for someone or something (Zajonc, 1980). LeDoux also views some emotions as requiring no cognition: some emotions completely bypass contextual interpretation. His research into the neuroscience of emotion has demonstrated the amygdala's primary role in fear (Cunha, Monfils, & LeDoux, 2010; LeDoux 1996, 2002). A fear stimulus is processed by the brain through one of two paths: from the thalamus (where it is perceived) directly to the amygdala or from the thalamus through the cortex and then to the amygdala. The first path is quick, while the second enables more processing about details of the stimulus. In the following section, we will look more closely at the neuroscience of emotional response.

The Biology of Emotions

Earlier, you learned about the **limbic system**, which is the area of the brain involved in emotion and memory (See figure 10.22). The limbic system includes the hypothalamus, thalamus, amygdala, and the hippocampus. The hypothalamus plays a role in the activation of the sympathetic nervous system that is a part of any given emotional reaction. The thalamus serves as a sensory relay center whose neurons project to both the amygdala and the higher cortical regions for further processing. The amygdala plays a role in processing emotional information and sending that information on to cortical structures (Fossati, 2012).The hippocampus integrates emotional experience with cognition (Femenía, Gómez-Galán, Lindskog, & Magara, 2012).

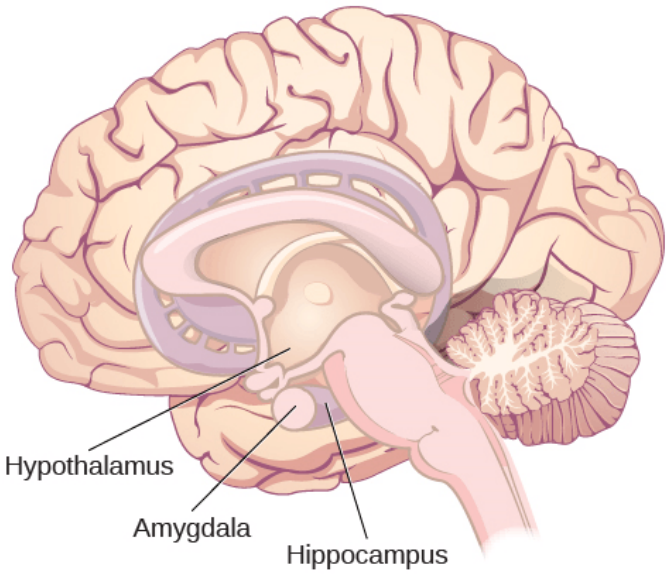


Figure 10.22 The limbic system, which includes the hypothalamus, thalamus, amygdala, and the hippocampus, is involved in mediating emotional response and memory.

Link to Learning

Work through this Open Colleges interactive 3D brain simulator for a refresher on the brain's parts and their functions. To begin, click the “Start Exploring” button. To access the limbic system, click the plus sign in the right-hand menu (set of three tabs).

Amygdala

The **amygdala** has received a great deal of attention from researchers interested in understanding the biological basis for emotions, especially fear and anxiety (Blackford & Pine, 2012; Goosens & Maren, 2002; Maren, Phan, & Liberzon, 2013). The amygdala is composed of various subnuclei, including the basolateral complex and the central nucleus (See figure 10.23). The **basolateral complex** has dense connections with a variety of sensory areas of the brain. It is critical for classical conditioning and for attaching emotional value to learning processes and memory. The **central nucleus** plays a role in attention, and it has connections with the hypothalamus and various brainstem areas to regulate the autonomic nervous and endocrine systems’ activity (Pessoa, 2010).

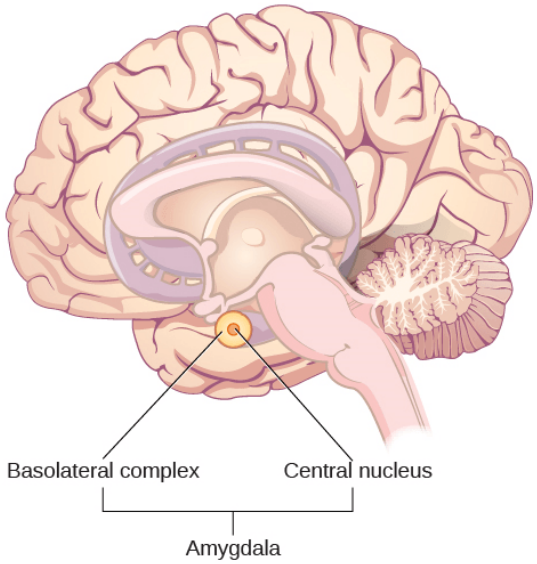


Figure 10.23 The anatomy of the basolateral complex and central nucleus of the amygdala are illustrated in this diagram.

Animal research has demonstrated that there is increased activation of the amygdala in rat pups that have odor cues paired with electrical shock when their mother is absent. This leads to an aversion to the odor cue that suggests the rats learned to fear the odor cue. Interestingly, when the mother was present, the rats actually showed a preference for the odor cue despite its association with an electrical shock. This preference was associated with no increases in amygdala activation. This suggests a differential effect on the amygdala by the *context* (the presence or absence of the mother) determined whether the pups learned to fear the odor or to be attracted to it (Moriceau & Sullivan, 2006).

Raineki, Cortés, Belnoue, and Sullivan (2012) demonstrated that, in rats, negative early life experiences could alter the function of the amygdala and result in adolescent patterns of behavior that mimic human mood disorders. In this study, rat pups received either abusive or normal treatment during postnatal days $8 - 12$. There were two forms of abusive treatment. The first form of abusive treatment had an insufficient bedding condition. The mother rat had insufficient bedding material in her cage to build a proper nest that resulted in her spending more time away from her pups trying to construct a nest and less times nursing her pups. The second form of abusive treatment had an associative learning task that involved pairing odors and an electrical stimulus in the absence of the mother, as described above. The control group was in a cage with sufficient bedding and was left undisturbed with their mothers during the same time period. The rat pups that experienced abuse were much more likely to exhibit depressive-like symptoms during adolescence when compared to controls. These depressive-like behaviors were associated with increased activation of the amygdala.

Human research also suggests a relationship between the amygdala and psychological disorders of mood or anxiety. Changes in amygdala structure and function have been demonstrated in adolescents who are either at-risk or have been diagnosed with various mood and/or anxiety disorders (Miguel-Hidalgo, 2013; Qin et al., 2013). It has also been suggested that functional differences in the amygdala could serve as a biomarker to differentiate individuals suffering from bipolar disorder from those suffering from major depressive disorder (Fournier, Keener, Almeida, Kronhaus, & Phillips, 2013).

Hippocampus

As mentioned earlier, the **hippocampus** is also involved in emotional processing. Like the amygdala, research has demonstrated that hippocampal structure and function are linked to a variety of mood and anxiety disorders. Individuals suffering from posttraumatic stress disorder (PTSD) show marked reductions in the volume of several parts of the hippocampus, which may result from decreased levels of neurogenesis and dendritic branching (the generation of new neurons and the generation of new dendrites in existing neurons, respectively) (Wang et al., 2010). While it is impossible to make a causal claim with correlational research like this, studies have demonstrated behavioral improvements and hippocampal volume increases following either pharmacological or cognitive-behavioral therapy in individuals suffering from PTSD (Bremner & Vermetten, 2004; Levy-Gigi, Szabó, Kelemen, & Kéri, 2013).

Facial Expression and Recognition of Emotions

Culture can impact the way in which people display emotion. A **cultural display rule** is one of a collection of culturally specific standards that govern the types and frequencies of displays of emotions that are acceptable (Malatesta & Haviland, 1982). Therefore, people from varying cultural backgrounds can have very different cultural display rules of emotion. For example, research has shown that individuals from the United States express negative emotions like fear, anger, and disgust both alone and in the presence of others, while Japanese individuals only do so while alone (Matsumoto, 1990). Furthermore, individuals from cultures that tend to emphasize social cohesion are more likely to engage in suppression of emotional reaction so they can evaluate which response is most appropriate in a given context (Matsumoto, Yoo, & Nakagawa, 2008).

Other distinct cultural characteristics might be involved in emotionality. For instance, there may be gender differences involved in emotional processing. While research into gender differences in emotional display is equivocal, there is some evidence that men and women may differ in regulation of emotions (McRae, Ochsner, Mauss, Gabrieli, & Gross, 2008).

Paul Ekman (1972) researched a New Guinea man who was living in a preliterate culture using stone implements, and which was isolated and had never seen any outsiders before. Ekman asked the man to show what his facial expression would be if: (1) friends visited, (2) his child had just died, (3) he was about to fight, (4) he stepped on a smelly dead pig. After Ekman's return from New Guinea, he researched facial expressions for more than four decades. Despite different emotional display rules, our ability to recognize and produce facial expressions of emotion appears to be universal. In fact, even congenitally blind individuals produce the same facial expression of emotions, despite their never having the opportunity to observe these facial displays of emotion in other people. This would seem to suggest that the pattern of activity in facial muscles involved in generating emotional expressions is universal, and indeed, this idea was suggested in the late 19th century in Charles Darwin's book *The Expression of Emotions in Man and Animals* (1872). In fact, there is substantial evidence for seven universal emotions that are each associated with distinct facial expressions. These include: happiness, surprise, sadness, fright, disgust, contempt, and anger (Figure 10.24) (Ekman & Keltner, 1997).

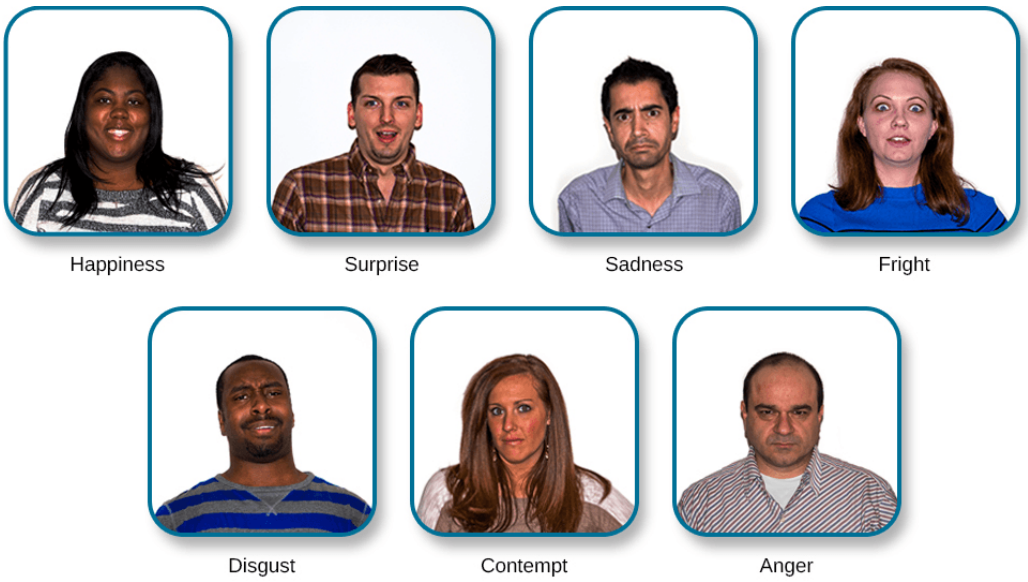


Figure 10.24 The seven universal facial expressions of emotion are shown. (credit: modification of work by Cory Zanker)

Of course, emotion is not only displayed through facial expression. We also use the tone of our voices, various behaviors, and body language to communicate information about our emotional states. **Body language** is the expression of emotion in terms of body position or movement. Research suggests that we are quite sensitive to the emotional information communicated through body language, even if we're not consciously aware of it (de Gelder, 2006; Tamietto et al., 2009).

Link to Learning

Watch this short CNN video about body language in the tense situation of a political debate to learn more. Watch this video to learn how to apply the same concepts to more everyday situations.

CONNECT THE CONCEPTS: Autism Spectrum Disorder and Expression of Emotions

Autism spectrum disorder (ASD) is a set of neurodevelopmental disorders characterized by repetitive behaviors and communication and social problems. Children who have autism spectrum disorders have difficulty recognizing the emotional states of others, and research has shown that this may stem from an inability to distinguish various nonverbal expressions of emotion (i.e., facial expressions) from one another (Hobson, 1986). In addition, there is evidence to suggest that autistic individuals also have difficulty expressing emotion through tone of voice and by producing facial expressions (Macdonald et al., 1989). Difficulties with emotional recognition and expression may contribute to the impaired social interaction and communication that characterize autism; therefore, various therapeutic approaches have been explored to address these difficulties. Various educational curricula, cognitive-behavioral therapies, and pharmacological therapies have shown some promise in helping autistic individuals process emotionally relevant information (Bauminger, 2002; Golan & Baron-Cohen, 2006; Guastella et al., 2010).

Emotion regulation describes how people respond to situations and experiences by modifying their emotional experiences and expressions. Covert emotion regulation strategies are those that occur within the individual, while overt strategies involve others or actions (such as seeking advice or consuming alcohol). Aldao and Dixon (2014) studied the relationship between overt emotional regulation strategies and psychopathology. They researched how 218 undergraduate students reported their use of covert and overt strategies and their reported symptoms associated with selected mental disorders, and found that overt emotional regulation strategies were better predictors of psychopathology than covert strategies. Another study examined the relationship between pregaming (the act of drinking heavily before a social event) and two emotion regulation strategies to understand how these might contribute to alcohol-related problems; results suggested a relationship but a complicated one (Pederson, 2016). Further research is needed in these areas to better understand patterns of adaptive and maladaptive emotion regulation (Aldao & Dixon-Gordon, 2014).

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17.3: Positive Emotions - The Power of Happiness

Learning Objectives

1. Understand the important role of positive emotions and happiness in responding to stress.
2. 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 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 et al. (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 college 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 college 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 8 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)[1], 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 et al. (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 favors 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 17.3.11, 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 the United States between 1946 to 1990, there was no increase in reports of well-being by the citizens of these countries. Americans 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.

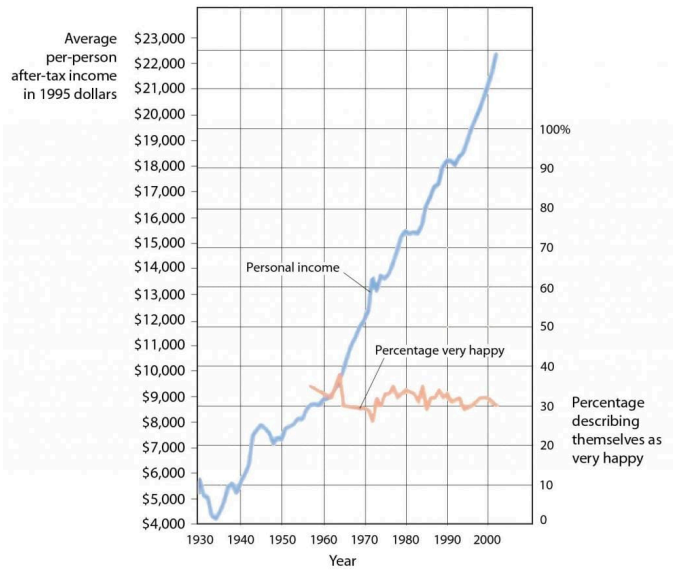


Figure 17.3.11: Income and Happiness. Although personal income keeps rising, happiness does not. Layard, R. (2005). Happiness: Lessons from a new science. New York, NY: Penguin.

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 can't 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?

[1]Pew Research Center (2006, February 13). Are we happy yet? Retrieved from pewresearch.org/pubs/301/are-we-happy-yet.

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CHAPTER 18: STRESS RESILIENCY

18.1: Stress Resiliency
18.2: What Is Stress?
18.3: Stressors
18.4: Stress and Illness
18.5: Regulation of Stress

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18.1: Stress Resiliency

Chapter Outline

14.1 What Is Stress?

14.2 Stressors

14.3 Stress and Illness

14.4 Regulation of Stress

14.5 The Pursuit of Happiness

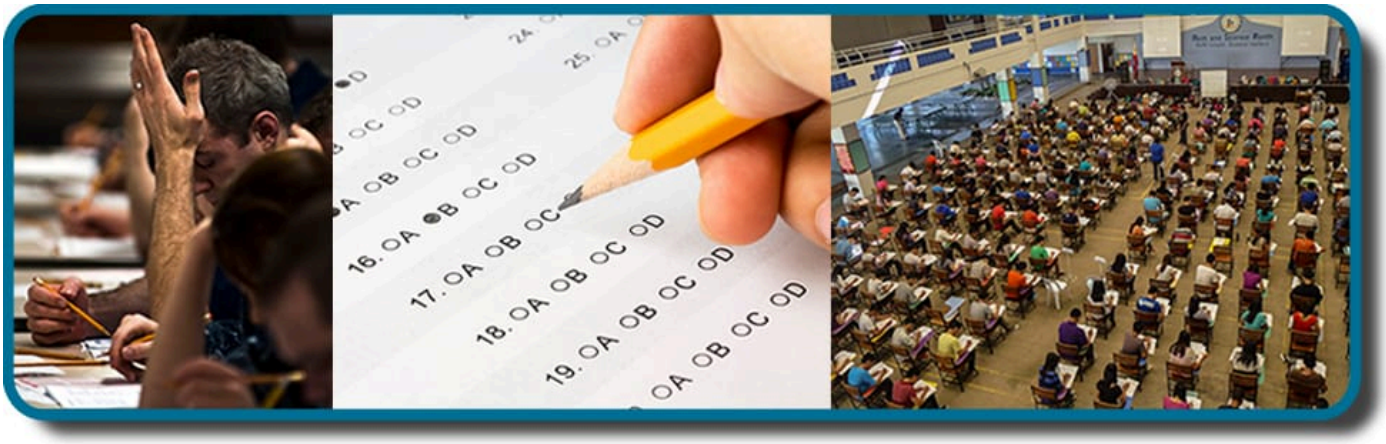


Figure 18.1.1: Exams are a stressful, but unavoidable, element of college life. (credit “left”: modification of work by Travis K. Mendoza; credit “center”: modification of work by “albertogp123”/Flickr; credit “right”: modification of work by Jeffrey Pioquinto, SJ)

Few would deny that today’s college students are under a lot of pressure. In addition to many usual stresses and strains incidental to the college experience (e.g., exams, term papers, and the dreaded freshman 15), students today are faced with increased college tuitions, burdensome debt, and difficulty finding employment after graduation. A significant population of non-traditional college students may face additional stressors, such as raising children or holding down a full-time job while working toward a degree.

Of course, life is filled with many additional challenges beyond those incurred in college or the workplace. We might have concerns with financial security, difficulties with friends or neighbors, family responsibilities, and we may not have enough time to do the things we want to do. Even minor hassles—losing things, traffic jams, and loss of internet service—all involve pressure and demands that can make life seem like a struggle and that can compromise our sense of well-being. That is, all can be stressful in some way.

Scientific interest in stress, including how we adapt and cope, has been longstanding in psychology; indeed, after nearly a century of research on the topic, much has been learned and many insights have been developed. This chapter examines stress and highlights our current understanding of the phenomenon, including its psychological and physiological natures, its causes and consequences, and the steps we can take to master stress rather than become its victim.

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18.2: What Is Stress?

Learning Objectives

- Differentiate between stimulus-based and response-based definitions of stress
- Define stress as a process
- Differentiate between good stress and bad stress
- Describe the early contributions of Walter Cannon and Hans Selye to the stress research field
- Understand the physiological basis of stress and describe the general adaptation syndrome

The term **stress** as it relates to the human condition first emerged in scientific literature in the 1930s, but it did not enter the popular vernacular until the 1970s (Lyon, 2012). Today, we often use the term loosely in describing a variety of unpleasant feeling states; for example, we often say we are stressed out when we feel frustrated, angry, conflicted, overwhelmed, or fatigued. Despite the widespread use of the term, stress is a fairly vague concept that is difficult to define with precision.

Researchers have had a difficult time agreeing on an acceptable definition of stress. Some have conceptualized stress as a demanding or threatening event or situation (e.g., a high-stress job, overcrowding, and long commutes to work). Such conceptualizations are known as stimulus-based definitions because they characterize stress as a stimulus that causes certain reactions. Stimulus-based definitions of stress are problematic, however, because they fail to recognize that people differ in how they view and react to challenging life events and situations. For example, a conscientious student who has studied diligently all semester would likely experience less stress during final exams week than would a less responsible, unprepared student.

Others have conceptualized stress in ways that emphasize the physiological responses that occur when faced with demanding or threatening situations (e.g., increased arousal). These conceptualizations are referred to as response-based definitions because they describe stress as a response to environmental conditions. For example, the endocrinologist Hans **Selye**, a famous stress researcher, once defined stress as the "response of the body to any demand, whether it is caused by, or results in, pleasant or unpleasant conditions" (Selye, 1976, p. 74). Selye's definition of stress is response-based in that it conceptualizes stress chiefly in terms of the body's physiological reaction to any demand that is placed on it. Neither stimulus-based nor response-based definitions provide a complete definition of stress. Many of the physiological reactions that occur when faced with demanding situations (e.g., accelerated heart rate) can also occur in response to things that most people would not consider to be genuinely stressful, such as receiving unanticipated good news: an unexpected promotion or raise.

A useful way to conceptualize **stress** is to view it as a process whereby an individual perceives and responds to events that he appraises as overwhelming or threatening to his well-being (Lazarus & Folkman, 1984). A critical element of this definition is that it emphasizes the importance of how we appraise—that is, judge—demanding or threatening events (often referred to as **stressors**); these appraisals, in turn, influence our reactions to such events. Two kinds of appraisals of a stressor are especially important in this regard: primary and secondary appraisals. A **primary appraisal** involves judgment about the degree of potential harm or threat to well-being that a stressor might entail. A stressor would likely be appraised as a threat if one anticipates that it could lead to some kind of harm, loss, or other negative consequence; conversely, a stressor would likely be appraised as a challenge if one believes that it carries the potential for gain or personal growth. For example, an employee who is promoted to a leadership position would likely perceive the promotion as a much greater threat if she believed the promotion would lead to excessive work demands than if she viewed it as an opportunity to gain new skills and grow professionally. Similarly, a college student on the cusp of graduation may face the change as a threat or a challenge (See figure 14.2 below).



Figure 14.2 Graduating from college and entering the workforce can be viewed as either a threat (loss of financial support) or a challenge (opportunity for independence and growth). (credit: Timothy Zanker)

The perception of a threat triggers a **secondary appraisal**: judgment of the options available to cope with a stressor, as well as perceptions of how effective such options will be (Lyon, 2012) (See figure 14.3). As you may recall from what you learned about self-efficacy, an individual's belief in his ability to complete a task is important (Bandura, 1994). A threat tends to be viewed as less catastrophic if one believes something can be done about it (Lazarus & Folkman, 1984). Imagine that two middle-aged women, Robin and Maria, perform breast self-examinations one morning and each woman notices a lump on the lower region of her left breast. Although both women view the breast lump as a potential threat (primary appraisal), their secondary appraisals differ considerably. In considering the breast lump, some of the thoughts racing through Robin's mind are, "Oh my God, I could have breast cancer! What if the cancer has spread to the rest of my body and I cannot recover? What if I have to go through chemotherapy? I've heard that experience is awful! What if I have to quit my job? My husband and I won't have enough money to pay the mortgage. Oh, this is just horrible...I can't deal with it!" On the other hand, Maria thinks, "Hmm, this may not be good. Although most times these things turn out to be benign, I need to have it checked out. If it turns out to be breast cancer, there are doctors who can take care of it because the medical technology today is quite advanced. I'll have a lot of different options, and I'll be just fine." Clearly, Robin and Maria have different outlooks on what might turn out to be a very serious situation: Robin seems to think that little could be done about it, whereas Maria believes that, worst case scenario, a number of options that are likely to be effective would be available. As such, Robin would clearly experience greater stress than would Maria.

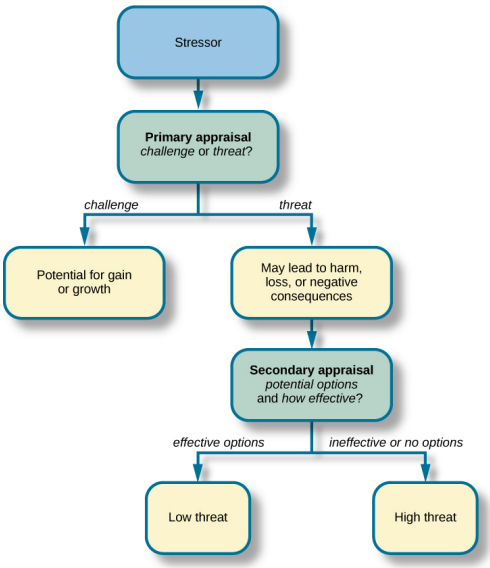


Figure 14.3 When encountering a stressor, a person judges its potential threat (primary appraisal) and then determines if effective options are available to manage the situation. Stress is likely to result if a stressor is perceived as extremely threatening or threatening with few or no effective coping options available.

To be sure, some stressors are inherently more stressful than others in that they are more threatening and leave less potential

for variation in cognitive appraisals (e.g., objective threats to one's health or safety). Nevertheless, appraisal will still play a role in augmenting or diminishing our reactions to such events (Everly & Lating, 2002).

If a person appraises an event as harmful and believes that the demands imposed by the event exceed the available resources to manage or adapt to it, the person will subjectively experience a state of stress. In contrast, if one does not appraise the same event as harmful or threatening, she is unlikely to experience stress. According to this definition, environmental events trigger stress reactions by the way they are interpreted and the meanings they are assigned. In short, stress is largely in the eye of the beholder: it's not so much what happens to you as it is how you respond (Selye, 1976).

Good Stress?

Although stress carries a negative connotation, at times it may be of some benefit. Stress can motivate us to do things in our best interests, such as study for exams, visit the doctor regularly, exercise, and perform to the best of our ability at work. Indeed, Selye (1974) pointed out that not all stress is harmful. He argued that stress can sometimes be a positive, motivating force that can improve the quality of our lives. This kind of stress, which Selye called **eustress** (from the Greek *eu* = "good"), is a good kind of stress associated with positive feelings, optimal health, and performance. A moderate amount of stress can be beneficial in challenging situations. For example, athletes may be motivated and energized by pregame stress, and students may experience similar beneficial stress before a major exam. Indeed, research shows that moderate stress can enhance both immediate and delayed recall of educational material. Male participants in one study who memorized a scientific text passage showed improved memory of the passage immediately after exposure to a mild stressor as well as one day following exposure to the stressor (Hupbach & Fieman, 2012).

Increasing one's level of stress will cause performance to change in a predictable way. As shown in figure 14.4, as stress increases, so do performance and general well-being (eustress); when stress levels reach an optimal level (the highest point of the curve), performance reaches its peak. A person at this stress level is colloquially at the top of his game, meaning he feels fully energized, focused, and can work with minimal effort and maximum efficiency. But when stress exceeds this optimal level, it is no longer a positive force—it becomes excessive and debilitating, or what Selye termed **distress** (from the Latin *dis* = "bad"). People who reach this level of stress feel burned out; they are fatigued, exhausted, and their performance begins to decline. If the stress remains excessive, health may begin to erode as well (Everly & Lating, 2002).

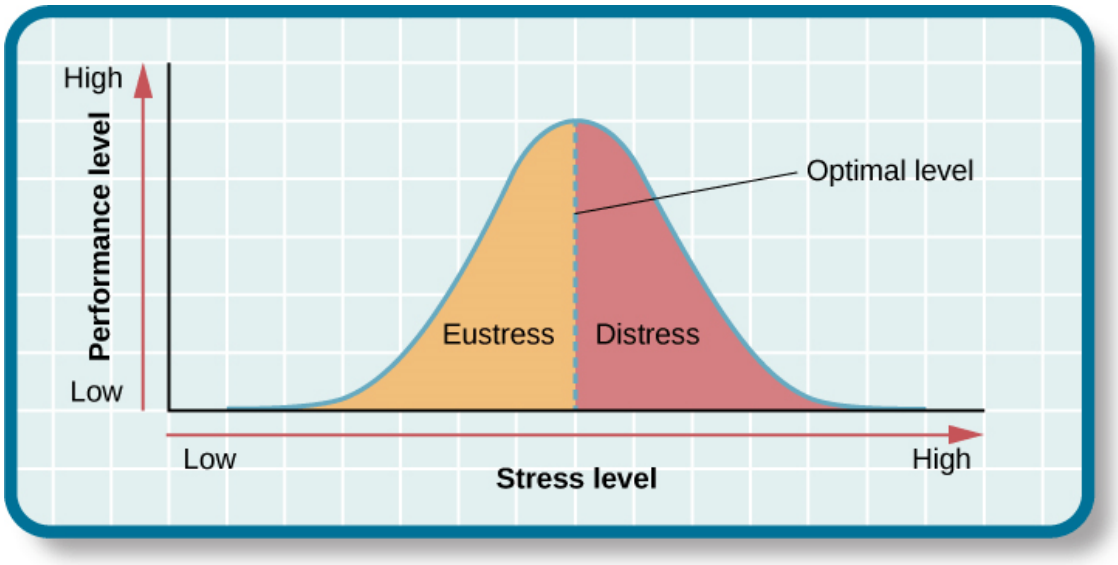


Figure 14.4 As the stress level increases from low to moderate, so does performance (eustress). At the optimal level (the peak of the curve), performance has reached its peak. If stress exceeds the optimal level, it will reach the distress region, where it will become excessive and debilitating, and performance will decline (Everly & Lating, 2002).

The Prevalence of Stress

Stress is everywhere and, as shown in figure 14.5, it has been on the rise over the last several years. Each of us is acquainted with stress—some are more familiar than others. In many ways, stress feels like a load you just can't carry—a feeling you experience

when, for example, you have to drive somewhere in a crippling blizzard, when you wake up late the morning of an important job interview, when you run out of money before the next pay period, and before taking an important exam for which you realize you are not fully prepared.

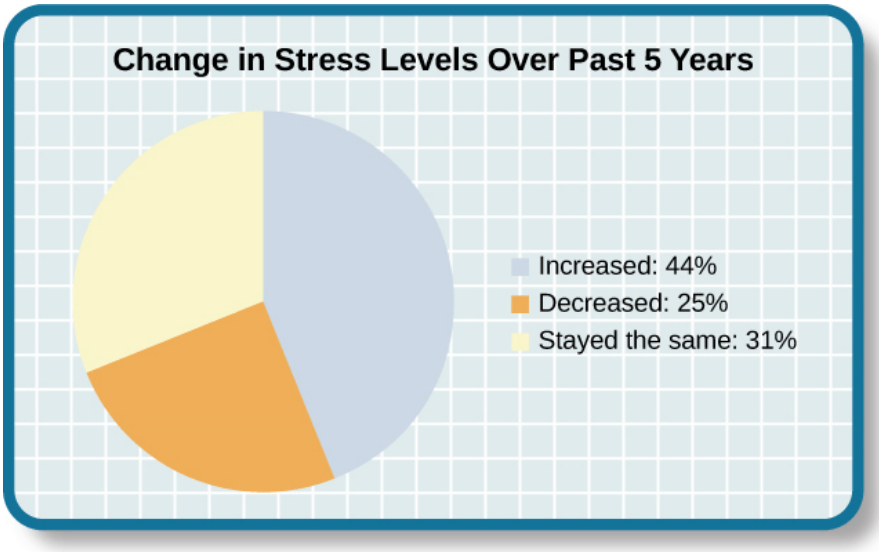


Figure 14.5 Nearly half of U.S. adults indicated that their stress levels have increased over the last five years (Neelakantan, 2013).

Stress is an experience that evokes a variety of responses, including those that are physiological (e.g., accelerated heart rate, headaches, or gastrointestinal problems), cognitive (e.g., difficulty concentrating or making decisions), and behavioral (e.g., drinking alcohol, smoking, or taking actions directed at eliminating the cause of the stress). Although stress can be positive at times, it can have deleterious health implications, contributing to the onset and progression of a variety of physical illnesses and diseases (Cohen & Herbert, 1996).

The scientific study of how stress and other psychological factors impact health falls within the realm of **health psychology**, a subfield of psychology devoted to understanding the importance of psychological influences on health, illness, and how people respond when they become ill (Taylor, 1999). Health psychology emerged as a discipline in the 1970s, a time during which there was increasing awareness of the role behavioral and lifestyle factors play in the development of illnesses and diseases (Straub, 2007). In addition to studying the connection between stress and illness, health psychologists investigate issues such as why people make certain lifestyle choices (e.g., smoking or eating unhealthy food despite knowing the potential adverse health implications of such behaviors). Health psychologists also design and investigate the effectiveness of interventions aimed at changing unhealthy behaviors. Perhaps one of the more fundamental tasks of health psychologists is to identify which groups of people are especially at risk for negative health outcomes, based on psychological or behavioral factors. For example, measuring differences in stress levels among demographic groups and how these levels change over time can help identify populations who may have an increased risk for illness or disease.

Figure 14.6 depicts the results of three national surveys in which several thousand individuals from different demographic groups completed a brief stress questionnaire; the surveys were administered in 1983, 2006, and 2009 (Cohen & Janicki-Deverts, 2012). All three surveys demonstrated higher stress in women than in men. Unemployed individuals reported high levels of stress in all three surveys, as did those with less education and income; retired persons reported the lowest stress levels. However, from 2006 to 2009 the greatest increase in stress levels occurred among men, Whites, people aged $45-64$, college graduates, and those with full-time employment. One interpretation of these findings is that concerns surrounding the 2008–2009 economic downturn (e.g., threat of or actual job loss and substantial loss of retirement savings) may have been especially stressful to White, college-educated, employed men with limited time remaining in their working careers.

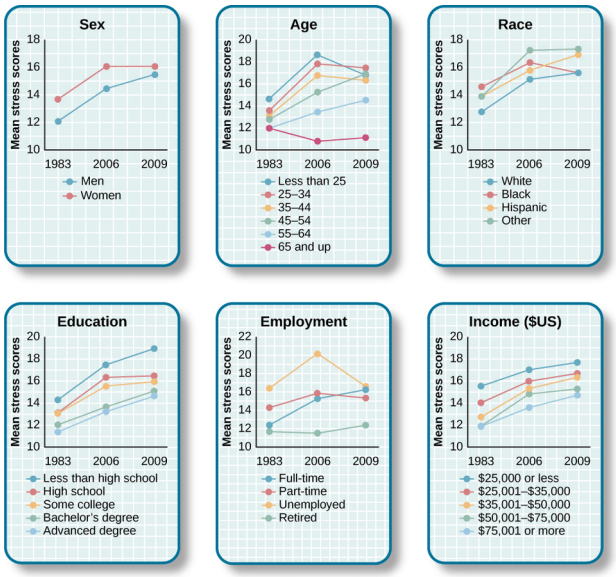


Figure 14.6 The charts above, adapted from Cohen & Janicki-Deverts (2012), depict the mean stress level scores among different demographic groups during the years 1983, 2006, and 2009. Across categories of sex, age, race, education level, employment status, and income, stress levels generally show a marked increase over this quarter-century time span.

Early contributions to the Study of Stress

As previously stated, scientific interest in stress goes back nearly a century. One of the early pioneers in the study of stress was Walter **Cannon**, an eminent American physiologist at Harvard Medical School (See figure 14.7). In the early part of the 20th century, Cannon was the first to identify the body's physiological reactions to stress.



Figure 14.7 Harvard physiologist Walter Cannon first articulated and named the fight-or-flight response, the nervous system's sympathetic response to a significant stressor.

Cannon and the Fight-or-Flight Response

Imagine that you are hiking in the beautiful mountains of Colorado on a warm and sunny spring day. At one point during your hike, a large, frightening-looking black bear appears from behind a stand of trees and sits about 50 yards from you. The bear notices you, sits up, and begins to lumber in your direction. In addition to thinking, "This is definitely not good," a constellation of physiological reactions begins to take place inside you. Prompted by a deluge of epinephrine (adrenaline) and norepinephrine

(noradrenaline) from your adrenal glands, your pupils begin to dilate. Your heart starts to pound and speeds up, you begin to breathe heavily and perspire, you get butterflies in your stomach, and your muscles become tense, preparing you to take some kind of direct action. Cannon proposed that this reaction, which he called the **fight-or-flight response**, occurs when a person experiences very strong emotions—especially those associated with a perceived threat (Cannon, 1932). During the fight-or-flight response, the body is rapidly aroused by activation of both the sympathetic nervous system and the endocrine system (See figure 14.8). This arousal helps prepare the person to either fight or flee from a perceived threat.

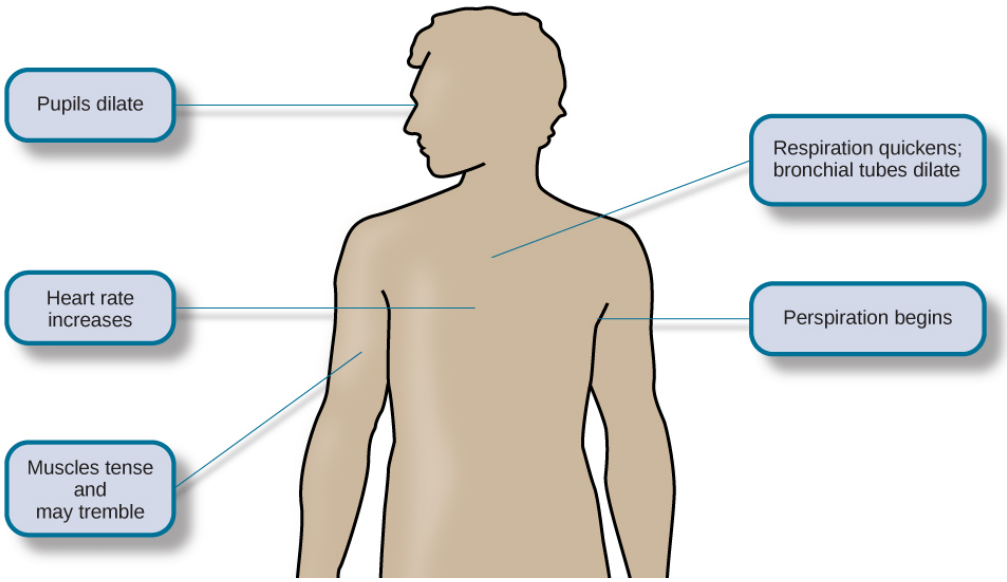


Figure 14.8 Fight or flight is a physiological response to a stressor.

According to Cannon, the fight-or-flight response is a built-in mechanism that assists in maintaining homeostasis—an internal environment in which physiological variables such as blood pressure, respiration, digestion, and temperature are stabilized at levels optimal for survival. Thus, Cannon viewed the fight-or-flight response as adaptive because it enables us to adjust internally and externally to changes in our surroundings, which is helpful in species survival.

Selye and the General Adaptation Syndrome

Another important early contributor to the stress field was Hans **Selye**, mentioned earlier. He would eventually become one of the world's foremost experts in the study of stress (See figure 14.9). As a young assistant in the biochemistry department at McGill University in the 1930s, Selye was engaged in research involving sex hormones in rats. Although he was unable to find an answer for what he was initially researching, he incidentally discovered that when exposed to prolonged negative stimulation (stressors)—such as extreme cold, surgical injury, excessive muscular exercise, and shock—the rats showed signs of adrenal enlargement, thymus and lymph node shrinkage, and stomach ulceration. Selye realized that these responses were triggered by a coordinated series of physiological reactions that unfold over time during continued exposure to a stressor. These physiological reactions were nonspecific, which means that regardless of the type of stressor, the same pattern of reactions would occur. What Selye discovered was the **general adaptation syndrome**, the body's nonspecific physiological response to stress.



Figure 14.9 Hans Selye specialized in research about stress. In 2009, his native Hungary honored his work with this stamp, released in conjunction with the 2nd annual World Conference on Stress.

The general adaptation syndrome, shown in figure 14.10, consists of three stages:

1. alarm reaction
2. stage of resistance
3. stage of exhaustion (Selye, 1936; 1976).

Alarm reaction describes the body's immediate reaction upon facing a threatening situation or emergency, and it is roughly analogous to the fight-or-flight response described by Cannon. During an alarm reaction, you are alerted to a stressor, and your body alarms you with a cascade of physiological reactions that provide you with the energy to manage the situation. A person who wakes up in the middle of the night to discover her house is on fire, for example, is experiencing an alarm reaction.

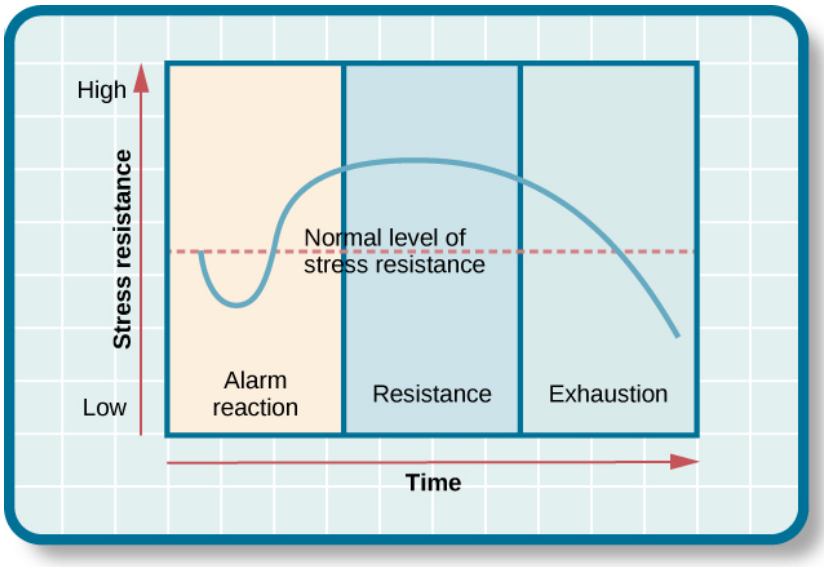


Figure 14.10 The three stages of Selye's general adaptation syndrome are shown in this graph. Prolonged stress ultimately results in exhaustion.

If exposure to a stressor is prolonged, the organism will enter the **stage of resistance**. During this stage, the initial shock of alarm reaction has worn off and the body has adapted to the stressor. Nevertheless, the body also remains on alert and is prepared to respond as it did during the alarm reaction, although with less intensity. For example, suppose a child who went missing is still missing 72 hours later. Although the parents would obviously remain extremely disturbed, the magnitude of physiological reactions would likely have diminished over the 72 intervening hours due to some adaptation to this event.

If exposure to a stressor continues over a longer period of time, the **stage of exhaustion** ensues. At this stage, the person is no longer able to adapt to the stressor: the body's ability to resist becomes depleted as physical wear takes its toll on the body's tissues and organs. As a result, illness, disease, and other permanent damage to the body—even death—may occur. If a missing child still remained missing after three months, the long-term stress associated with this situation may cause a parent to literally faint with exhaustion at some point or even to develop a serious and irreversible illness.

In short, Selye's general adaptation syndrome suggests that stressors tax the body via a three-phase process—an initial jolt, subsequent readjustment, and a later depletion of all physical resources—that ultimately lays the groundwork for serious health problems and even death. It should be pointed out, however, that this model is a response-based conceptualization of stress, focusing exclusively on the body's physical responses while largely ignoring psychological factors such as appraisal and interpretation of threats. Nevertheless, Selye's model has had an enormous impact on the field of stress because it offers a general explanation for how stress can lead to physical damage and, thus, disease. As we shall discuss later, prolonged or repeated stress has been implicated in development of a number of disorders such as hypertension and coronary artery disease.

The Physiological Basis of Stress

What goes on inside our bodies when we experience stress? The physiological mechanisms of stress are extremely complex, but they generally involve the work of two systems—the **sympathetic nervous system** and the **hypothalamic-pituitary-adrenal (HPA) axis**. When a person first perceives something as stressful (Selye's alarm reaction), the sympathetic nervous system triggers arousal via the release of adrenaline from the adrenal glands. Release of these hormones activates the fight-or-flight responses to stress, such as accelerated heart rate and respiration. At the same time, the HPA axis, which is primarily endocrine in nature, becomes especially active, although it works much more slowly than the sympathetic nervous system. In response to stress, the hypothalamus (one of the limbic structures in the brain) releases corticotrophin-releasing factor, a hormone that causes the pituitary gland to release adrenocorticotropic hormone (ACTH) (See figure 14.11). The ACTH then activates the adrenal glands to secrete a number of hormones into the bloodstream; an important one is cortisol, which can affect virtually every organ within the body. **Cortisol** is commonly known as a stress hormone and helps provide that boost of energy when we first encounter a stressor, preparing us to run away or fight. However, sustained elevated levels of cortisol weaken the immune system.

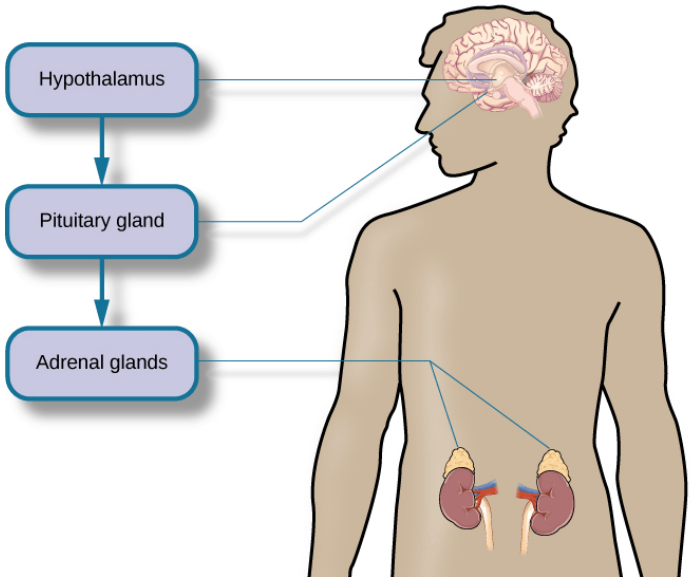


Figure 14.11 This diagram shows the functioning of the hypothalamic-pituitary-adrenal (HPA) axis. The hypothalamus activates the pituitary gland, which in turn activates the adrenal glands, increasing their secretion of cortisol.

In short bursts, this process can have some favorable effects, such as providing extra energy, improving **immune system** functioning temporarily, and decreasing pain sensitivity. However, extended release of cortisol—as would happen with prolonged or chronic stress—often comes at a high price. High levels of cortisol have been shown to produce a number of harmful effects. For example, increases in cortisol can significantly weaken our immune system (Glaser & Kiecolt-Glaser, 2005), and high levels are frequently observed among depressed individuals (Geoffroy, Hertzman, Li, & Power, 2013). In summary, a stressful event causes a variety of physiological reactions that activate the adrenal glands, which in turn release epinephrine, norepinephrine, and cortisol. These hormones affect a number of bodily processes in ways that prepare the stressed person to take direct action, but also in ways that may heighten the potential for illness.

When stress is extreme or chronic, it can have profoundly negative consequences. For example, stress often contributes to the development of certain psychological disorders, including post-traumatic stress disorder, major depressive disorder, and other serious psychiatric conditions. Additionally, we noted earlier that stress is linked to the development and progression of a variety of physical illnesses and diseases. For example, researchers in one study found that people injured during the September 11, 2001, World Trade Center disaster or who developed post-traumatic stress symptoms afterward later suffered significantly elevated

rates of heart disease (Jordan, Miller-Archie, Cone, Morabia, & Stellman, 2011). Another investigation yielded that self-reported stress symptoms among aging and retired Finnish food industry workers were associated with morbidity 11 years later. This study also predicted the onset of musculoskeletal, nervous system, and endocrine and metabolic disorders (Salonen, Arola, Nygård, & Huhtala, 2008). Another study reported that male South Korean manufacturing employees who reported high levels of work-related stress were more likely to catch the common cold over the next several months than were those employees who reported lower work-related stress levels (Park et al., 2011). Later, you will explore the mechanisms through which stress can produce physical illness and disease.

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18.3: Stressors

Learning Objectives

- Describe different types of possible stressors
- Explain the importance of life changes as potential stressors
- Describe the Social Readjustment Rating Scale
- Understand the concepts of job strain and job burnout

For an individual to experience **stress**, he must first encounter a potential **stressor**. In general, stressors can be placed into one of two broad categories: chronic and acute. Chronic stressors include events that persist over an extended period of time, such as caring for a parent with dementia, long-term unemployment, or imprisonment. Acute stressors involve brief focal events that sometimes continue to be experienced as overwhelming well after the event has ended, such as falling on an icy sidewalk and breaking your leg (Cohen, Janicki-Deverts, & Miller, 2007). Whether chronic or acute, potential stressors come in many shapes and sizes. They can include major traumatic events, significant life changes, daily hassles, as well as other situations in which a person is regularly exposed to threat, challenge, or danger.

Traumatic Events

Some stressors involve traumatic events or situations in which a person is exposed to actual or threatened death or serious injury. Stressors in this category include exposure to military combat, threatened or actual physical assaults (e.g., physical attacks, sexual assault, robbery, childhood abuse), terrorist attacks, natural disasters (e.g., earthquakes, floods, hurricanes), and automobile accidents. Men, non-Whites, and individuals in lower socioeconomic status (SES) groups report experiencing a greater number of traumatic events than do women, Whites, and individuals in higher SES groups (Hatch & Dohrenwend, 2007). Some individuals who are exposed to stressors of extreme magnitude develop post-traumatic stress disorder (PTSD): a chronic stress reaction characterized by experiences and behaviors that may include intrusive and painful memories of the stressor event, jumpiness, persistent negative emotional states, detachment from others, angry outbursts, and avoidance of reminders of the event (American Psychiatric Association [APA], 2013).

Life Changes

Most stressors that we encounter are not nearly as intense as the ones described above. Many potential stressors we face involve events or situations that require us to make changes in our ongoing lives and require time as we adjust to those changes. Examples include death of a close family member, marriage, divorce, and moving. See figure below:



Figure 14.12 Some fairly typical life events, such as moving, can be significant stressors. Even when the move is intentional and positive, the amount of resulting change in daily life can cause stress. (credit: "Jellaluna"/Flickr)

In the 1960s, psychiatrists Thomas **Holmes** and Richard **Rahe** wanted to examine the link between life stressors and physical illness, based on the hypothesis that life events requiring significant changes in a person's normal life routines are stressful, whether these events are desirable or undesirable. They developed the **Social Readjustment Rating Scale (SRRS)**, consisting of 43 life events that require varying degrees of personal readjustment (Holmes & Rahe, 1967). Many life events that most people would consider pleasant (e.g., holidays, retirement, marriage) are among those listed on the SRRS; these are examples of eustress. Holmes and Rahe also proposed that life events can add up over time, and that experiencing a cluster of stressful events increases one's risk of developing physical illnesses.

In developing their scale, Holmes and Rahe asked 394 participants to provide a numerical estimate for each of the 43 items; each estimate corresponded to how much readjustment participants felt each event would require. These estimates resulted in mean value scores for each event—often called life change units (LCUs) (Rahe, McKeen, & Arthur, 1967). The numerical scores ranged from 11 to 100, representing the perceived magnitude of life change each event entails. Death of a spouse ranked highest on the scale with 100 LCUs, and divorce ranked second highest with 73 LCUs. In addition, personal injury or illness, marriage, and job termination also ranked highly on the scale with 53, 50, and 47 LCUs, respectively. Conversely, change in residence (20 LCUs), change in eating habits (15 LCUs), and vacation (13 LCUs) ranked low on the scale (See Table 14.1 below). Minor violations of the law ranked the lowest with 11 LCUs. To complete the scale, participants checked yes for events experienced within the last 12 months. LCUs for each checked item are totaled for a score quantifying the amount of life change. Agreement on the amount of adjustment required by the various life events on the SRRS is highly consistent, even cross-culturally (Holmes & Masuda, 1974).

Table 14.1 *Some Stressors on the Social Readjustment Rating Scale (Holmes & Rahe, 1967)*

Life event	Life change units
Death of a close family member	63
Personal injury or illness	53
Dismissal from work	47
Change in financial state	38
Change to different line of work	36
Outstanding personal achievement	28
Beginning or ending school	26
Change in living conditions	25
Change in working hours or conditions	20
Change in residence	20
Change in schools	20
Change in social activities	18
Change in sleeping habits	16
Change in eating habits	15
Minor violation of the law	11

Extensive research has demonstrated that accumulating a high number of life change units within a brief period of time (one or two years) is related to a wide range of physical illnesses (even accidents and athletic injuries) and mental health problems (Monat & Lazarus, 1991; Scully, Tosi, & Banning, 2000). In an early demonstration, researchers obtained LCU scores for U.S. and Norwegian Navy personnel who were about to embark on a six-month voyage. A later examination of medical records revealed positive (but small) correlations between LCU scores prior to the voyage and subsequent illness symptoms during the ensuing six-month journey (Rahe, 1974). In addition, people tend to experience more physical symptoms, such as backache, upset stomach, diarrhea, and acne, on specific days in which self-reported LCU values are considerably higher than normal, such as the day of a family member's wedding (Holmes & Holmes, 1970).

The Social Readjustment Rating Scale (SRRS) provides researchers a simple, easy-to-administer way of assessing the amount of stress in people's lives, and it has been used in hundreds of studies (Thoits, 2010). Despite its widespread use, the scale has been subject to criticism. First, many of the items on the SRRS are vague; for example, death of a close friend could involve the death

of a long-absent childhood friend that requires little social readjustment (Dohrenwend, 2006). In addition, some have challenged its assumption that undesirable life events are no more stressful than desirable ones (Derogatis & Coons, 1993). However, most of the available evidence suggests that, at least as far as mental health is concerned, undesirable or negative events are more strongly associated with poor outcomes (such as depression) than are desirable, positive events (Hatch & Dohrenwend, 2007). Perhaps the most serious criticism is that the scale does not take into consideration respondents' appraisals of the life events it contains. As you recall, appraisal of a stressor is a key element in the conceptualization and overall experience of stress. Being fired from work may be devastating to some but a welcome opportunity to obtain a better job for others. The SRRS remains one of the most well-known instruments in the study of stress, and it is a useful tool for identifying potential stress-related health outcomes (Scully et al., 2000).

Link to Learning

Go to this site and complete the SRRS scale to determine the total number of LCUs you have experienced over the last year.

CONNECT THE CONCEPTS: Correlational Research

The Holmes and Rahe Social Readjustment Rating Scale (SRRS) uses the **correlational research** method to identify the connection between stress and health. That is, respondents' LCU scores are correlated with the number or frequency of self-reported symptoms indicating health problems. These correlations are typically positive—as LCU scores increase, the number of symptoms increase. Consider all the thousands of studies that have used this scale to correlate stress and illness symptoms: If you were to assign an average correlation coefficient to this body of research, what would be your best guess? How strong do you think the correlation coefficient would be? Why can't the SRRS show a causal relationship between stress and illness? If it were possible to show causation, do you think stress causes illness or illness causes stress?

Hassles

Potential stressors do not always involve major life events. **Daily hassles**—the minor irritations and annoyances that are part of our everyday lives (e.g., rush hour traffic, lost keys, obnoxious coworkers, inclement weather, arguments with friends or family)—can build on one another and leave us just as stressed as life change events (See figure 14.13) (Kanner, Coyne, Schaefer, & Lazarus, 1981).



Figure 14.13 Daily commutes, whether (a) on the road or (b) via public transportation, can be hassles that contribute to our feelings of everyday stress. (credit a: modification of work by Jeff Turner; credit b: modification of work by "epSos.de"/Flickr)

Researchers have demonstrated that the frequency of daily hassles is actually a better predictor of both physical and psychological health than are life change units. In a well-known study of San Francisco residents, the frequency of daily hassles was found to be more strongly associated with physical health problems than were life change events (DeLongis, Coyne, Dakof, Folkman, & Lazarus, 1982). In addition, daily minor hassles, especially interpersonal conflicts, often lead to negative and distressed mood states (Bolger, DeLongis, Kessler, & Schilling, 1989). Cyber hassles that occur on social media may represent a new source of stress. In one investigation, undergraduates who, over a 10-week period, reported greater Facebook-induced

stress (e.g., guilt or discomfort over rejecting friend requests and anger or sadness over being unfriended by another) experienced increased rates of upper respiratory infections, especially if they had larger social networks (Campisi et al., 2012). Clearly, daily hassles can add up and take a toll on us both emotionally and physically.

Other Stressors

Stressors can include situations in which one is frequently exposed to challenging and unpleasant events, such as difficult, demanding, or unsafe working conditions. Although most jobs and occupations can at times be demanding, some are clearly more stressful than others (See figure 14.14). For example, most people would likely agree that a firefighter's work is inherently more stressful than that of a florist. Equally likely, most would agree that jobs containing various unpleasant elements, such as those requiring exposure to loud noise (heavy equipment operator), constant harassment and threats of physical violence (prison guard), perpetual frustration (bus driver in a major city), or those mandating that an employee work alternating day and night shifts (hotel desk clerk), are much more demanding—and thus, more stressful—than those that do not contain such elements. The Table 14.2 below lists several occupations and some of the specific stressors associated with those occupations (Sulsky & Smith, 2005).



Figure 14.14 (a) Police officers and (b) firefighters hold high stress occupations. (credit a: modification of work by Australian Civil-Military Centre; credit b: modification of work by Andrew Magill)

Table 14.2 Occupations and Their Related Stressors

Occupation	Stressors Specific to Occupation (Sulsky & Smith, 2005)
Police officer	physical dangers, excessive paperwork, red tape, dealing with court system, coworker and supervisor conflict, lack of support from the public
Firefighter	uncertainty over whether a serious fire or hazard awaits after an alarm
Social worker	little positive feedback from jobs or from the public, unsafe work environments, frustration in dealing with bureaucracy, excessive paperwork, sense of personal responsibility for clients, work overload
Teacher	Excessive paperwork, lack of adequate supplies or facilities, work overload, lack of positive feedback, vandalism, threat of physical violence
Nurse	Work overload, heavy physical work, patient concerns (dealing with death and medical concerns), interpersonal problems with other medical staff (especially physicians)
Emergency medical worker	Unpredictable and extreme nature of the job, inexperience
Air traffic controller	Little control over potential crisis situations and workload, fear of causing an accident, peak traffic situations, general work environment

Occupation	Stressors Specific to Occupation (Sulsky & Smith, 2005)
Clerical and secretarial work	Little control over job mobility, unsupportive supervisors, work overload, lack of perceived control
Managerial work	Work overload, conflict and ambiguity in defining the managerial role, difficult work relationships

Although the specific stressors for these occupations are diverse, they seem to share two common denominators: heavy workload and uncertainty about and lack of control over certain aspects of a job. Both of these factors contribute to **job strain**, a work situation that combines excessive job demands and workload with little discretion in decision making or job control (Karasek & Theorell, 1990). Clearly, many occupations other than the ones listed in Table 14.2 involve at least a moderate amount of job strain in that they often involve heavy workloads and little job control (e.g., inability to decide when to take breaks). Such jobs are often low-status and include those of factory workers, postal clerks, supermarket cashiers, taxi drivers, and short-order cooks. Job strain can have adverse consequences on both physical and mental health; it has been shown to be associated with increased risk of hypertension (Schnall & Landsbergis, 1994), heart attacks (Theorell et al., 1998), recurrence of heart disease after a first heart attack (Aboa-Éboulé et al., 2007), significant weight loss or gain (Kivimäki et al., 2006), and major depressive disorder (Stansfeld, Shipley, Head, & Fuhrer, 2012). A longitudinal study of over 10,000 British civil servants reported that workers under 50 years old who earlier had reported high job strain were 68% more likely to later develop heart disease than were those workers under 50 years old who reported little job strain (Chandola et al., 2008).

Some people who are exposed to chronically stressful work conditions can experience **job burnout**, which is a general sense of emotional exhaustion and cynicism in relation to one's job (Maslach & Jackson, 1981). Job burnout occurs frequently among those in human service jobs (e.g., social workers, teachers, therapists, and police officers). Job burnout consists of three dimensions. The first dimension is exhaustion—a sense that one's emotional resources are drained or that one is at the end of her rope and has nothing more to give at a psychological level. Second, job burnout is characterized by depersonalization: a sense of emotional detachment between the worker and the recipients of his services, often resulting in callous, cynical, or indifferent attitudes toward these individuals. Third, job burnout is characterized by diminished personal accomplishment, which is the tendency to evaluate one's work negatively by, for example, experiencing dissatisfaction with one's job-related accomplishments or feeling as though one has categorically failed to influence others' lives through one's work.

Job strain appears to be one of the greatest risk factors leading to job burnout, which is most commonly observed in workers who are older (ages $55 - 64$), unmarried, and whose jobs involve manual labor. Heavy alcohol consumption, physical inactivity, being overweight, and having a physical or lifetime mental disorder are also associated with job burnout (Ahola, et al., 2006). In addition, depression often co-occurs with job burnout. One large-scale study of over $3,000$ Finnish employees reported that half of the participants with severe job burnout had some form of depressive disorder (Ahola et al., 2005). Job burnout is often precipitated by feelings of having invested considerable energy, effort, and time into one's work while receiving little in return (e.g., little respect or support from others or low pay) (Tatris, Peeters, Le Blanc, Schreurs, & Schaufeli, 2001).

As an illustration, consider CharlieAnn, a nursing assistant who worked in a nursing home. CharlieAnn worked long hours for little pay in a difficult facility. Her supervisor was domineering, unpleasant, and unsupportive; he was disrespectful of CharlieAnn's personal time, frequently informing her at the last minute she must work several additional hours after her shift ended or that she must report to work on weekends. CharlieAnn had very little autonomy at her job. She had little say in her day-to-day duties and how to perform them, and she was not permitted to take breaks unless her supervisor explicitly told her that she could. CharlieAnn did not feel as though her hard work was appreciated, either by supervisory staff or by the residents of the home. She was very unhappy over her low pay, and she felt that many of the residents treated her disrespectfully.

After several years, CharlieAnn began to hate her job. She dreaded going to work in the morning, and she gradually developed a callous, hostile attitude toward many of the residents. Eventually, she began to feel as though she could no longer help the nursing home residents. CharlieAnn's absenteeism from work increased, and one day she decided that she had had enough and quit. She now has a job in sales, vowing never to work in nursing again.

Link to Learning

Watch this clip from the 1999 comedy *Office Space* for a humorous illustration of lack of supervisory support in which a sympathetic character's insufferable boss makes a last-minute demand that he "go ahead and come in" to the office on both Saturday and Sunday.

Finally, our close relationships with friends and family—particularly the negative aspects of these relationships—can be a potent source of stress. Negative aspects of close relationships can include adverse exchanges and conflicts, lack of emotional support or confiding, and lack of reciprocity. All of these can be overwhelming, threatening to the relationship, and thus stressful. Such stressors can take a toll both emotionally and physically. A longitudinal investigation of over $9,000$ British civil servants found that those who at one point had reported the highest levels of negative interactions in their closest relationship were 34% more likely to experience serious heart problems (fatal or nonfatal heart attacks) over a $13-15$ year period, compared to those who experienced the lowest levels of negative interaction (De Vogli, Chandola & Marmot, 2007).

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18.4: Stress and Illness

Learning Objectives

- Explain the nature of psychophysiological disorders
- Describe the immune system and how stress impacts its functioning
- Describe how stress and emotional factors can lead to the development and exacerbation of cardiovascular disorders, asthma, and tension headaches

In this section, we will discuss **stress** and illness. As stress researcher Robert Sapolsky (1998) describes,

> *"stress-related disease emerges, predominantly, out of the fact that we so often activate a physiological system that has evolved for responding to acute physical emergencies, but we turn it on for months on end, worrying about mortgages, relationships, and promotions". (p. 6)*

The stress response, as noted earlier, consists of a coordinated but complex system of physiological reactions that are called upon as needed. These reactions are beneficial at times because they prepare us to deal with potentially dangerous or threatening situations (for example, recall our old friend, the fearsome bear on the trail). However, health is affected when physiological reactions are sustained, as can happen in response to ongoing stress.

Psychophysiological Disorders

If the reactions that compose the stress response are chronic or if they frequently exceed normal ranges, they can lead to cumulative wear and tear on the body, in much the same way that running your air conditioner on full blast all summer will eventually cause wear and tear on it. For example, the high blood pressure that a person under considerable job strain experiences might eventually take a toll on his heart and set the stage for a heart attack or heart failure. Also, someone exposed to high levels of the stress hormone cortisol might become vulnerable to infection or disease because of weakened immune system functioning (McEwen, 1998).

Link to learning

Neuroscientists Robert Sapolsky and Carol Shively have conducted extensive research on stress in non-human primates for over 30 years. Both have shown that position in the social hierarchy predicts stress, mental health status, and disease. Their research sheds light on how stress may lead to negative health outcomes for stigmatized or ostracized people. Here are two videos featuring Dr. Sapolsky: one is regarding killer stress and the other is an excellent in-depth documentary from *National Geographic*.

Physical disorders or diseases whose symptoms are brought about or worsened by stress and emotional factors are called **psychophysiological disorders**. The physical symptoms of psychophysiological disorders are real and they can be produced or exacerbated by psychological factors (hence the *psycho* and *physiological* in psychophysiological). A list of frequently encountered psychophysiological disorders is provided in the Table 14.3 below:

Table 14.3 Types of Psychophysiological Disorders (adapted from Everly & Lating, 2002)

Type of Psychophysiological Disorder	Examples
Cardiovascular	hypertension, coronary heart disease
Gastrointestinal	irritable bowel syndrome
Respiratory	asthma, allergy
Musculoskeletal	low back pain, tension headaches
Skin	acne, eczema, psoriasis

Friedman and Booth-Kewley (1987) statistically reviewed 101 studies to examine the link between personality and illness. They proposed the existence of disease-prone personality characteristics, including depression, anger/hostility, and anxiety. Indeed, a study of over 61,000 Norwegians identified depression as a risk factor for all major disease-related causes of death (Mykletun et al., 2007). In addition, neuroticism—a personality trait that reflects how anxious, moody, and sad one is—has been identified as a risk factor for chronic health problems and mortality (Ploubidis & Grundy, 2009).

Below, we discuss two kinds of psychophysiological disorders about which a great deal is known: cardiovascular disorders and asthma. First, however, it is necessary to turn our attention to a discussion of the immune system—one of the major pathways through which stress and emotional factors can lead to illness and disease.

Everyday Connection: Social States, Stress, and Health Care

Psychologists have long been aware that social status (e.g., wealth, privilege) is intimately tied to stress, health, and well-being. Some factors that contribute to high stress and poor health among people with lower social status include lack of control and predictability (e.g., greater unemployment) and resource inequality (e.g., less access to health care and other community resources) (Marmot & Sapolsky, 2014).

In the United States, resource inequalities tied to social status often create race and gender differences in health care. For example, African American women have the highest rates of emergency room visits and unmet health care needs compared to any other group, and this disparity increased significantly from 2006 to 2014 (Manuel, 2018). Lesbian, gay, bisexual, and transgender youth often experience poor quality of care as a result of stigma, lack of understanding, and insensitivity among health care professionals (Hafeez, Zeshan, Tahir, Jahan, & Naveed, 2017). One goal of the U.S. government's Healthy People 2020 initiative is to eliminate gender and race disparities in health care. Their interactive dataset provides an updated snapshot of health disparities: https://www.healthypeople.gov/2020/d...sparities-data.

Stress and the Immune System

In a sense, the **immune system** is the body's surveillance system. It consists of a variety of structures, cells, and mechanisms that serve to protect the body from invading toxins and microorganisms that can harm or damage the body's tissues and organs. When the immune system is working as it should, it keeps us healthy and disease free by eliminating bacteria, viruses, and other foreign substances that have entered the body (Everly & Lating, 2002).

Immune System Errors

Sometimes, the immune system will function erroneously. For example, sometimes it can go awry by mistaking your body's own healthy cells for invaders and repeatedly attacking them. When this happens, the person is said to have an autoimmune disease, which can affect almost any part of the body. How an autoimmune disease affects a person depends on what part of the body is targeted. For instance, rheumatoid arthritis, an autoimmune disease that affects the joints, results in joint pain, stiffness, and loss of function. Systemic lupus erythematosus, an autoimmune disease that affects the skin, can result in rashes and swelling of the skin. Grave's disease, an autoimmune disease that affects the thyroid gland, can result in fatigue, weight gain, and muscle aches (National Institute of Arthritis and Musculoskeletal and Skin Diseases [NIAMS], 2012).

In addition, the immune system may sometimes break down and be unable to do its job. This situation is referred to as **immunosuppression**, the decreased effectiveness of the immune system. When people experience immunosuppression, they become susceptible to any number of infections, illness, and diseases. For example, acquired immune deficiency syndrome (AIDS) is a serious and lethal disease that is caused by human immunodeficiency virus (HIV), which greatly weakens the immune system by infecting and destroying antibody-producing cells, thus rendering a person vulnerable to any of a number of opportunistic infections (Powell, 1996).

Stressors and Immune Function

The question of whether stress and negative emotional states can influence immune function has captivated researchers for over three decades, and discoveries made over that time have dramatically changed the face of health psychology (Kiecolt-Glaser, 2009). **Psychoneuroimmunology** is the field that studies how psychological factors such as stress influence the immune system and immune functioning. The term psychoneuroimmunology was first coined in 1981, when it appeared as the title of a book that

reviewed available evidence for associations between the brain, endocrine system, and immune system (Zacharie, 2009). To a large extent, this field evolved from the discovery that there is a connection between the central nervous system and the immune system.

Some of the most compelling evidence for a connection between the brain and the immune system comes from studies in which researchers demonstrated that immune responses in animals could be classically conditioned (Everly & Lating, 2002). For example, Ader and Cohen (1975) paired flavored water (the conditioned stimulus) with the presentation of an immunosuppressive drug (the unconditioned stimulus), causing sickness (an unconditioned response). Not surprisingly, rats exposed to this pairing developed a conditioned aversion to the flavored water. However, the taste of the water itself later produced immunosuppression (a conditioned response), indicating that the immune system itself had been conditioned. Many subsequent studies over the years have further demonstrated that immune responses can be classically conditioned in both animals and humans (Ader & Cohen, 2001). Thus, if classical conditioning can alter immunity, other psychological factors should be capable of altering it as well.

Hundreds of studies involving tens of thousands of participants have tested many kinds of brief and chronic stressors and their effect on the immune system (e.g., public speaking, medical school examinations, unemployment, marital discord, divorce, death of spouse, burnout and job strain, caring for a relative with Alzheimer's disease, and exposure to the harsh climate of Antarctica). It has been repeatedly demonstrated that many kinds of stressors are associated with poor or weakened immune functioning (Glaser & Kiecolt-Glaser, 2005; Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Segerstrom & Miller, 2004).

When evaluating these findings, it is important to remember that there is a tangible physiological connection between the brain and the immune system. For example, the sympathetic nervous system innervates immune organs such as the thymus, bone marrow, spleen, and even lymph nodes (Maier, Watkins, & Fleshner, 1994). Also, we noted earlier that stress hormones released during hypothalamic-pituitary-adrenal (HPA) axis activation can adversely impact immune function. One way they do this is by inhibiting the production of **lymphocytes**, white blood cells that circulate in the body's fluids that are important in the immune response (Everly & Lating, 2002).

Some of the more dramatic examples demonstrating the link between stress and impaired immune function involve studies in which volunteers were exposed to viruses. The rationale behind this research is that because stress weakens the immune system, people with high stress levels should be more likely to develop an illness compared to those under little stress. In one memorable experiment using this method, researchers interviewed 276 healthy volunteers about recent stressful experiences (Cohen et al., 1998). Following the interview, these participants were given nasal drops containing the cold virus (in case you are wondering why anybody would ever want to participate in a study in which they are subjected to such treatment, the participants were paid $800 for their trouble). When examined later, participants who reported experiencing chronic stressors for more than one month—especially enduring difficulties involving work or relationships—were considerably more likely to have developed colds than were participants who reported no chronic stressors (See figure below).

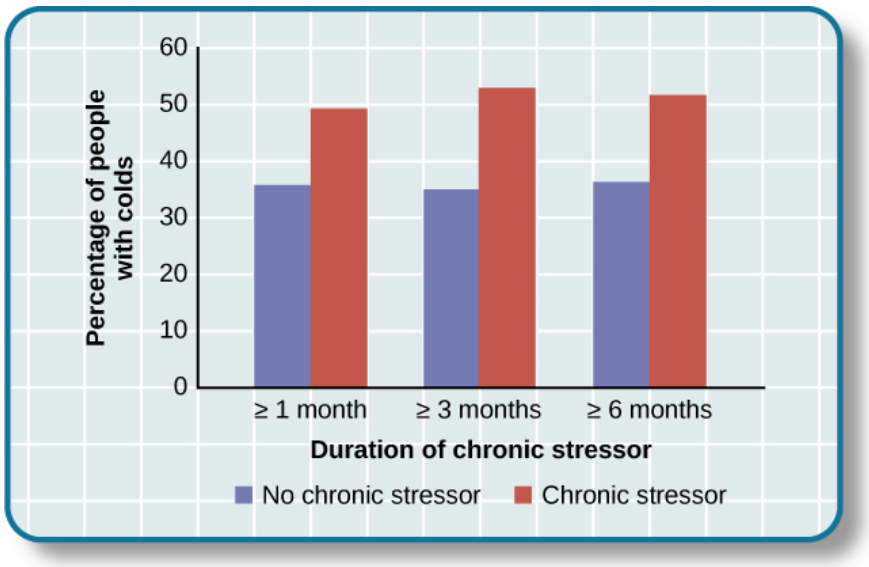


Figure 14.15 This graph shows the percentages of participants who developed colds (after receiving the cold virus) after reporting having experienced chronic stressors lasting at least one month, three months, and six months (adapted from Cohen et al., 1998).

In another study, older volunteers were given an influenza virus vaccination. Compared to controls, those who were caring for a

spouse with Alzheimer's disease (and thus were under chronic stress) showed poorer antibody response following the vaccination (Kiecolt-Glaser, Glaser, Gravenstein, Malarkey, & Sheridan, 1996).

Other studies have demonstrated that stress slows down wound healing by impairing immune responses important to wound repair (Glaser & Kiecolt-Glaser, 2005). In one study, for example, skin blisters were induced on the forearm. Subjects who reported higher levels of stress produced lower levels of immune proteins necessary for wound healing (Glaser et al., 1999). Stress, then, is not so much the sword that kills the knight, so to speak; rather, it's the sword that breaks the knight's shield, and your immune system is that shield.

DIG DEEPER: Stress and Aging: A Tale of Telomeres

Have you ever wondered why people who are stressed often seem to have a haggard look about them? A pioneering study from 2004 suggests that the reason is because stress can actually accelerate the cell biology of aging.

Stress, it seems, can shorten telomeres, which are segments of DNA that protect the ends of chromosomes. Shortened telomeres can inhibit or block cell division, which includes growth and proliferation of new cells, thereby leading to more rapid aging (Sapolsky, 2004). In the study, researchers compared **telomere** lengths in the white blood cells in mothers of chronically ill children to those of mothers of healthy children (Epel et al., 2004). Mothers of chronically ill children would be expected to experience more stress than would mothers of healthy children. The longer a mother had spent caring for her ill child, the shorter her telomeres (the correlation between years of caregiving and telomere length was $r = -0.40$). In addition, higher levels of perceived stress were negatively correlated with telomere size ($r = -0.31$). These researchers also found that the average telomere length of the most stressed mothers, compared to the least stressed, was similar to what you would find in people who were $9 - 17$ years older than they were on average.

Numerous other studies since have continued to find associations between stress and eroded telomeres (Blackburn & Epel, 2012). Some studies have even demonstrated that stress can begin to erode telomeres in childhood and perhaps even before children are born. For example, childhood exposure to violence (e.g., maternal domestic violence, bullying victimization, and physical maltreatment) was found in one study to accelerate telomere erosion from ages 5 to 10 (Shalev et al., 2013). Another study reported that young adults whose mothers had experienced severe stress during their pregnancy had shorter telomeres than did those whose mothers had stress-free and uneventful pregnancies (Entringer et al., 2011). Further, the corrosive effects of childhood stress on telomeres can extend into young adulthood. In an investigation of over $4,000$ U.K. women ages $41 - 80$, adverse experiences during childhood (e.g., physical abuse, being sent away from home, and parent divorce) were associated with shortened telomere length (Surtees et al., 2010), and telomere size decreased as the amount of experienced adversity increased (See figure 14.16 below).

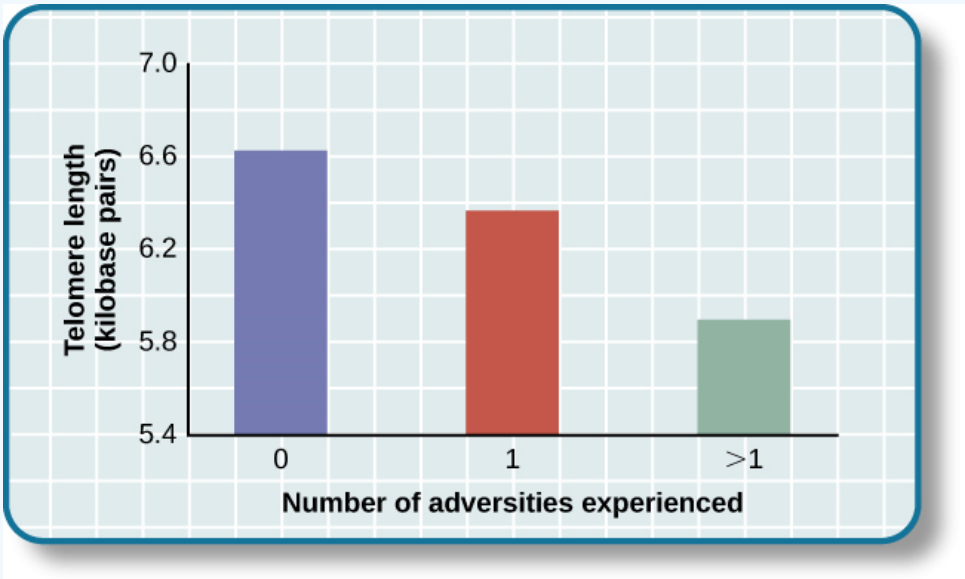


Figure 14.16 Telomeres are shorter in adults who experienced more trauma as children (adapted from Blackburn & Epel, 2012).

Efforts to dissect the precise cellular and physiological mechanisms linking short telomeres to stress and disease are currently underway. For the time being, telomeres provide us with yet another reminder that stress, especially during early life, can be just as harmful to our health as smoking or fast food (Blackburn & Epel, 2012).

Cardiovascular Disorders

The cardiovascular system is composed of the heart and blood circulation system. For many years, disorders that involve the cardiovascular system—known as **cardiovascular disorders**—have been a major focal point in the study of psychophysiological disorders because of the cardiovascular system's centrality in the stress response (Everly & Lating, 2002). **Heart disease** is one such condition. Each year, heart disease causes approximately one in three deaths in the United States, and it is the leading cause of death in the developed world (Centers for Disease Control and Prevention [CDC], 2011; Shapiro, 2005).

The symptoms of heart disease vary somewhat depending on the specific kind of heart disease one has, but they generally involve angina—chest pains or discomfort that occur when the heart does not receive enough blood (Office on Women's Health, 2009). The pain often feels like the chest is being pressed or squeezed; burning sensations in the chest and shortness of breath are also commonly reported. Such pain and discomfort can spread to the arms, neck, jaws, stomach (as nausea), and back (American Heart Association [AHA], 2012a) (See figure 14.17 below).

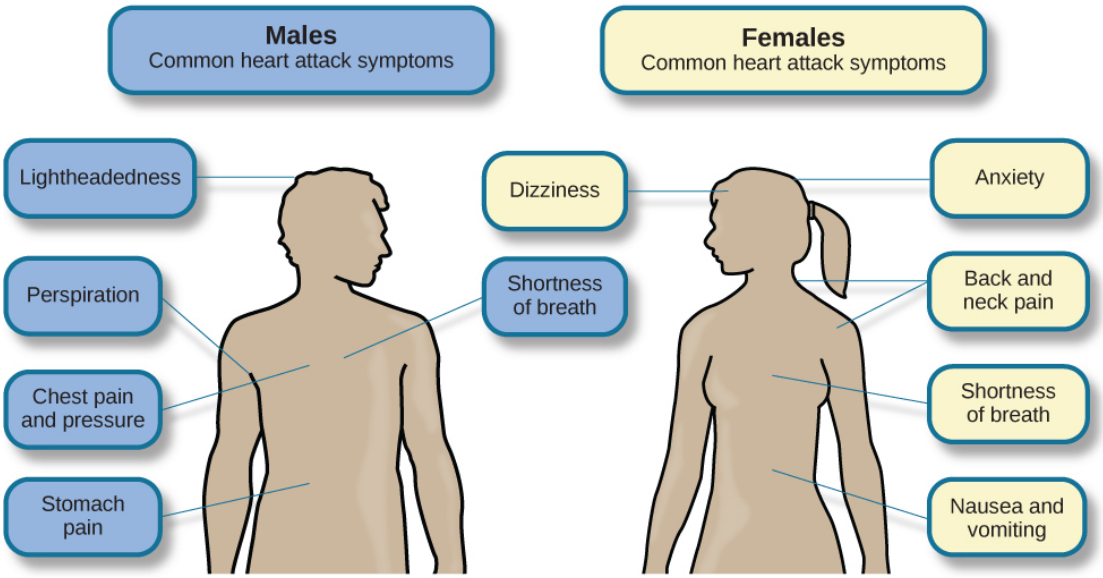


Figure 14.17 Males and females often experience different symptoms of a heart attack.

A major risk factor for heart disease is **hypertension**, which is high blood pressure. Hypertension forces a person's heart to pump harder, thus putting more physical strain on the heart. If left unchecked, hypertension can lead to a heart attack, stroke, or heart failure; it can also lead to kidney failure and blindness. Hypertension is a serious cardiovascular disorder, and it is sometimes called the silent killer because it has no symptoms—one who has high blood pressure may not even be aware of it (AHA, 2012b).

Many risk factors contributing to cardiovascular disorders have been identified. These risk factors include social determinants such as aging, income, education, and employment status, as well as behavioral risk factors that include unhealthy diet, tobacco use, physical inactivity, and excessive alcohol consumption; obesity and diabetes are additional risk factors (World Health Organization [WHO], 2013).

Over the past few decades, there has been much greater recognition and awareness of the importance of stress and other psychological factors in cardiovascular health (Nusair, Al-dadah, & Kumar, 2012). Indeed, exposure to stressors of many kinds has also been linked to cardiovascular problems; in the case of hypertension, some of these stressors include job strain (Trudel, Brisson, & Milot, 2010), natural disasters (Saito, Kim, Maekawa, Ikeda, & Yokoyama, 1997), marital conflict (Nealey-Moore, Smith, Uchino, Hawkins, & Olson-Cerny, 2007), and exposure to high traffic noise levels at one's home (de Kluizenaar, Gansevoort, Miedema, & de Jong, 2007). Perceived discrimination appears to be associated with hypertension among African Americans (Sims et al., 2012). In addition, laboratory-based stress tasks, such as performing mental arithmetic under time pressure, immersing one's hand into ice water (known as the cold pressor test), mirror tracing, and public speaking have all been shown to

elevate blood pressure (Phillips, 2011).

Are you Type A or Type B?

Sometimes research ideas and theories emerge from seemingly trivial observations. In the 1950s, cardiologist Meyer Friedman was looking over his waiting room furniture, which consisted of upholstered chairs with armrests. Friedman decided to have these chairs reupholstered. When the man doing the reupholstering came to the office to do the work, he commented on how the chairs were worn in a unique manner—the front edges of the cushions were worn down, as were the front tips of the arm rests. It seemed like the cardiology patients were tapping or squeezing the front of the armrests, as well as literally sitting on the edge of their seats (Friedman & Rosenman, 1974). Were cardiology patients somehow different than other types of patients? If so, how?

After researching this matter, Friedman and his colleague, Ray Rosenman, came to understand that people who are prone to heart disease tend to think, feel, and act differently than those who are not. These individuals tend to be intensively driven workaholics who are preoccupied with deadlines and always seem to be in a rush. According to Friedman and Rosenman, these individuals exhibit **Type A** behavior pattern; those who are more relaxed and laid-back were characterized as **Type B** (See figure 14.18). In a sample of Type As and Type Bs, Friedman and Rosenman were startled to discover that heart disease was over seven times more frequent among the Type As than the Type Bs (Friedman & Rosenman, 1959).

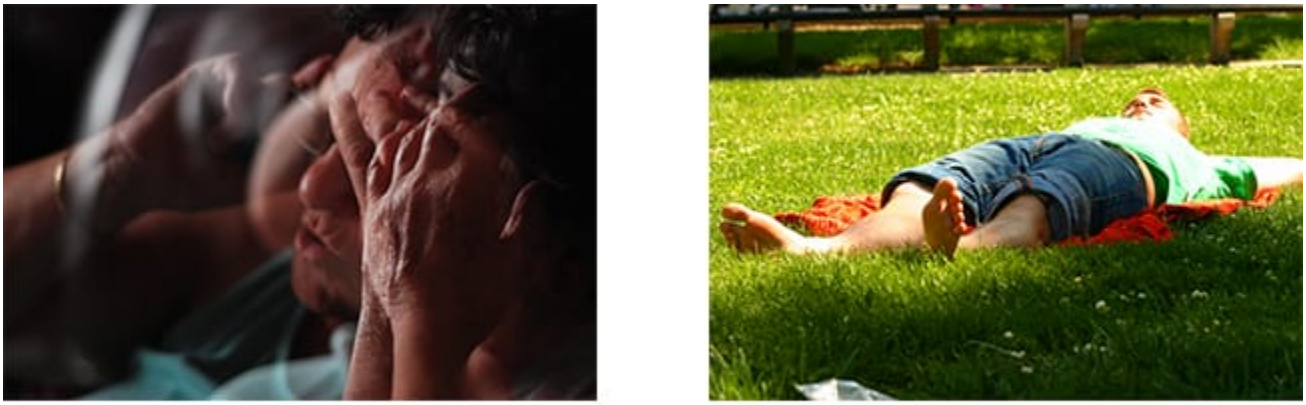


Figure 14.18 (a) Type A individuals are characterized as intensely driven, (b) while Type B people are characterized as laid-back and relaxed. (credit a: modification of work by Greg Hernandez; credit b: modification of work by Elvert Barnes)

The major components of the Type A pattern include an aggressive and chronic struggle to achieve more and more in less and less time (Friedman & Rosenman, 1974). Specific characteristics of the Type A pattern include an excessive competitive drive, chronic sense of time urgency, impatience, and hostility toward others (particularly those who get in the person's way).

An example of a person who exhibits Type A behavior pattern is Jeffrey. Even as a child, Jeffrey was intense and driven. He excelled at school, was captain of the swim team, and graduated with honors from an Ivy League college. Jeffrey never seems able to relax; he is always working on something, even on the weekends. However, Jeffrey always seems to feel as though there are not enough hours in the day to accomplish all he feels he should. He volunteers to take on extra tasks at work and often brings his work home with him; he often goes to bed angry late at night because he feels that he has not done enough. Jeffrey is quick tempered with his coworkers; he often becomes noticeably agitated when dealing with those coworkers he feels work too slowly or whose work does not meet his standards. He typically reacts with hostility when interrupted at work. He has experienced problems in his marriage over his lack of time spent with family. When caught in traffic during his commute to and from work, Jeffrey incessantly pounds on his horn and swears loudly at other drivers. When Jeffrey was 52, he suffered his first heart attack.

By the 1970s, a majority of practicing cardiologists believed that Type A behavior pattern was a significant risk factor for heart disease (Friedman, 1977). Indeed, a number of early longitudinal investigations demonstrated a link between Type A behavior pattern and later development of heart disease (Rosenman et al., 1975; Haynes, Feinleib, & Kannel, 1980).

Subsequent research examining the association between Type A and heart disease, however, failed to replicate these earlier findings (Glassman, 2007; Myrtek, 2001). Because Type A theory did not pan out as well as they had hoped, researchers shifted their attention toward determining if any of the specific elements of Type A predict heart disease.

Extensive research clearly suggests that the anger/hostility dimension of Type A behavior pattern may be one of the most important factors in the development of heart disease. This relationship was initially described in the Haynes et al. (1980) study mentioned above: Suppressed hostility was found to substantially elevate the risk of heart disease for both men and women. Also, one investigation followed over $1,000$ male medical students from 32 to 48 years. At the beginning of the study, these men completed a questionnaire assessing how they react to pressure; some indicated that they respond with high levels of **anger**, whereas others indicated that they respond with less anger. Decades later, researchers found that those who earlier had indicated the highest levels of anger were over 6 times more likely than those who indicated less anger to have had a heart attack by age 55, and they were 3.5 times more likely to have experienced heart disease by the same age (Chang, Ford, Meoni, Wang, & Klag, 2002). From a health standpoint, it clearly does not pay to be an angry young person.

After reviewing and statistically summarizing 35 studies from 1983 to 2006, Chida and Steptoe (2009) concluded that the bulk of the evidence suggests that anger and hostility constitute serious long-term risk factors for adverse cardiovascular outcomes among both healthy individuals and those already suffering from heart disease. One reason angry and hostile moods might contribute to cardiovascular diseases is that such moods can create social strain, mainly in the form of antagonistic social encounters with others. This strain could then lay the foundation for disease-promoting cardiovascular responses among hostile individuals (Vella, Kamarck, Flory, & Manuck, 2012). In this transactional model, hostility and social strain form a cycle (See figure below).

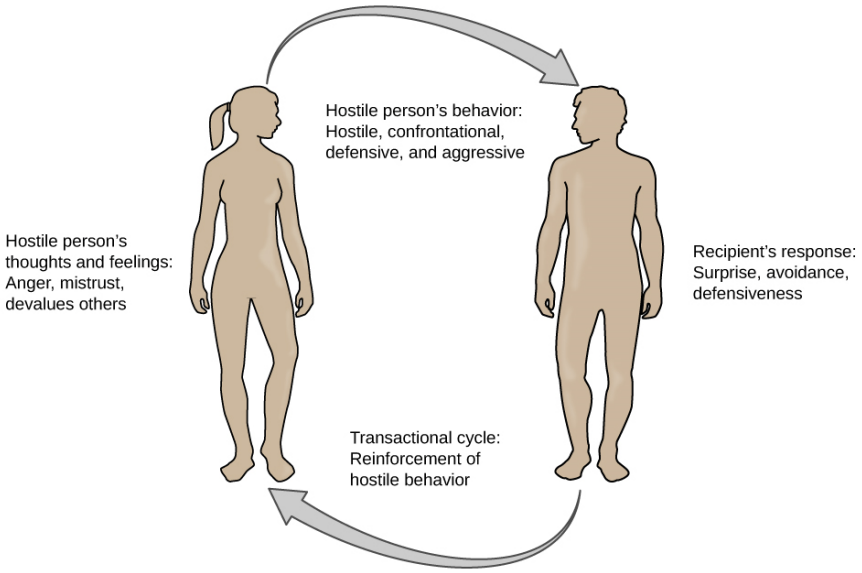


Figure 14.19 According to the transactional model of hostility for predicting social interactions (Vella et al., 2012), the thoughts and feelings of a hostile person promote antagonistic behavior toward others, which in turn reinforces complimentary reactions from others, thereby intensifying ones' hostile disposition and intensifying the cyclical nature of this relationship.

For example, suppose Kaitlin has a hostile disposition; she has a cynical, distrustful attitude toward others and often thinks that other people are out to get her. She is very defensive around people, even those she has known for years, and she is always looking for signs that others are either disrespecting or belittling her. In the shower each morning before work, she often mentally rehearses what she would say to someone who said or did something that angered her, such as making a political statement that was counter to her own ideology. As Kaitlin goes through these mental rehearsals, she often grins and thinks about the retaliation on anyone who will irk her that day.

Socially, she is confrontational and tends to use a harsh tone with people, which often leads to very disagreeable and sometimes argumentative social interactions. As you might imagine, Kaitlin is not especially popular with others, including coworkers, neighbors, and even members of her own family. They either avoid her at all costs or snap back at her, which causes Kaitlin to become even more cynical and distrustful of others, making her disposition even more hostile. Kaitlin's hostility—through her own doing—has created an antagonistic environment that cyclically causes her to become even more hostile and angry, thereby potentially setting the stage for cardiovascular problems.

In addition to anger and hostility, a number of other negative emotional states have been linked with heart disease, including negative affectivity and depression (Suls & Bunde, 2005). **Negative affectivity** is a tendency to experience distressed emotional states involving anger, contempt, disgust, guilt, fear, and nervousness (Watson, Clark, & Tellegen, 1988). It has been linked with the development of both hypertension and heart disease. For example, over $3,000$ initially healthy participants in one study were

tracked longitudinally, up to 22 years. Those with higher levels of negative affectivity at the time the study began were substantially more likely to develop and be treated for hypertension during the ensuing years than were those with lower levels of negative affectivity (Jonas & Lando, 2000). In addition, a study of over 10,000 middle-aged London-based civil servants who were followed an average of 12.5 years revealed that those who earlier had scored in the upper third on a test of negative affectivity were 32% more likely to have experienced heart disease, heart attack, or angina over a period of years than were those who scored in the lowest third (Nabi, Kivimaki, De Vogli, Marmot, & Singh-Manoux, 2008). Hence, negative affectivity appears to be a potentially vital risk factor for the development of cardiovascular disorders.

Depression and the Heart

For centuries, poets and folklore have asserted that there is a connection between moods and the heart (Glassman & Shapiro, 1998). You are no doubt familiar with the notion of a broken heart following a disappointing or depressing event and have encountered that notion in songs, films, and literature.

Perhaps the first to recognize the link between **depression** and **heart disease** was Benjamin Malzberg (1937), who found that the death rate among institutionalized patients with melancholia (an archaic term for depression) was six times higher than that of the population. A classic study in the late 1970s looked at over 8,000 manic-depressive persons in Denmark, finding a nearly 50% increase in deaths from heart disease among these patients compared with the general Danish population (Weeke, 1979). By the early 1990s, evidence began to accumulate showing that depressed individuals who were followed for long periods of time were at increased risk for heart disease and cardiac death (Glassman, 2007). In one investigation of over 700 Denmark residents, those with the highest depression scores were 71% more likely to have experienced a heart attack than were those with lower depression scores (Barefoot & Schroll, 1996). Figure 14.20 illustrates the gradation in risk of heart attacks for both men and women.

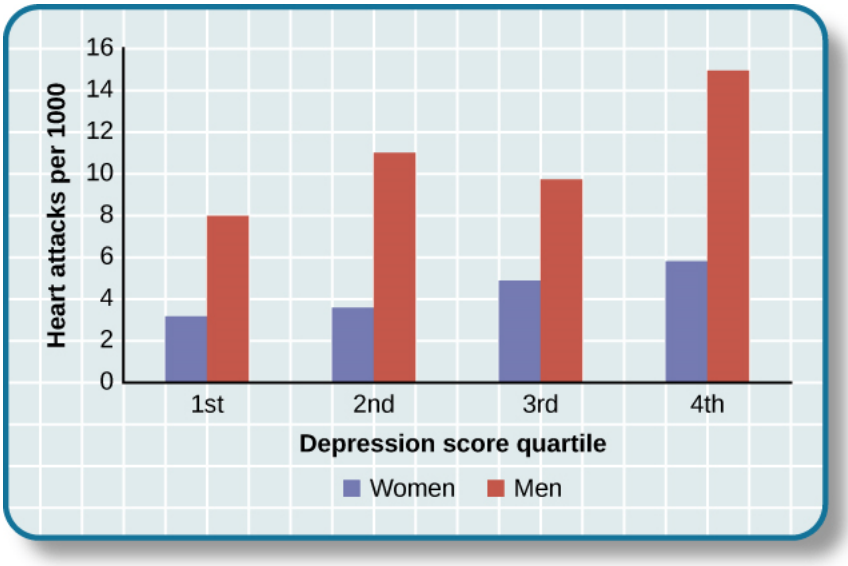


Figure 14.20 This graph shows the incidence of heart attacks among men and women by depression score quartile (adapted from Barefoot & Schroll, 1996).

After more than two decades of research, it is now clear that a relationship exists: Patients with heart disease have more depression than the general population, and people with depression are more likely to eventually develop heart disease and experience higher mortality than those who do not have depression (Hare, Toukhsati, Johansson, & Jaarsma, 2013); the more severe the depression, the higher the risk (Glassman, 2007). Consider the following:

- In one study, death rates from cardiovascular problems was substantially higher in depressed people; depressed men were 50% more likely to have died from cardiovascular problems, and depressed women were 70% more likely (Ösby, Brandt, Correia, Ekbom, & Sparén, 2001).
- A statistical review of 10 longitudinal studies involving initially healthy individuals revealed that those with elevated depressive symptoms have, on average, a 64% greater risk of developing heart disease than do those with fewer symptoms (Wulsin & Singal, 2003).
- A study of over 63,000 registered nurses found that those with more depressed symptoms when the study began were 49%

more likely to experience fatal heart disease over a 12-year period (Whang et al., 2009).

The American Heart Association, fully aware of the established importance of depression in cardiovascular diseases, several years ago recommended routine depression screening for all heart disease patients (Lichtman et al., 2008). Recently, they have recommended including depression as a risk factor for heart disease patients (AHA, 2014).

Although the exact mechanisms through which depression might produce heart problems have not been fully clarified, a recent investigation examining this connection in early life has shed some light. In an ongoing study of childhood depression, adolescents who had been diagnosed with depression as children were more likely to be obese, smoke, and be physically inactive than were those who had not received this diagnosis (Rottenberg et al., 2014). One implication of this study is that depression, especially if it occurs early in life, may increase the likelihood of living an unhealthy lifestyle, thereby predisposing people to an unfavorable cardiovascular disease risk profile.

It is important to point out that depression may be just one piece of the emotional puzzle in elevating the risk for heart disease, and that chronically experiencing several negative emotional states may be especially important. A longitudinal investigation of Vietnam War veterans found that depression, anxiety, hostility, and trait anger each independently predicted the onset of heart disease (Boyle, Michalek, & Suarez, 2006). However, when each of these negative psychological attributes was combined into a single variable, this new variable (which researchers called psychological risk factor) predicted heart disease more strongly than any of the individual variables. Thus, rather than examining the predictive power of isolated psychological risk factors, it seems crucial for future researchers to examine the effects of combined and more general negative emotional and psychological traits in the development of cardiovascular illnesses.

Asthma

Asthma is a chronic and serious disease in which the airways of the respiratory system become obstructed, leading to great difficulty expelling air from the lungs. The airway obstruction is caused by inflammation of the airways (leading to thickening of the airway walls) and a tightening of the muscles around them, resulting in a narrowing of the airways (See figure 14.21) (American Lung Association, 2010). Because airways become obstructed, a person with asthma will sometimes have great difficulty breathing and will experience repeated episodes of wheezing, chest tightness, shortness of breath, and coughing, the latter occurring mostly during the morning and night (CDC, 2006).

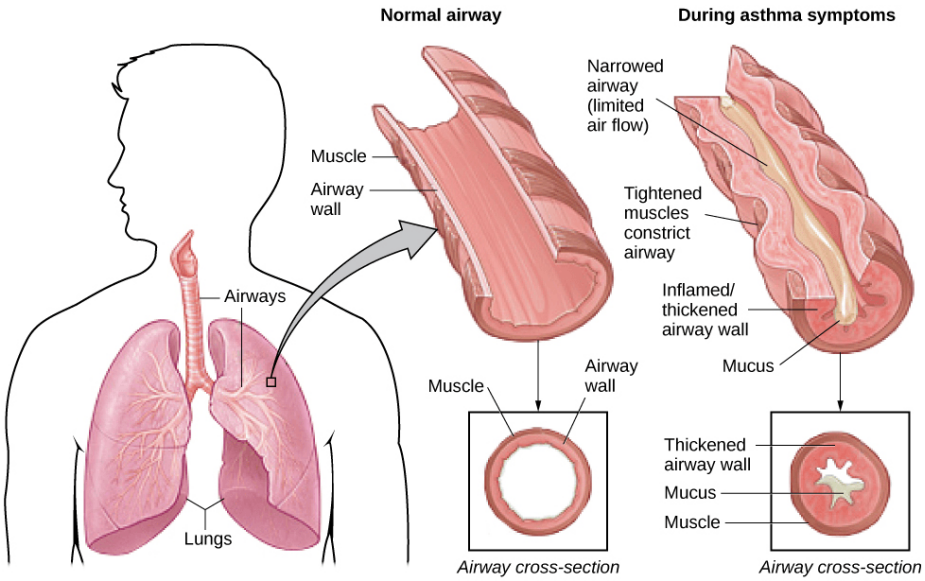


Figure 14.21 In asthma, the airways become inflamed and narrowed.

According to the Centers for Disease Control and Prevention (CDC), around $4,000$ people die each year from asthma-related causes, and asthma is a contributing factor to another $7,000$ deaths each year (CDC, 2013a). The CDC has revealed that asthma affects 18.7 million U.S. adults and is more common among people with lower education and income levels (CDC, 2013b). Especially concerning is that asthma is on the rise, with rates of asthma increasing 157% between 2000 and 2010 (CDC, 2013b).

Asthma attacks are acute episodes in which an asthma sufferer experiences the full range of symptoms. Asthma exacerbation is

often triggered by environmental factors, such as air pollution, allergens (e.g., pollen, mold, and pet hairs), cigarette smoke, airway infections, cold air or a sudden change in temperature, and exercise (CDC, 2013b).

Psychological factors appear to play an important role in asthma (Wright, Rodriguez, & Cohen, 1998), although some believe that psychological factors serve as potential triggers in only a subset of asthma patients (Ritz, Steptoe, Bobb, Harris, & Edwards, 2006). Many studies over the years have demonstrated that some people with asthma will experience asthma-like symptoms if they expect to experience such symptoms, such as when breathing an inert substance that they (falsely) believe will lead to airway obstruction (Sodergren & Hyland, 1999). As stress and emotions directly affect immune and respiratory functions, psychological factors likely serve as one of the most common triggers of asthma exacerbation (Trueba & Ritz, 2013).

People with asthma tend to report and display a high level of negative emotions such as anxiety, and asthma attacks have been linked to periods of high emotionality (Lehrer, Isenberg, & Hochron, 1993). In addition, high levels of emotional distress during both laboratory tasks and daily life have been found to negatively affect airway function and can produce asthma-like symptoms in people with asthma (von Leupoldt, Ehnes, & Dahme, 2006). In one investigation, 20 adults with asthma wore preprogrammed wristwatches that signaled them to breathe into a portable device that measures airway function. Results showed that higher levels of negative emotions and stress were associated with increased airway obstruction and self-reported asthma symptoms (Smyth, Soefer, Hurewitz, Kliment, & Stone, 1999). In addition, D'Amato, Liccardi, Cecchi, Pellegrino, & D'Amato (2010) described a case study of an 18-year-old man with asthma whose girlfriend had broken up with him, leaving him in a depressed state. She had also unfriended him on Facebook , while friending other young males. Eventually, the young man was able to "friend" her once again and could monitor her activity through Facebook. Subsequently, he would experience asthma symptoms whenever he logged on and accessed her profile. When he later resigned not to use Facebook any longer, the asthma attacks stopped. This case suggests that the use of Facebook and other forms of social media may represent a new source of stress—it may be a triggering factor for asthma attacks, especially in depressed asthmatic individuals.

Exposure to stressful experiences, particularly those that involve parental or interpersonal conflicts, has been linked to the development of asthma throughout the lifespan. A longitudinal study of 145 children found that parenting difficulties during the first year of life increased the chances that the child developed asthma by 107% (Klinnert et al., 2001). In addition, a cross-sectional study of over $10,000$ Finnish college students found that high rates of parent or personal conflicts (e.g., parental divorce, separation from spouse, or severe conflicts in other long-term relationships) increased the risk of asthma onset (Kilpeläinen, Koskenvuo, Helenius, & Terho, 2002). Further, a study of over $4,000$ middle-aged men who were interviewed in the early 1990s and again a decade later found that breaking off an important life partnership (e.g., divorce or breaking off relationship from parents) increased the risk of developing asthma by 124% over the time of the study (Loerbroks, Apfelbacher, Thayer, Debling, & Stürmer, 2009).

Tension Headaches

A headache is a continuous pain anywhere in the head and neck region. Migraine headaches are a type of headache thought to be caused by blood vessel swelling and increased blood flow (McIntosh, 2013). Migraines are characterized by severe pain on one or both sides of the head, an upset stomach, and disturbed vision. They are more frequently experienced by women than by men (American Academy of Neurology, 2014). Tension headaches are triggered by tightening/tensing of facial and neck muscles; they are the most commonly experienced kind of headache, accounting for about 42% of all headaches worldwide (Stovner et al., 2007). In the United States, well over one-third of the population experiences tension headaches each year, and $2-3\%$ of the population suffers from chronic tension headaches (Schwartz, Stewart, Simon, & Lipton, 1998).

A number of factors can contribute to tension headaches, including sleep deprivation, skipping meals, eye strain, overexertion, muscular tension caused by poor posture, and stress (MedicineNet, 2013). Although there is uncertainty regarding the exact mechanisms through which stress can produce tension headaches, stress has been demonstrated to increase sensitivity to pain (Caceres & Burns, 1997; Logan et al., 2001). In general, tension headache sufferers, compared to non-sufferers, have a lower threshold for and greater sensitivity to pain (Ukestad & Wittrock, 1996), and they report greater levels of subjective stress when faced with a stressor (Myers, Wittrock, & Foreman, 1998). Thus, stress may contribute to tension headaches by increasing pain sensitivity in already-sensitive pain pathways in tension headache sufferers (Cathcart, Petkov, & Pritchard, 2008).

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18.5: Regulation of Stress

Learning Objectives

- Define coping and differentiate between problem-focused and emotion-focused coping
- Describe the importance of perceived control in our reactions to stress
- Explain how social support is vital in health and longevity

As we learned in the previous section, **stress**—especially if it is chronic—takes a toll on our bodies and can have enormously negative health implications. When we experience events in our lives that we appraise as stressful, it is essential that we use effective coping strategies to manage our stress. **Coping** refers to mental and behavioral efforts that we use to deal with problems relating to stress, including its presumed cause and the unpleasant feelings and emotions it produces.

Coping Styles

Lazarus and Folkman (1984) distinguished two fundamental kinds of coping: problem-focused coping and emotion-focused coping. In problem-focused coping, one attempts to manage or alter the problem that is causing one to experience stress (i.e., the stressor). Problem-focused coping strategies are similar to strategies used in everyday problem-solving: they typically involve identifying the problem, considering possible solutions, weighing the costs and benefits of these solutions, and then selecting an alternative (Lazarus & Folkman, 1984). As an example, suppose Bradford receives a midterm notice that he is failing statistics class. If Bradford adopts a **problem-focused coping** approach to managing his stress, he would be proactive in trying to alleviate the source of the stress. He might contact his professor to discuss what must be done to raise his grade, he might also decide to set aside two hours daily to study statistics assignments, and he may seek tutoring assistance. A problem-focused approach to managing stress means we actively try to do things to address the problem.

Emotion-focused coping, in contrast, consists of efforts to change or reduce the negative emotions associated with stress. These efforts may include avoiding, minimizing, or distancing oneself from the problem, or positive comparisons with others ("I'm not as bad off as she is"), or seeking something positive in a negative event ("Now that I've been fired, I can sleep in for a few days"). In some cases, **emotion-focused coping** strategies involve reappraisal, whereby the stressor is construed differently (and somewhat self-deceptively) without changing its objective level of threat (Lazarus & Folkman, 1984). For example, a person sentenced to federal prison who thinks, "This will give me a great chance to network with others," is using reappraisal. If Bradford adopted an emotion-focused approach to managing his midterm deficiency stress, he might watch a comedy movie, play video games, or spend hours on Twitter to take his mind off the situation. In a certain sense, emotion-focused coping can be thought of as treating the symptoms rather than the actual cause.

While many stressors elicit both kinds of coping strategies, problem-focused coping is more likely to occur when encountering stressors we perceive as controllable, while emotion-focused coping is more likely to predominate when faced with stressors that we believe we are powerless to change (Folkman & Lazarus, 1980). Clearly, emotion-focused coping is more effective in dealing with uncontrollable stressors. For example, if at midnight you are stressing over a 40-page paper due in the morning that you have not yet started, you are probably better off recognizing the hopelessness of the situation and doing something to take your mind off it; taking a problem-focused approach by trying to accomplish this task would only lead to frustration, anxiety, and even more stress.

Fortunately, most stressors we encounter can be modified and are, to varying degrees, controllable. A person who cannot stand her job can quit and look for work elsewhere; a middle-aged divorcee can find another potential partner; the freshman who fails an exam can study harder next time, and a breast lump does not necessarily mean that one is fated to die of breast cancer.

Control and Stress

The desire and ability to predict events, make decisions, and affect outcomes—that is, to enact control in our lives—is a basic tenet of human behavior (Everly & Lating, 2002). Albert Bandura (1997) stated that "the intensity and chronicity of human stress is governed largely by perceived control over the demands of one's life" (p. 262). As cogently described in his statement, our reaction to potential stressors depends to a large extent on how much control we feel we have over such things. **Perceived**

control is our beliefs about our personal capacity to exert influence over and shape outcomes, and it has major implications for our health and happiness (Infurna & Gerstorf, 2014). Extensive research has demonstrated that perceptions of personal control are associated with a variety of favorable outcomes, such as better physical and mental health and greater psychological well-being (Diehl & Hay, 2010). Greater personal control is also associated with lower reactivity to stressors in daily life. For example, researchers in one investigation found that higher levels of perceived control at one point in time were later associated with lower emotional and physical reactivity to interpersonal stressors (Neupert, Almeida, & Charles, 2007). Further, a daily diary study with 34 older widows found that their stress and anxiety levels were significantly reduced on days during which the widows felt greater perceived control (Ong, Bergeman, & Bisconti, 2005).

DIG DEEPER: Learned Helplessness

When we lack a sense of control over the events in our lives, particularly when those events are threatening, harmful, or noxious, the psychological consequences can be profound. In one of the better illustrations of this concept, psychologist Martin Seligman conducted a series of classic experiments in the 1960s (Seligman & Maier, 1967) in which dogs were placed in a chamber where they received electric shocks from which they could not escape. Later, when these dogs were given the opportunity to escape the shocks by jumping across a partition, most failed to even try; they seemed to just give up and passively accept any shocks the experimenters chose to administer. In comparison, dogs who were previously allowed to escape the shocks tended to jump the partition and escape the pain (See figure 14.22 below).



Figure 14.22 *Seligman's learned helplessness experiments with dogs used an apparatus that measured when the animals would move from a floor delivering shocks to one without.*

Seligman believed that the dogs who failed to try to escape the later shocks were demonstrating **learned helplessness**: They had acquired a belief that they were powerless to do anything about the noxious stimulation they were receiving. Seligman also believed that the passivity and lack of initiative these dogs demonstrated was similar to that observed in human depression. Therefore, Seligman speculated that acquiring a sense of learned helplessness might be an important cause of depression in humans: Humans who experience negative life events that they believe they are unable to control may become helpless. As a result, they give up trying to control or change the situation and some may become depressed and show lack of initiative in future situations in which they can control the outcomes (Seligman, Maier, & Geer, 1968).

Seligman and colleagues later reformulated the original learned helplessness model of depression (Abramson, Seligman, & Teasdale, 1978). In their reformulation, they emphasized attributions (i.e., a mental explanation for why something occurred) that lead to the perception that one lacks control over negative outcomes are important in fostering a sense of learned helplessness. For example, suppose a coworker shows up late to work; your belief as to what caused the coworker's tardiness would be an attribution (e.g., too much traffic, slept too late, or just doesn't care about being on time).

The reformulated version of Seligman's study holds that the attributions made for negative life events contribute to depression. Consider the example of a student who performs poorly on a midterm exam. This model suggests that the student will make three kinds of attributions for this outcome: internal vs. external (believing the outcome was caused by his own personal inadequacies or by environmental factors), stable vs. unstable (believing the cause can be changed or is permanent), and global vs. specific (believing the outcome is a sign of inadequacy in most everything versus just this area). Assume that the student makes an internal ("I'm just not smart"), stable ("Nothing can be done to change the fact that I'm not smart") and global ("This is another example of how lousy I am at everything") attribution for the poor performance. The reformulated theory predicts that the student would perceive a lack of control over this stressful event and thus be especially prone to developing depression. Indeed, research has demonstrated that people who have a tendency to make internal, global, and stable attributions for bad outcomes tend to develop symptoms of depression when faced with negative life experiences (Peterson & Seligman, 1984).

Seligman's learned helplessness model has emerged over the years as a leading theoretical explanation for the onset of major depressive disorder. When you study psychological disorders, you will learn more about the latest reformulation of this model—now called hopelessness theory.

People who report higher levels of perceived control view their health as controllable, thereby making it more likely that they will better manage their health and engage in behaviors conducive to good health (Bandura, 2004). Not surprisingly, greater perceived control has been linked to lower risk of physical health problems, including declines in physical functioning (Infurna, Gerstorf, Ram, Schupp, & Wagner, 2011), heart attacks (Rosengren et al., 2004), and both cardiovascular disease incidence (Stürmer, Hasselbach, & Amelang, 2006) and mortality from cardiac disease (Surtees et al., 2010). In addition, longitudinal studies of British civil servants have found that those in low-status jobs (e.g., clerical and office support staff) in which the degree of control over the job is minimal are considerably more likely to develop heart disease than those with high-status jobs or considerable control over their jobs (Marmot, Bosma, Hemingway, & Stansfeld, 1997).

The link between perceived control and health may provide an explanation for the frequently observed relationship between social class and health outcomes (Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012). In general, research has found that more affluent individuals experience better health mainly because they tend to believe that they can personally control and manage their reactions to life's stressors (Johnson & Krueger, 2006). Perhaps buoyed by the perceived level of control, individuals of higher social class may be prone to overestimating the degree of influence they have over particular outcomes. For example, those of higher social class tend to believe that their votes have greater sway on election outcomes than do those of lower social class, which may explain higher rates of voting in more affluent communities (Krosnick, 1990). Other research has found that a sense of perceived control can protect less affluent individuals from poorer health, depression, and reduced life-satisfaction—all of which tend to accompany lower social standing (Lachman & Weaver, 1998).

Taken together, findings from these and many other studies clearly suggest that perceptions of control and coping abilities are important in managing and coping with the stressors we encounter throughout life.

Social Support

The need to form and maintain strong, stable relationships with others is a powerful, pervasive, and fundamental human motive (Baumeister & Leary, 1995). Building strong interpersonal relationships with others helps us establish a network of close, caring individuals who can provide social support in times of distress, sorrow, and fear. **Social support** can be thought of as the soothing impact of friends, family, and acquaintances (Baron & Kerr, 2003). Social support can take many forms, including advice, guidance, encouragement, acceptance, emotional comfort, and tangible assistance (such as financial help). Thus, other people can be very comforting to us when we are faced with a wide range of life stressors, and they can be extremely helpful in our efforts to manage these challenges. Even in nonhuman animals, species mates can offer social support during times of stress. For example, elephants seem to be able to sense when other elephants are stressed and will often comfort them with physical contact—such as a trunk touch—or an empathetic vocal response (Krumboltz, 2014).

Scientific interest in the importance of social support first emerged in the 1970s when health researchers developed an interest in the health consequences of being socially integrated (Stroebe & Stroebe, 1996). Interest was further fueled by longitudinal studies showing that social connectedness reduced mortality. In one classic study, nearly $7,000$ Alameda County, California, residents were followed over 9 years. Those who had previously indicated that they lacked social and community ties were more likely to die during the follow-up period than those with more extensive social networks. Compared to those with the most social contacts, isolated men and women were, respectively, 2.3 and 2.8 times more likely to die. These trends persisted even after controlling for a variety of health-related variables, such as smoking, alcohol consumption, self-reported health at the beginning

of the study, and physical activity (Berkman & Syme, 1979).

Since the time of that study, social support has emerged as one of the well-documented psychosocial factors affecting health outcomes (Uchino, 2009). A statistical review of 148 studies conducted between 1982 and 2007 involving over $300,000$ participants concluded that individuals with stronger social relationships have a 50% greater likelihood of survival compared to those with weak or insufficient social relationships (Holt-Lunstad, Smith, & Layton, 2010). According to the researchers, the magnitude of the effect of social support observed in this study is comparable with quitting smoking and exceeded many well-known risk factors for mortality, such as obesity and physical inactivity (See figure 14.23).

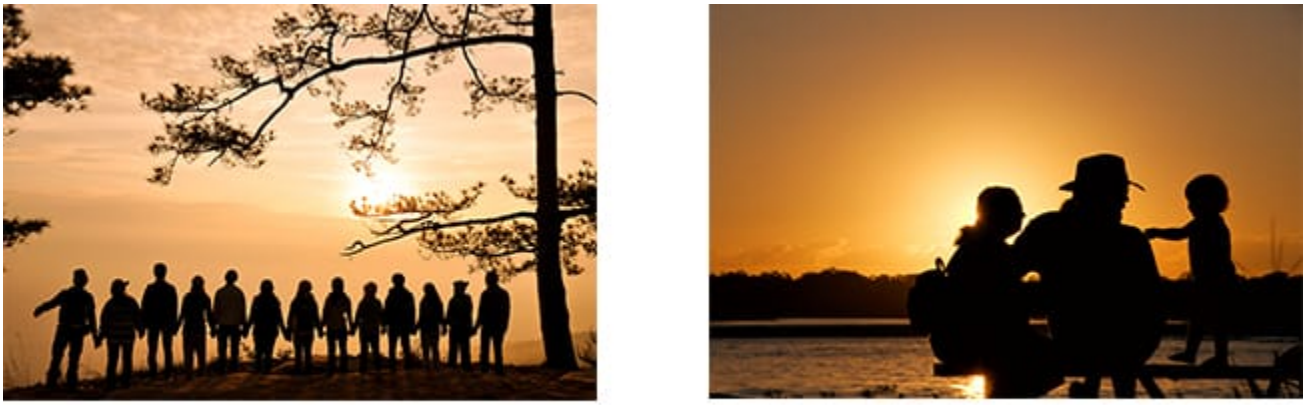


Figure 14.23 Close relationships with others, whether (a) a group of friends or (b) a family circle, provide more than happiness and fulfillment—they can help foster good health. (credit a: modification of work by Nattachai Noogure; credit b: modification of work by Christian Haugen)

A number of large-scale studies have found that individuals with low levels of social support are at greater risk of mortality, especially from cardiovascular disorders (Brummett et al., 2001). Further, higher levels of social supported have been linked to better survival rates following breast cancer (Falagas et al., 2007) and infectious diseases, especially HIV infection (Lee & Rotheram-Borus, 2001). In fact, a person with high levels of social support is less likely to contract a common cold. In one study, 334 participants completed questionnaires assessing their sociability; these individuals were subsequently exposed to a virus that causes a common cold and monitored for several weeks to see who became ill. Results showed that increased sociability was linearly associated with a decreased probability of developing a cold (Cohen, Doyle, Turner, Alper, & Skoner, 2003).

For many of us, friends are a vital source of social support. But what if you found yourself in a situation in which you lacked friends or companions? For example, suppose a popular high school student attends a far-away college, does not know anyone, and has trouble making friends and meaningful connections with others during the first semester. What can be done? If real life social support is lacking, access to distant friends via social media may help compensate. In a study of college freshmen, those with few face-to-face friends on campus but who communicated electronically with distant friends were less distressed that those who did not (Raney & Troop-Gordon, 2012). Also, for some people, our families—especially our parents—are a major source of social support.

Social support appears to work by boosting the immune system, especially among people who are experiencing stress (Uchino, Vaughn, Carlisle, & Birmingham, 2012). In a pioneering study, spouses of cancer patients who reported high levels of social support showed indications of better immune functioning on two out of three immune functioning measures, compared to spouses who were below the median on reported social support (Baron, Cutrona, Hicklin, Russell, & Lubaroff, 1990). Studies of other populations have produced similar results, including those of spousal caregivers of dementia sufferers, medical students, elderly adults, and cancer patients (Cohen & Herbert, 1996; Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002).

In addition, social support has been shown to reduce blood pressure for people performing stressful tasks, such as giving a speech or performing mental arithmetic (Lepore, 1998). In these kinds of studies, participants are usually asked to perform a stressful task either alone, with a stranger present (who may be either supportive or unsupportive), or with a friend present. Those tested with a friend present generally exhibit lower blood pressure than those tested alone or with a stranger (Fontana, Diegnan, Villeneuve, & Lepore, 1999). In one study, 112 female participants who performed stressful mental arithmetic exhibited lower blood pressure when they received support from a friend rather than a stranger, but only if the friend was a male (Phillips, Gallagher, & Carroll, 2009). Although these findings are somewhat difficult to interpret, the authors mention that it is possible

that females feel less supported and more evaluated by other females, particularly females whose opinions they value.

Taken together, the findings above suggest one of the reasons social support is connected to favorable health outcomes is because it has several beneficial physiological effects in stressful situations. However, it is also important to consider the possibility that social support may lead to better health behaviors, such as a healthy diet, exercising, smoking cessation, and cooperation with medical regimens (Uchino, 2009).

DIG DEEPER: Stress and Discrimination

Being the recipient of prejudice and discrimination is associated with a number of negative outcomes. Many studies have shown how discrimination is a significant stressor for marginalized groups (Pascoe & Smart Richman, 2009). Discrimination negatively impacts both physical and mental health for individuals in stigmatized groups. As you'll learn when you study social psychology, various social identities (such as gender, age, religion, sexuality, ethnicity) often lead people to simultaneously be exposed to multiple forms of discrimination, which can have even stronger negative effects on mental and physical health (Vines, Ward, Cordoba, & Black, 2017). For example, the amplified levels of discrimination faced by Latinx transgender women may have related effects, leading to high stress levels and poor mental and physical health outcomes.

Perceived control and the general adaptation syndrome help explain the process by which discrimination affects mental and physical health. Discrimination can be conceptualized as an uncontrollable, persistent, and unpredictable stressor. When a discriminatory event occurs, the target of the event initially experiences an acute stress response (alarm stage). This acute reaction alone does not typically have a great impact on health. However, discrimination tends to be a chronic stressor. As people in marginalized groups experience repeated discrimination, they develop a heightened reactivity as their bodies prepare to act quickly (resistance stage). This long-term accumulation of stress responses can eventually lead to increases in negative emotion and wear on physical health (exhaustion stage). This explains why a history of perceived discrimination is associated with a host of mental and physical health problems including depression, cardiovascular disease, and cancer (Pascoe & Smart Richman, 2009).

Protecting stigmatized groups from the negative impact of discrimination-induced stress may involve reducing the incidence of discriminatory behaviors in conjunction with protective strategies that reduce the impact of discriminatory events when they occur. Civil rights legislation has protected some stigmatized groups by making discrimination a prosecutable offense in many social contexts. However, some groups (e.g., transgender people) often lack important legal recourse when discrimination occurs. Moreover, most modern discrimination comes in subtle forms that fall below the radar of the law. For example, discrimination may be experienced as selective inhospitality toward people of specific races or ethnicities, but little is done in response since it would be easy to attribute the behavior to other causes. Although some cultural changes are increasingly helping people to recognize and control subtle discrimination, such shifts may take a long time.

Similar to other stressors, buffers like social support and healthy coping strategies appear to be effective in lowering the impact of perceived discrimination. For example, one study (Ajrouch, Reisine, Lim, Sohn, & Ismail, 2010) showed that discrimination predicted high psychological distress among African American mothers living in Detroit. However, the women who had readily available emotional support from friends and family experienced less distress than those with fewer social resources. While coping strategies and social support may buffer the effects of discrimination, they fail to erase all of the negative impacts. Vigilant antidiscrimination efforts, including the development of legal protections for vulnerable groups, are needed to reduce discrimination, stress, and the resulting physical and mental health effects.

Stress Reduction Techniques

Beyond having a sense of control and establishing social support networks, there are numerous other means by which we can manage stress (See figure 14.24). A common technique people use to combat stress is **exercise** (Salmon, 2001). It is well-established that exercise, both of long (aerobic) and short (anaerobic) duration, is beneficial for both physical and mental health (Everly & Lating, 2002). There is considerable evidence that physically fit individuals are more resistant to the adverse effects of stress and recover more quickly from stress than less physically fit individuals (Cotton, 1990). In a study of more than 500 Swiss police officers and emergency service personnel, increased physical fitness was associated with reduced stress, and regular exercise was reported to protect against stress-related health problems (Gerber, Kellman, Hartman, & Pühse, 2010).



(a) (b) (c)

Figure 14.24 Stress reduction techniques may include (a) exercise, (b) meditation and relaxation, or (c) biofeedback. (credit a: modification of work by "UNE Photos"/Flickr; credit b: modification of work by Caleb Roenigk; credit c: modification of work by Dr. Carmen Russoniello)

One reason exercise may be beneficial is because it might buffer some of the deleterious physiological mechanisms of stress. One study found rats that exercised for six weeks showed a decrease in hypothalamic-pituitary-adrenal responsiveness to mild stressors (Campeau et al., 2010). In high-stress humans, exercise has been shown to prevent telomere shortening, which may explain the common observation of a youthful appearance among those who exercise regularly (Puterman et al., 2010). Further, exercise in later adulthood appears to minimize the detrimental effects of stress on the hippocampus and memory (Head, Singh, & Bugg, 2012). Among cancer survivors, exercise has been shown to reduce anxiety (Speck, Courneya, Masse, Duval, & Schmitz, 2010) and depressive symptoms (Craft, VanIterson, Helenowski, Rademaker, & Courneya, 2012). Clearly, exercise is a highly effective tool for regulating stress.

In the 1970s, Herbert Benson, a cardiologist, developed a stress reduction method called the **relaxation response technique** (Greenberg, 2006). The relaxation response technique combines relaxation with transcendental **meditation**, and consists of four components (Stein, 2001):

1. sitting upright on a comfortable chair with feet on the ground and body in a relaxed position,
2. a quiet environment with eyes closed,
3. repeating a word or a phrase—a mantra—to oneself, such as "alert mind, calm body,"
4. passively allowing the mind to focus on pleasant thoughts, such as nature or the warmth of your blood nourishing your body.

The relaxation response approach is conceptualized as a general approach to stress reduction that reduces sympathetic arousal, and it has been used effectively to treat people with high blood pressure (Benson & Proctor, 1994).

Another technique to combat stress, **biofeedback**, was developed by Gary Schwartz at Harvard University in the early 1970s. Biofeedback is a technique that uses electronic equipment to accurately measure a person's neuromuscular and autonomic activity—feedback is provided in the form of visual or auditory signals. The main assumption of this approach is that providing somebody biofeedback will enable the individual to develop strategies that help gain some level of voluntary control over what are normally involuntary bodily processes (Schwartz & Schwartz, 1995). A number of different bodily measures have been used in biofeedback research, including facial muscle movement, brain activity, and skin temperature, and it has been applied successfully with individuals experiencing tension headaches, high blood pressure, asthma, and phobias (Stein, 2001).

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CHAPTER 19: SLEEP

19.1: Sleep
19.2: Why Do We Sleep?
19.3: Sleeping and Dreaming Revitalize Us for Action
19.4: Sleep Problems and Disorders

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19.1: Sleep

We spend approximately one-third of our lives sleeping. Given that the average life expectancy for U.S. citizens falls between 73 and 79 years old (Singh & Siahpush, 2006), we can expect to spend approximately 25 years of our lives sleeping. Some animals never sleep (e.g., several fish and amphibian species); other animals can go extended periods of time without sleep and without apparent negative consequences (e.g., dolphins); yet some animals (e.g., rats) die after two weeks of sleep deprivation (Siegel, 2008). Why do we devote so much time to sleeping? Is it absolutely essential that we sleep? This section will consider these questions and explore various explanations for why we sleep.

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19.2: Why Do We Sleep?

Given the central role that sleep plays in our lives and the number of adverse consequences that have been associated with sleep deprivation, one would think that we would have a clear understanding of why it is that we sleep. Unfortunately, this is not the case; however, several hypotheses have been proposed to explain the function of sleep.

Adaptive Function of Sleep

One popular hypothesis of sleep incorporates the perspective of evolutionary psychology. **Evolutionary psychology** is a discipline that studies how universal patterns of behavior and cognitive processes have evolved over time as a result of natural selection. Variations and adaptations in cognition and behavior make individuals more or less successful in reproducing and passing their genes to their offspring. One hypothesis from this perspective might argue that sleep is essential to restore resources that are expended during the day. Just as bears hibernate in the winter when resources are scarce, perhaps people sleep at night to reduce their energy expenditures. While this is an intuitive explanation of sleep, there is little research that supports this explanation. In fact, it has been suggested that there is no reason to think that energetic demands could not be addressed with periods of rest and inactivity (Frank, 2006; Rial et al., 2007), and some research has actually found a negative correlation between energetic demands and the amount of time spent sleeping (Capellini et al., 2008).

Another evolutionary hypothesis of sleep holds that our sleep patterns evolved as an adaptive response to predatory risks, which increase in darkness. Thus we sleep in safe areas to reduce the chance of harm. Again, this is an intuitive and appealing explanation for why we sleep. Perhaps our ancestors spent extended periods of time asleep to reduce attention to themselves from potential predators. Comparative research indicates, however, that the relationship that exists between predatory risk and sleep is very complex and equivocal. Some research suggests that species that face higher predatory risks sleep fewer hours than other species (Capellini et al., 2008), while other researchers suggest there is no relation- ship between the amount of time a given species spends in deep sleep and its predation risk (Lesku et al., 2006).

It is quite possible that sleep serves no single universally adaptive function, and different species have evolved different patterns of sleep in response to their unique evolutionary pressures. While we have discussed the negative outcomes associated with sleep deprivation, it should be pointed out that there are many benefits that are associated with adequate amounts of sleep. A few such benefits listed by the National Sleep Foundation (n.d.) include maintaining healthy weight, lowering stress levels, improving mood, and increasing motor coordination, as well as a number of benefits related to cognition and memory formation.

Cognitive Function of Sleep

Another theory regarding why we sleep involves sleep's importance for cognitive function and memory formation (Rattenborg et al., 2007). Indeed, we know sleep deprivation results in disruptions in cognition and memory deficits (Brown, 2012), leading to impairments in our abilities to maintain attention, make decisions, and recall long-term memories. Moreover, these impairments become more severe as the amount of sleep deprivation increases (Alhola & Polo-Kantola, 2007).

Furthermore, slow-wave sleep after learning a new task can improve resultant performance on that task (Huber et al., 2004) and seems essential for effective memory formation (Stickgold, 2005). Understanding the impact of sleep on cognitive function should help you understand that cramming all night for a test may be not effective and can even prove counterproductive.

LINK TO LEARNING

Watch this brief video describing sleep deprivation in college students.

Here's another brief video describing sleep tips for college students.

Sleep has also been associated with other cognitive benefits. Research indicates that included among these possible benefits are increased capacities for creative thinking (Cai et al., 2009; Wagner et al., 2004), language learning (Fenn et al., 2003; Gómez et al., 2006), and inferential judgments (Ellenbogen et al., 2007). It is possible that even the processing of emotional information

is influenced by certain aspects of sleep (Walker, 2009).

LINK TO LEARNING

Watch this brief video describing the relationship between sleep and memory.

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19.3: Sleeping and Dreaming Revitalize Us for Action

Learning Objectives

1. Draw a graphic showing the usual phases of sleep during a normal night and notate the characteristics of each phase.
2. Review the disorders that affect sleep and the costs of sleep deprivation.
3. 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 behaviors* 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 behavior, 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. In addition to sending visual information to the thalamus, the ganglion cells in the retina send signals to a the *suprachiasmatic nucleus* (SCN) of the hypothalamus, located below the thalamus. The suprachiasmatic nucleus is the body's primary circadian "pacemaker" and contains cells that analyze the strength and duration of the light stimulus and send 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 misbehavior by other college 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 offenses 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 offenses 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 an 11-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 19.3.2, 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.

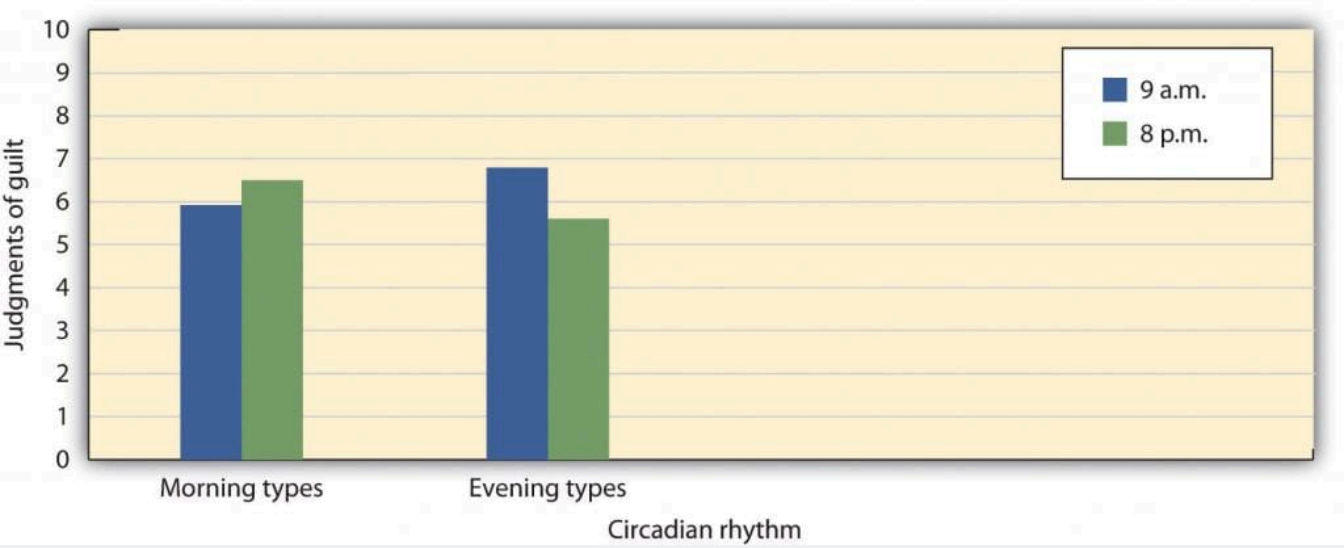


Figure 19.3.2 Circadian Rhythms and Stereotyping. Students who indicated that they had more energy in the morning relied on their stereotypes more at night, and students who indicated that they had more energy in the night relied on their stereotypes more in the morning. Adapted from Bodenhausen, G. V. (1990). Stereotypes as judgmental heuristics: Evidence of circadian variations in discrimination. *Psychological Science, 1*, 319–322.

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 while their brain waves were recorded by monitors, such as an *electroencephalogram*, or *EEG* (Figure 19.3.3).

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 19.3.4, these stages are of two major types: Rapid eye movement (REM) sleep is *a sleep stage characterized by the presence of quick fast 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 brain waves, 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).

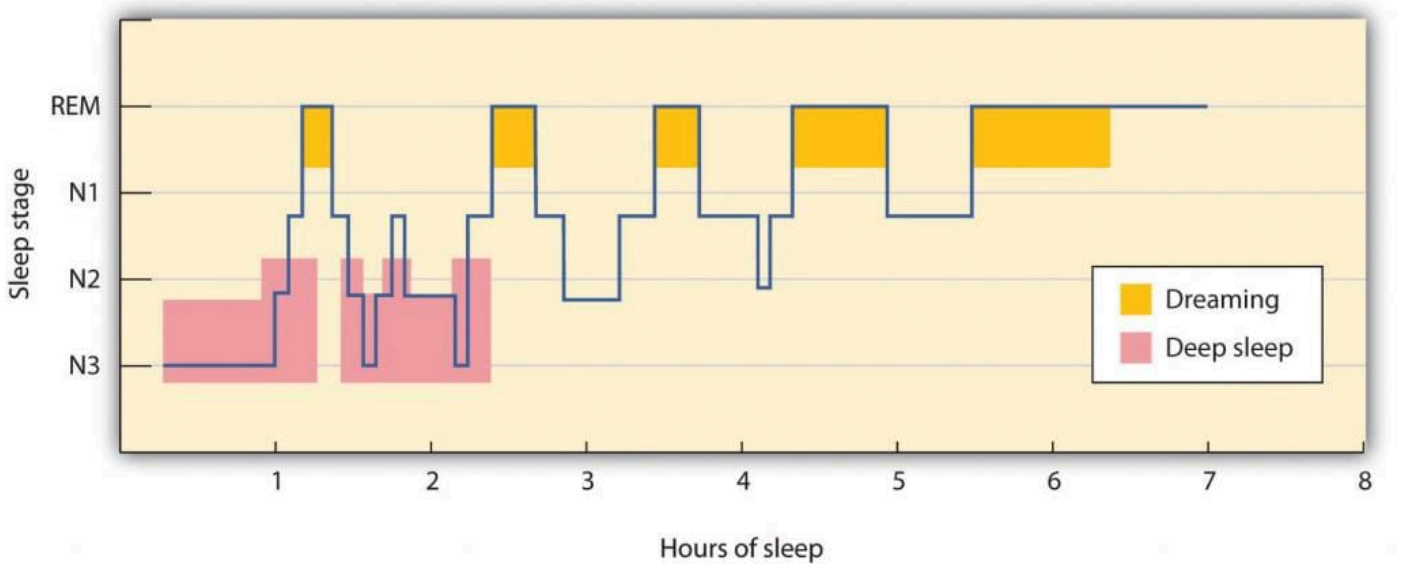


Figure 19.3.4 Stages of Sleep. During a typical night, our sleep cycles move between REM and non-REM sleep, with each cycle repeating at about 90-minute intervals. The deeper non-REM sleep stages usually occur earlier in the night.

As you can see in Figure 19.3.5, the brain waves 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.

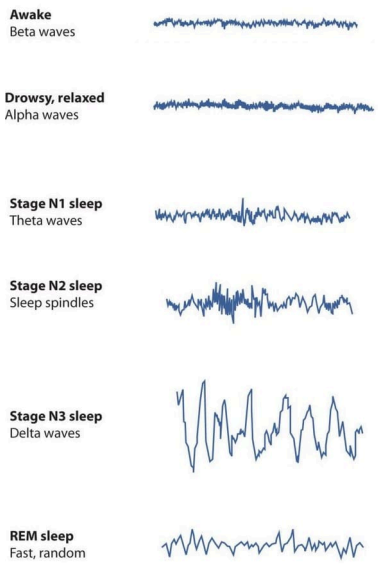


Figure 19.3.5 EEG Recordings of Brain Patterns During Sleep. Each stage of sleep has its own distinct pattern of brain activity.

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 bed-wetting 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 behaviors, 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 of 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 19.3.5). The length of the REM portion of the cycle tends to increase through the night, from about 5 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 (National Sleep Foundation, 2009), about one-fourth of American adults say they get a good night’s sleep only a few nights a month or less. 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 savings 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 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 19.3.6: Sarah – Big giant ouchie – CC BY 2.0.

Taking pills to sleep is not recommended unless all other methods of improving sleep have been tried. According to the National Sleep Foundation, 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.

- Think positively about your sleeping—try not to get anxious just because you are losing a little sleep.
- 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 3 hours before bedtime.
- Avoid naps, particularly in the late afternoon or evening.
- Keep a sleep diary to identify your sleep habits and patterns that you can share with your doctor.

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 raise 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 at least 200,000 Americans suffer from narcolepsy, although only about a quarter of these people have been diagnosed (National Heart, Lung, and Blood Institute, 2008).

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 *somnamulism* (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 latter can cause sleep disruption and injury for both the sufferer and bed partner.

Although many sleep disorders occur during non-REM sleep, *REM sleep behavior 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 9 hours of sleep per night, and most adults say that they require 7 to 8 hours per night (Mercer, Merritt, & Cowell, 1998; National Sleep Foundation, 2008). There are also individual differences in need for sleep. Some people do quite well with fewer than 6 hours of sleep per night, whereas others need 9 hours or more. The most recent study by the National Sleep Foundation suggests that adults should get between 7 and 9 hours of sleep per night (Figure 19.3.8), and yet Americans now average fewer than 7 hours.

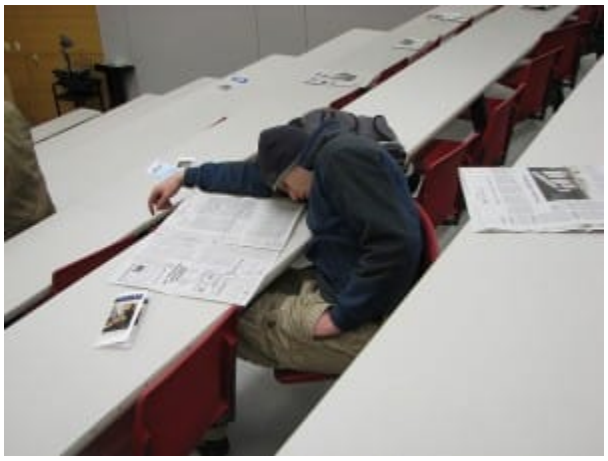


Figure 19.3.7: Are you getting enough sleep to maintain your health and abilities to concentrate? This student doesn't seem to be.. Hope For Gorilla – sleeping kid in NSC – CC BY 2.0.

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 college 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 1 or 2 hours can have a substantial impact on mood and performance.

How much sleep do you really need?

Age	Sleep needs
Newborns (0–2 months)	12 to 18 hours
Infants (3–11 months)	14 to 15 hours
Toddlers (1–3 years)	12 to 14 hours
Preschoolers (3–5 years)	11 to 13 hours
School-age children (5–10 years)	10 to 11 hours
Teens (10–17 years)	8.5 to 9.25 hours
Adults	7 to 9 hours

Figure 19.3.8: Average Hours of Required Sleep per Night. The average U.S. adult reported getting only 6.7 hours of sleep per night, which is less than the recommended range propose by the National Sleep Foundation. Adapted from National Sleep Foundation. (2008). *Sleep in America Poll*. Washington, DC: Author. Retrieved from www.sleepfoundation.org/sites/default/files/2008%20POLL%20SOF.PDF.

Sleep has a vital restorative function, and a prolonged lack of sleep results in increased anxiety, diminished performance, and, if severe and extended, may even result in 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 et al. (2003) found that older adults who had better sleep patterns also lived longer.

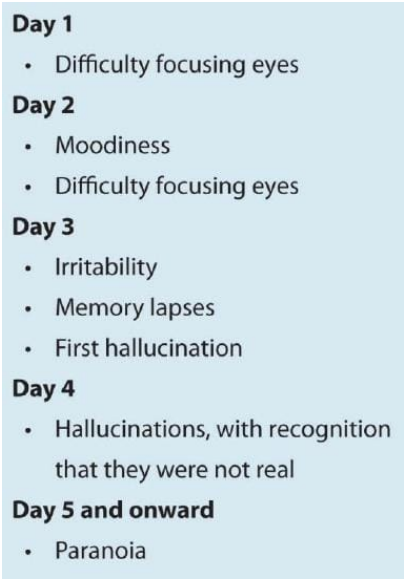


Figure 19.3.9: The Effects of Sleep Deprivation. In 1964, 17-year-old high school student Randy Gardner remained awake for 264 hours (11 days) in order to set a new Guinness World Record. At the request of his worried parents, he was monitored by a U.S. Navy psychiatrist, Lt. Cmdr. John J. Ross. This chart maps the progression of his behavioral changes over the 11 days. Adapted from Ross, J. J. (1965). Neurological findings after prolonged sleep deprivation. *Archives of Neurology, 12*, 399–403.

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 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 fulfillment*, 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 behaviors. 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 the consciousness is the result of neural activity in the brain.
- Human and animal behavior 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, known as stage N1, N2, and N3.
- Each sleep stage is marked by a specific pattern of biological responses and brain wave patterns.
- 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 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.

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19.4: Sleep Problems and Disorders

Learning Objectives

- Describe the symptoms and treatments of insomnia
- Recognize the symptoms of several parasomnias
- Describe the symptoms and treatments for sleep apnea
- Recognize risk factors associated with sudden infant death syndrome (SIDS) and steps to prevent it
- Describe the symptoms and treatments for narcolepsy

Many people experience disturbances in their sleep at some point in their lives. Depending on the population and sleep disorder being studied, between 30% and 50% of the population suffers from a sleep disorder at some point in their lives (Bixler, Kales, Soldatos, Kaels, & Healey, 1979; Hossain & Shapiro, 2002; Ohayon, 1997, 2002; Ohayon & Roth, 2002). This section will describe several sleep disorders as well as some of their treatment options.

Insomnia

Insomnia, a consistent difficulty in falling or staying asleep, is the most common of the sleep disorders. Individuals with insomnia often experience long delays between the times that they go to bed and actually fall asleep. In addition, these individuals may wake up several times during the night only to find that they have difficulty getting back to sleep. As mentioned earlier, one of the criteria for insomnia involves experiencing these symptoms for at least three nights a week for at least one month's time (Roth, 2007).

It is not uncommon for people suffering from insomnia to experience increased levels of anxiety about their inability to fall asleep. This becomes a self-perpetuating cycle because increased anxiety leads to increased arousal, and higher levels of arousal make the prospect of falling asleep even more unlikely. Chronic insomnia is almost always associated with feeling overtired and may be associated with symptoms of depression.

There may be many factors that contribute to insomnia, including age, drug use, exercise, mental status, and bedtime routines. Not surprisingly, insomnia treatment may take one of several different approaches. People who suffer from insomnia might limit their use of stimulant drugs (such as caffeine) or increase their amount of physical exercise during the day. Some people might turn to over-the-counter (OTC) or prescribed sleep medications to help them sleep, but this should be done sparingly because many sleep medications result in dependence and alter the nature of the sleep cycle, and they can increase insomnia over time. Those who continue to have insomnia, particularly if it affects their quality of life, should seek professional treatment.

Some forms of psychotherapy, such as cognitive-behavioral therapy, can help sufferers of insomnia. **Cognitive-behavioral therapy** is a type of psychotherapy that focuses on cognitive processes and problem behaviors. The treatment of insomnia likely would include stress management techniques and changes in problematic behaviors that could contribute to insomnia (e.g., spending more waking time in bed). Cognitive-behavioral therapy has been demonstrated to be quite effective in treating insomnia (Savard, Simard, Ivers, & Morin, 2005; Williams, Roth, Vatthauer, & McCrae, 2013).

Everyday Connection

Solutions to Support Healthy Sleep

Has something like this ever happened to you? My sophomore college housemate got so stressed out during finals sophomore year he drank almost a whole bottle of Nyquil to try to fall asleep. When he told me, I made him go see the college therapist.

Many college students struggle getting the recommended 7–9 hours of sleep each night. However, for some, it's not because of all-night partying or late-night study sessions. It's simply that they feel so overwhelmed and stressed that they cannot fall asleep or stay asleep. One or two nights of sleep difficulty is not unusual, but if you experience anything more than that, you should seek a doctor's advice.

Here are some tips to maintain healthy sleep:

- Stick to a sleep schedule, even on the weekends. Try going to bed and waking up at the same time every day to keep your biological clock in sync so your body gets in the habit of sleeping every night.
- Avoid anything stimulating for an hour before bed. That includes exercise and bright light from devices.
- Exercise daily.
- Avoid naps.
- Keep your bedroom temperature between 60 and 67 degrees. People sleep better in cooler temperatures.
- Avoid alcohol, cigarettes, caffeine, and heavy meals before bed. It may feel like alcohol helps you sleep, but it actually disrupts REM sleep and leads to frequent awakenings. Heavy meals may make you sleepy, but they can also lead to frequent awakenings due to gastric distress.
- If you cannot fall asleep, leave your bed and do something else until you feel tired again. Train your body to associate the bed with sleeping rather than other activities like studying, eating, or watching television shows.

Parasomnias

A **parasomnia** is one of a group of sleep disorders in which unwanted, disruptive motor activity and/or experiences during sleep play a role. Parasomnias can occur in either REM or NREM phases of sleep. Sleepwalking, restless leg syndrome, and night terrors are all examples of parasomnias (Mahowald & Schenck, 2000).

Sleepwalking

In **sleepwalking**, or somnambulism, the sleeper engages in relatively complex behaviors ranging from wandering about to driving an automobile. During periods of sleepwalking, sleepers often have their eyes open, but they are not responsive to attempts to communicate with them. Sleepwalking most often occurs during slow-wave sleep, but it can occur at any time during a sleep period in some affected individuals (Mahowald & Schenck, 2000).

Historically, somnambulism has been treated with a variety of pharmacotherapies ranging from benzodiazepines to antidepressants. However, the success rate of such treatments is questionable. Guilleminault et al. (2005) found that sleepwalking was not alleviated with the use of benzodiazepines. However, all of their somnambulistic patients who also suffered from sleep-related breathing problems showed a marked decrease in sleepwalking when their breathing problems were effectively treated.

DIG DEEPER: A Sleepwalking Defense?

On January 16, 1997, Scott Falater sat down to dinner with his wife and children and told them about difficulties he was experiencing on a project at work. After dinner, he prepared some materials to use in leading a church youth group the following morning, and then he attempted to repair the family's swimming pool pump before retiring to bed. The following morning, he awoke to barking dogs and unfamiliar voices from downstairs. As he went to investigate what was going on, he was met by a group of police officers who arrested him for the murder of his wife (Cartwright, 2004; CNN, 1999).

Yarmila Falater's body was found in the family's pool with 44 stab wounds. A neighbor called the police after witnessing Falater standing over his wife's body before dragging her into the pool. Upon a search of the premises, police found blood-stained clothes and a bloody knife in the trunk of Falater's car, and he had blood stains on his neck.

Remarkably, Falater insisted that he had no recollection of hurting his wife in any way. His children and his wife's parents all agreed that Falater had an excellent relationship with his wife and they couldn't think of a reason that would provide any sort of motive to murder her (Cartwright, 2004).

Scott Falater had a history of regular episodes of sleepwalking as a child, and he had even behaved violently toward his sister once when she tried to prevent him from leaving their home in his pajamas during a sleepwalking episode. He suffered from no apparent anatomical brain anomalies or psychological disorders. It appeared that Scott Falater had killed his wife in his sleep, or at least, that is the defense he used when he was tried for his wife's murder (Cartwright, 2004; CNN, 1999). In Falater's case, a jury found him guilty of first degree murder in June of 1999 (CNN, 1999); however, there are other murder

cases where the sleepwalking defense has been used successfully. As scary as it sounds, many sleep researchers believe that homicidal sleepwalking is possible in individuals suffering from the types of sleep disorders described below (Broughton et al., 1994; Cartwright, 2004; Mahowald, Schenck, & Cramer Bornemann, 2005; Pressman, 2007).

REM Sleep Behavior Disorder (RBD)

REM sleep behavior disorder (RBD) occurs when the muscle paralysis associated with the REM sleep phase does not occur. Individuals who suffer from RBD have high levels of physical activity during REM sleep, especially during disturbing dreams. These behaviors vary widely, but they can include kicking, punching, scratching, yelling, and behaving like an animal that has been frightened or attacked. People who suffer from this disorder can injure themselves or their sleeping partners when engaging in these behaviors. Furthermore, these types of behaviors ultimately disrupt sleep, although affected individuals have no memories that these behaviors have occurred (Arnulf, 2012).

This disorder is associated with a number of neurodegenerative diseases such as Parkinson's disease. In fact, this relationship is so robust that some view the presence of RBD as a potential aid in the diagnosis and treatment of a number of neurodegenerative diseases (Ferini-Strambi, 2011). Clonazepam, an anti-anxiety medication with sedative properties, is most often used to treat RBD. It is administered alone or in conjunction with doses of melatonin (the hormone secreted by the pineal gland). As part of treatment, the sleeping environment is often modified to make it a safer place for those suffering from RBD (Zangini, Calandra-Buonaura, Grimaldi, & Cortelli, 2011).

Other Parasomnias

A person with **restless leg syndrome** has uncomfortable sensations in the legs during periods of inactivity or when trying to fall asleep. This discomfort is relieved by deliberately moving the legs, which, not surprisingly, contributes to difficulty in falling or staying asleep. Restless leg syndrome is quite common and has been associated with a number of other medical diagnoses, such as chronic kidney disease and diabetes (Mahowald & Schenck, 2000). There are a variety of drugs that treat restless leg syndrome: benzodiazepines, opiates, and anticonvulsants (Restless Legs Syndrome Foundation, n.d.).

Night terrors result in a sense of panic in the sufferer and are often accompanied by screams and attempts to escape from the immediate environment (Mahowald & Schenck, 2000). Although individuals suffering from night terrors appear to be awake, they generally have no memories of the events that occurred, and attempts to console them are ineffective. Typically, individuals suffering from night terrors will fall back asleep again within a short time. Night terrors apparently occur during the NREM phase of sleep (Provini, Tinuper, Bisulli, & Lagaresi, 2011). Generally, treatment for night terrors is unnecessary unless there is some underlying medical or psychological condition that is contributing to the night terrors (Mayo Clinic, n.d.).

Sleep Apnea

Sleep apnea is defined by episodes during which a sleeper's breathing stops. These episodes can last 10–20 seconds or longer and often are associated with brief periods of arousal. While individuals suffering from sleep apnea may not be aware of these repeated disruptions in sleep, they do experience increased levels of fatigue. Many individuals diagnosed with sleep apnea first seek treatment because their sleeping partners indicate that they snore loudly and/or stop breathing for extended periods of time while sleeping (Henry & Rosenthal, 2013). Sleep apnea is much more common in overweight people and is often associated with loud snoring. Surprisingly, sleep apnea may exacerbate cardiovascular disease (Sánchez-de-la-Torre, Campos-Rodriguez, & Barbé, 2012). While sleep apnea is less common in thin people, anyone, regardless of their weight, who snores loudly or gasps for air while sleeping, should be checked for sleep apnea.

While people are often unaware of their sleep apnea, they are keenly aware of some of the adverse consequences of insufficient sleep. Consider a patient who believed that as a result of his sleep apnea he "had three car accidents in six weeks. They were ALL my fault. Two of them I didn't even know I was involved in until afterwards" (Henry & Rosenthal, 2013, p. 52). It is not uncommon for people suffering from undiagnosed or untreated sleep apnea to fear that their careers will be affected by the lack of sleep, illustrated by this statement from another patient, "I'm in a job where there's a premium on being mentally alert. I was really sleepy... and having trouble concentrating.... It was getting to the point where it was kind of scary" (Henry & Rosenthal, 2013, p. 52).

There are two types of sleep apnea: obstructive sleep apnea and central sleep apnea. **Obstructive sleep apnea** occurs when an individual's airway becomes blocked during sleep, and air is prevented from entering the lungs. In **central sleep apnea**,

disruption in signals sent from the brain that regulate breathing cause periods of interrupted breathing (White, 2005).

One of the most common treatments for sleep apnea involves the use of a special device during sleep. A **continuous positive airway pressure (CPAP)** device includes a mask that fits over the sleeper's nose and mouth, which is connected to a pump that pumps air into the person's airways, forcing them to remain open, as shown in Figure 4.13. Some newer CPAP masks are smaller and cover only the nose. This treatment option has proven to be effective for people suffering from mild to severe cases of sleep apnea (McDaid et al., 2009). However, alternative treatment options are being explored because consistent compliance by users of CPAP devices is a problem. Recently, a new EPAP (expiratory positive air pressure) device has shown promise in double-blind trials as one such alternative (Berry, Kryger, & Massie, 2011).

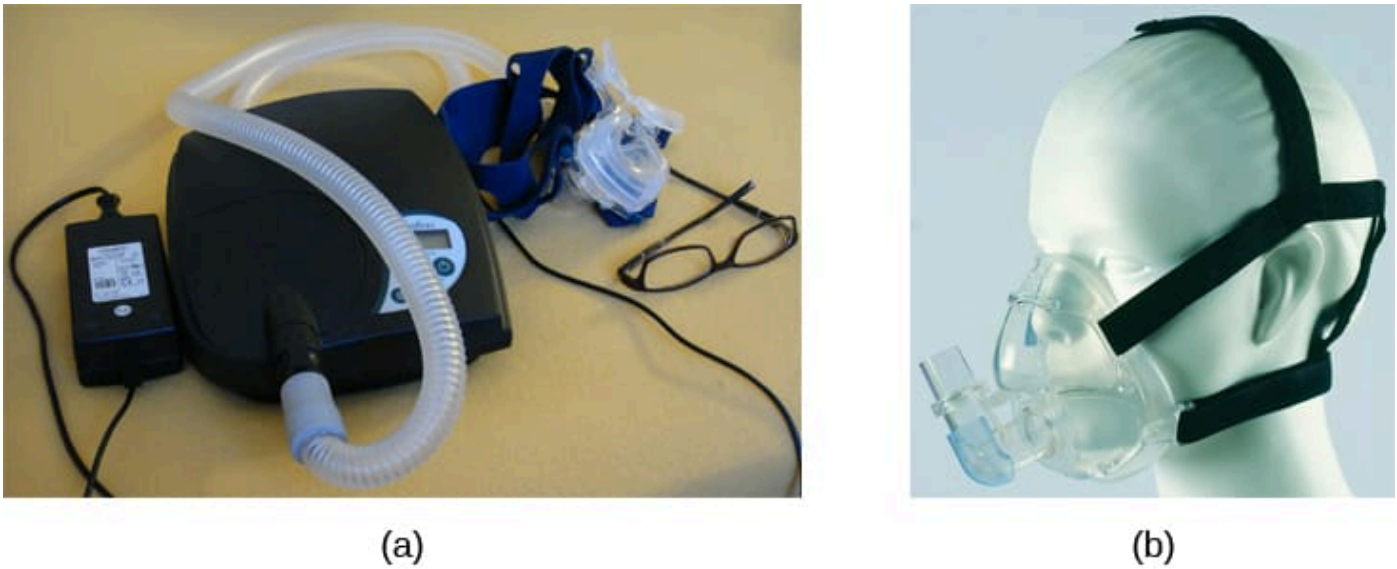


Figure **4.13** (a) A typical CPAP device used in the treatment of sleep apnea is (b) affixed to the head with straps, and a mask that covers the nose and mouth.

SIDS

In **sudden infant death syndrome (SIDS)** an infant stops breathing during sleep and dies. Infants younger than 12 months appear to be at the highest risk for SIDS, and boys have a greater risk than girls. A number of risk factors have been associated with SIDS including premature birth, smoking within the home, and hyperthermia. There may also be differences in both brain structure and function in infants that die from SIDS (Berkowitz, 2012; Mage & Donner, 2006; Thach, 2005).

The substantial amount of research on SIDS has led to a number of recommendations to parents to protect their children (Figure 4.14). For one, research suggests that infants should be placed on their backs when put down to sleep, and their cribs should not contain any items which pose suffocation threats, such as blankets, pillows or padded crib bumpers (cushions that cover the bars of a crib). Infants should not have caps placed on their heads when put down to sleep in order to prevent overheating, and people in the child's household should abstain from smoking in the home. Recommendations like these have helped to decrease the number of infant deaths from SIDS in recent years (Mitchell, 2009; Task Force on Sudden Infant Death Syndrome, 2011).



Figure **4.14** The Safe to Sleep campaign educates the public about how to minimize risk factors associated with SIDS. This campaign is sponsored in part by the National Institute of Child Health and Human Development.

Narcolepsy

Unlike the other sleep disorders described in this section, a person with **narcolepsy** cannot resist falling asleep at inopportune times. These sleep episodes are often associated with **cataplexy**, which is a lack of muscle tone or muscle weakness, and in some cases involves complete paralysis of the voluntary muscles. This is similar to the kind of paralysis experienced by healthy individuals during REM sleep (Burgess & Scammell, 2012; Hishikawa & Shimizu, 1995; Luppi et al., 2011). Narcoleptic episodes take on other features of REM sleep. For example, around one third of individuals diagnosed with narcolepsy experience vivid, dream-like hallucinations during narcoleptic attacks (Chokroverty, 2010).

Surprisingly, narcoleptic episodes are often triggered by states of heightened arousal or stress. The typical episode can last from a minute or two to half an hour. Once awakened from a narcoleptic attack, people report that they feel refreshed (Chokroverty, 2010). Obviously, regular narcoleptic episodes could interfere with the ability to perform one's job or complete schoolwork, and in some situations, narcolepsy can result in significant harm and injury (e.g., driving a car or operating machinery or other potentially dangerous equipment).

Generally, narcolepsy is treated using psychomotor stimulant drugs, such as amphetamines (Mignot, 2012). These drugs promote increased levels of neural activity. Narcolepsy is associated with reduced levels of the signaling molecule hypocretin in some areas of the brain (De la Herrán-Arita & Drucker-Colín, 2012; Han, 2012), and the traditional stimulant drugs do not have direct effects on this system. Therefore, it is quite likely that new medications that are developed to treat narcolepsy will be designed to target the hypocretin system.

There is a tremendous amount of variability among sufferers, both in terms of how symptoms of narcolepsy manifest and the effectiveness of currently available treatment options. This is illustrated by McCarty's (2010) case study of a 50-year-old woman who sought help for the excessive sleepiness during normal waking hours that she had experienced for several years. She indicated that she had fallen asleep at inappropriate or dangerous times, including while eating, while socializing with friends, and while driving her car. During periods of emotional arousal, the woman complained that she felt some weakness in the right side of her body. Although she did not experience any dream-like hallucinations, she was diagnosed with narcolepsy as a result of sleep testing. In her case, the fact that her cataplexy was confined to the right side of her body was quite unusual. Early attempts to treat her condition with a stimulant drug alone were unsuccessful. However, when a stimulant drug was used in conjunction with a popular antidepressant, her condition improved dramatically.

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CHAPTER 20: UNDERSTANDING YOUR BRAIN

20.1: Parts of the Nervous System
20.2: The Neuron is the Building Block of the Nervous System
20.3: The Brain and Spinal Cord
20.4: Debunking a common brain myth

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20.1: Parts of the Nervous System

Learning Objectives

- Describe the difference between the central and peripheral nervous systems
- Explain the difference between the somatic and autonomic nervous systems
- Differentiate between the sympathetic and parasympathetic divisions of the autonomic nervous system

The nervous system can be divided into two major subdivisions: the **central nervous system (CNS)** and the **peripheral nervous system (PNS)**, shown in Figure 3.13. The CNS is comprised of the brain and spinal cord; the PNS connects the CNS to the rest of the body. In this section, we focus on the peripheral nervous system; later, we look at the brain and spinal cord.

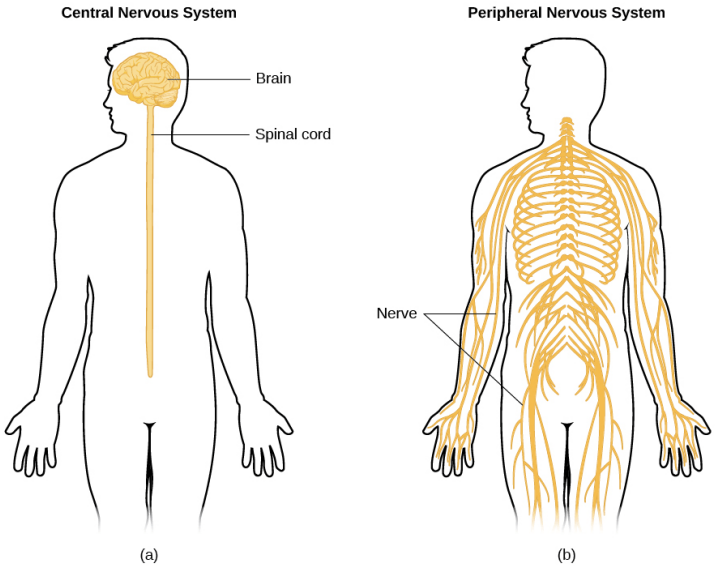


Figure **3.13** The nervous system is divided into two major parts: (a) the Central Nervous System and (b) the Peripheral Nervous System.

Peripheral Nervous System

The peripheral nervous system is made up of thick bundles of axons, called nerves, carrying messages back and forth between the CNS and the muscles, organs, and senses in the periphery of the body (i.e., everything outside the CNS). The PNS has two major subdivisions: the somatic nervous system and the autonomic nervous system.

The **somatic nervous system** is associated with activities traditionally thought of as conscious or voluntary. It is involved in the relay of sensory and motor information to and from the CNS; therefore, it consists of motor neurons and sensory neurons. Motor neurons, carrying instructions from the CNS to the muscles, are efferent fibers (efferent means “moving away from”). Sensory neurons, carrying sensory information to the CNS, are afferent fibers (afferent means “moving toward”). A helpful way to remember this is that **e**fferent = **e**xit and **a**fferent = **a**rrive. Each nerve is basically a bundle of neurons forming a two-way superhighway, containing thousands of axons, both efferent and afferent.

The **autonomic nervous system** controls our internal organs and glands and is generally considered to be outside the realm of voluntary control. It can be further subdivided into the sympathetic and parasympathetic divisions (Figure 3.14). The **sympathetic nervous system** is involved in preparing the body for stress-related activities; the **parasympathetic nervous system** is associated with returning the body to routine, day-to-day operations. The two systems have complementary functions, operating in tandem to maintain the body’s homeostasis. **Homeostasis** is a state of equilibrium, or balance, in which biological conditions (such as body temperature) are maintained at optimal levels.

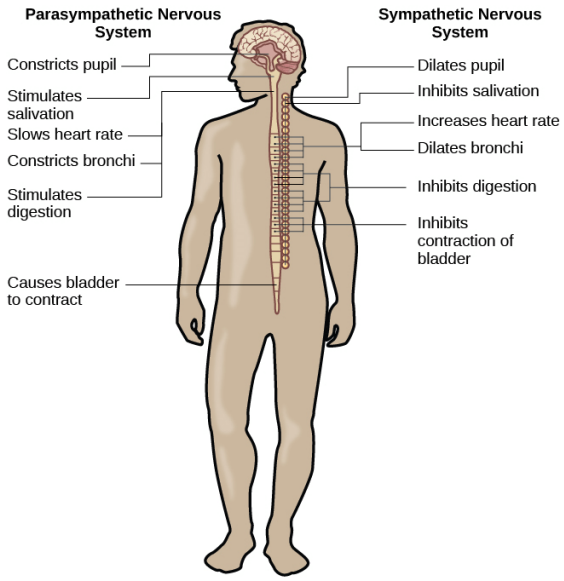


Figure **3.14** The sympathetic and parasympathetic divisions of the autonomic nervous system have the opposite effects on various systems.

The sympathetic nervous system is activated when we are faced with stressful or high-arousal situations. The activity of this system was adaptive for our ancestors, increasing their chances of survival. Imagine, for example, that one of our early ancestors, out hunting small game, suddenly disturbs a large bear with her cubs. At that moment, his body undergoes a series of changes—a direct function of sympathetic activation—preparing him to face the threat. His pupils dilate, his heart rate and blood pressure increase, his bladder relaxes, his liver releases glucose, and adrenaline surges into his bloodstream. This constellation of physiological changes, known as the **fight or flight response**, allows the body access to energy reserves and heightened sensory capacity so that it might fight off a threat or run away to safety.

Link to Learning

Watch this video about the Fight Flight Freeze response to learn more.

While it is clear that such a response would be critical for survival for our ancestors, who lived in a world full of real physical threats, many of the high-arousal situations we face in the modern world are more psychological in nature. For example, think about how you feel when you have to stand up and give a presentation in front of a roomful of people, or right before taking a big test. You are in no real physical danger in those situations, and yet you have evolved to respond to a perceived threat with the fight or flight response. This kind of response is not nearly as adaptive in the modern world; in fact, we suffer negative health consequences when faced constantly with psychological threats that we can neither fight nor flee. Recent research suggests that an increase in susceptibility to heart disease (Chandola, Brunner, & Marmot, 2006) and impaired function of the immune system (Glaser & Kiecolt-Glaser, 2005) are among the many negative consequences of persistent and repeated exposure to stressful situations. Some of this tendency for stress reactivity can be wired by early experiences of trauma.

Once the threat has been resolved, the parasympathetic nervous system takes over and returns bodily functions to a relaxed state. Our hunter's heart rate and blood pressure return to normal, his pupils constrict, he regains control of his bladder, and the liver begins to store glucose in the form of glycogen for future use. These restorative processes are associated with activation of the parasympathetic nervous system.

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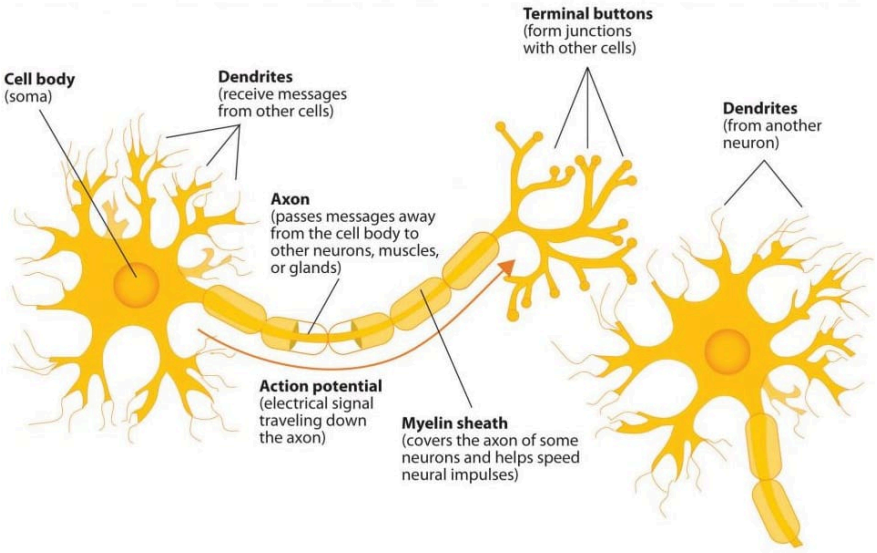
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20.2: The Neuron is the Building Block of the Nervous System

Learning Objectives

1. Describe the structure and functions of the neuron.
2. Draw a diagram of the pathways of communication within and between neurons.
3. 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 20.2.2, 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 fiber known as the dendrite, which *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 or to the muscles and glands*.



Figure

: Components of the Neuron

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*.

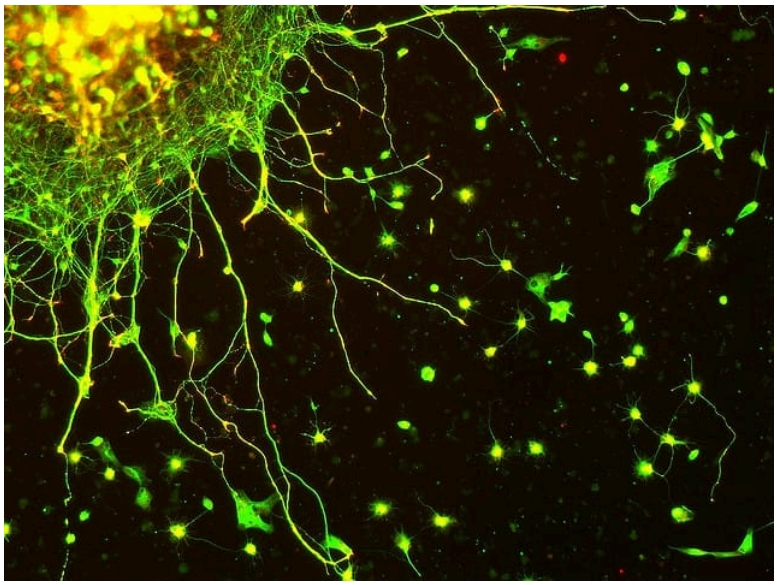


Figure 20.2.3: The nervous system, including the brain, is made up of billions of interlinked neurons. This vast interconnected web is responsible for all human thinking, feeling, and behavior. MR McGill – Neurons, In Vitro Color! – CC BY-NC 2.0

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, is it 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 signaled to emit chemicals known as *neurotransmitters*, which communicate with other neurons across the spaces between the cells, known as *synapses*.

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Video Clip: The Electrochemical Action of the Neuron. This video clip shows a model of the electrochemical action of the neuron and neurotransmitters. https://youtu.be/TKG0MtH5crc

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 20.2.4, 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. 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.

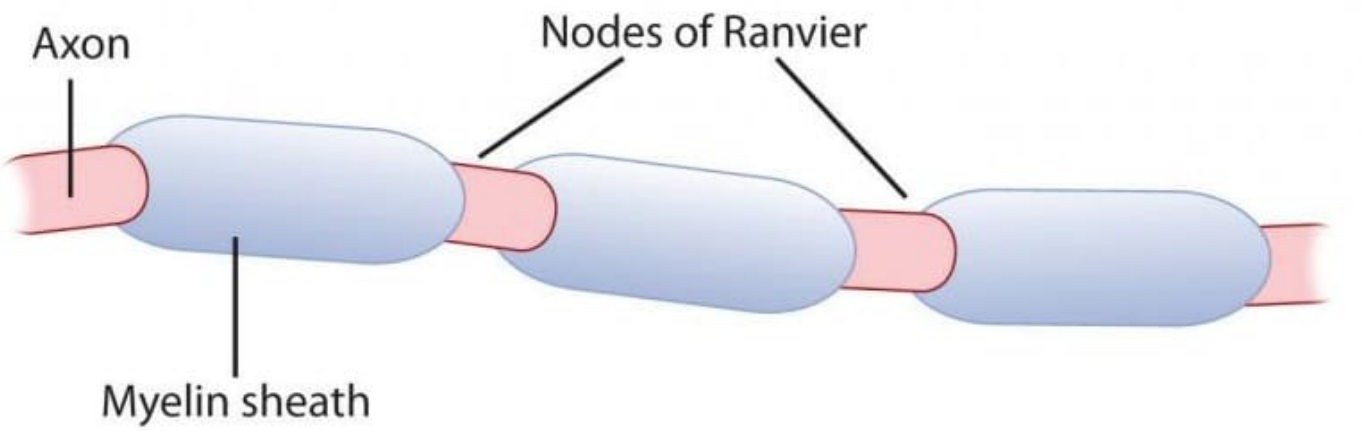


Figure 20.2.4: The Myelin Sheath and the Nodes of Ranvier. The myelin sheath wraps around the axon but also leaves small gaps called the nodes of Ranvier. The action potential jumps from node to node as it travels down the axon.

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, *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 neighboring 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 neighboring 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 20.2.5).

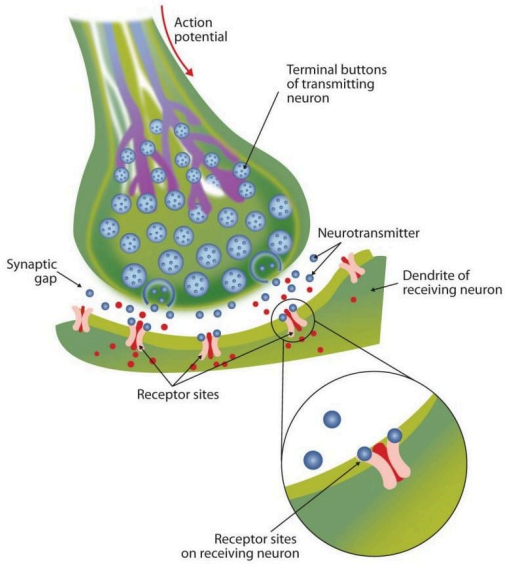


Figure 20.2.5: The Synapse. When the nerve impulse reaches the terminal button, it triggers the release of neurotransmitters into the synapse. The neurotransmitters fit into receptors on the receiving dendrites in the manner of a lock and key.

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, then 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, and 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 behavior. Neurotransmitters regulate our appetite, our memory, our emotions, as well as our muscle action and movement. And as you can see in Table 20.2.1, 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 behavior. 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 20.2.1 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.

Neurotransmitter	Description and function	Notes
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 behaviors 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 fiber 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 type of lock and key system.
- The many different neurotransmitters work together to influence cognition, memory, and behavior.
- Agonists are drugs that mimic the actions of neurotransmitters, whereas antagonists are drugs that block the action 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.

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20.3: The Brain and Spinal Cord

Learning Objectives

- Explain the functions of the spinal cord
- Identify the hemispheres and lobes of the brain
- Describe the types of techniques available to clinicians and researchers to image or scan the brain

The brain is a remarkably complex organ comprised of billions of interconnected neurons and glia. It is a bilateral, or two-sided, structure that can be separated into distinct lobes. Each lobe is associated with certain types of functions, but, ultimately, all of the areas of the brain interact with one another to provide the foundation for our thoughts and behaviors. In this section, we discuss the overall organization of the brain and the functions associated with different brain areas, beginning with what can be seen as an extension of the brain, the spinal cord.

The Spinal Cord

It can be said that the spinal cord is what connects the brain to the outside world. Because of it, the brain can act. The spinal cord is like a relay station, but a very smart one. It not only routes messages to and from the brain, but it also has its own system of automatic processes, called reflexes.

The top of the spinal cord is a bundle of nerves that merges with the brain stem, where the basic processes of life are controlled, such as breathing and digestion. In the opposite direction, the spinal cord ends just below the ribs—contrary to what we might expect, it does not extend all the way to the base of the spine.

The spinal cord is functionally organized in 30 segments, corresponding with the vertebrae. Each segment is connected to a specific part of the body through the peripheral nervous system. Nerves branch out from the spine at each vertebra. Sensory nerves bring messages in; motor nerves send messages out to the muscles and organs. Messages travel to and from the brain through every segment.

Some sensory messages are immediately acted on by the spinal cord, without any input from the brain. Withdrawal from a hot object and the knee jerk are two examples. When a sensory message meets certain parameters, the spinal cord initiates an automatic reflex. The signal passes from the sensory nerve to a simple processing center, which initiates a motor command. Seconds are saved, because messages don't have to go the brain, be processed, and get sent back. In matters of survival, the spinal reflexes allow the body to react extraordinarily fast.

The spinal cord is protected by bony vertebrae and cushioned in cerebrospinal fluid, but injuries still occur. When the spinal cord is damaged in a particular segment, all lower segments are cut off from the brain, causing paralysis. Therefore, the lower on the spine damage occurs, the fewer functions an injured individual will lose.

Neuroplasticity

Bob Woodruff, a reporter for ABC, suffered a traumatic brain injury after a bomb exploded next to the vehicle he was in while covering a news story in Iraq. As a consequence of these injuries, Woodruff experienced many cognitive deficits including difficulties with memory and language. However, over time and with the aid of intensive amounts of cognitive and speech therapy, Woodruff has shown an incredible recovery of function (Fernandez, 2008, October 16).

One of the factors that made this recovery possible was **neuroplasticity**. Neuroplasticity refers to how the nervous system can change and adapt. Neuroplasticity can occur in a variety of ways including personal experiences, developmental processes, or, as in Woodruff's case, in response to some sort of damage or injury that has occurred. Neuroplasticity can involve creation of new synapses, pruning of synapses that are no longer used, changes in glial cells, and even the birth of new neurons. Because of neuroplasticity, our brains are constantly changing and adapting, and while our nervous system is most plastic when we are very young, as Woodruff's case suggests, it is still capable of remarkable changes later in life.

The Two Hemispheres

The surface of the brain, known as the **cerebral cortex**, is very uneven, characterized by a distinctive pattern of folds or bumps, known as **gyri** (singular: gyrus), and grooves, known as **sulci** (singular: sulcus), shown in Figure 3.15. These gyri and sulci form important landmarks that allow us to separate the brain into functional centers. The most prominent sulcus, known as the **longitudinal fissure**, is the deep groove that separates the brain into two halves or **hemispheres**: the left hemisphere and the right hemisphere.

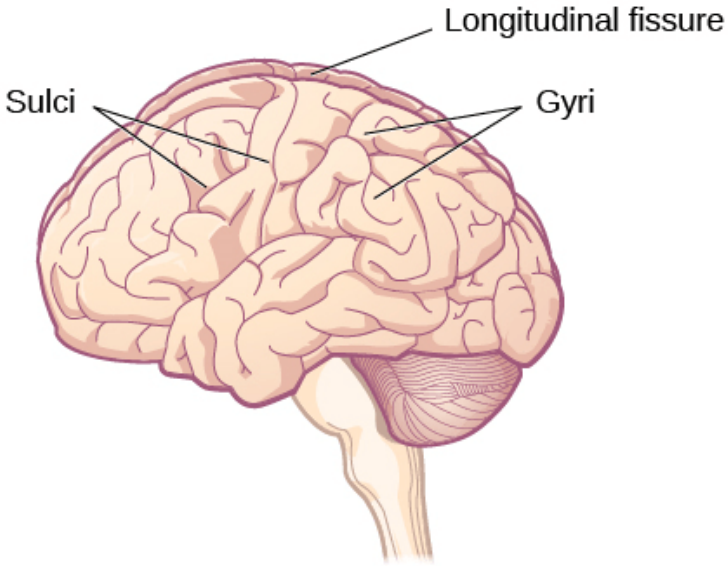


Figure **3.15** The surface of the brain is covered with gyri and sulci. A deep sulcus is called a fissure, such as the longitudinal fissure that divides the brain into left and right hemispheres. (credit: modification of work by Bruce Blaus)

There is evidence of specialization of function—referred to as **lateralization**—in each hemisphere, mainly regarding differences in language functions. The left hemisphere controls the right half of the body, and the right hemisphere controls the left half of the body. Decades of research on lateralization of function by Michael Gazzaniga and his colleagues suggest that a variety of functions ranging from cause-and-effect reasoning to self-recognition may follow patterns that suggest some degree of hemispheric dominance (Gazzaniga, 2005). For example, the left hemisphere has been shown to be superior for forming associations in memory, selective attention, and positive emotions. The right hemisphere, on the other hand, has been shown to be superior in pitch perception, arousal, and negative emotions (Ehret, 2006). However, it should be pointed out that research on which hemisphere is dominant in a variety of different behaviors has produced inconsistent results, and therefore, it is probably better to think of how the two hemispheres interact to produce a given behavior rather than attributing certain behaviors to one hemisphere versus the other (Banich & Heller, 1998).

The two hemispheres are connected by a thick band of neural fibers known as the **corpus callosum**, consisting of about 200 million axons. The corpus callosum allows the two hemispheres to communicate with each other and allows for information being processed on one side of the brain to be shared with the other side.

Normally, we are not aware of the different roles that our two hemispheres play in day-to-day functions, but there are people who come to know the capabilities and functions of their two hemispheres quite well. In some cases of severe epilepsy, doctors elect to sever the corpus callosum as a means of controlling the spread of seizures (Figure 3.16). While this is an effective treatment option, it results in individuals who have "split brains." After surgery, these split-brain patients show a variety of interesting behaviors. For instance, a split-brain patient is unable to name a picture that is shown in the patient's left visual field because the information is only available in the largely nonverbal right hemisphere. However, they are able to recreate the picture with their left hand, which is also controlled by the right hemisphere. When the more verbal left hemisphere sees the picture that the hand drew, the patient is able to name it (assuming the left hemisphere can interpret what was drawn by the left hand).

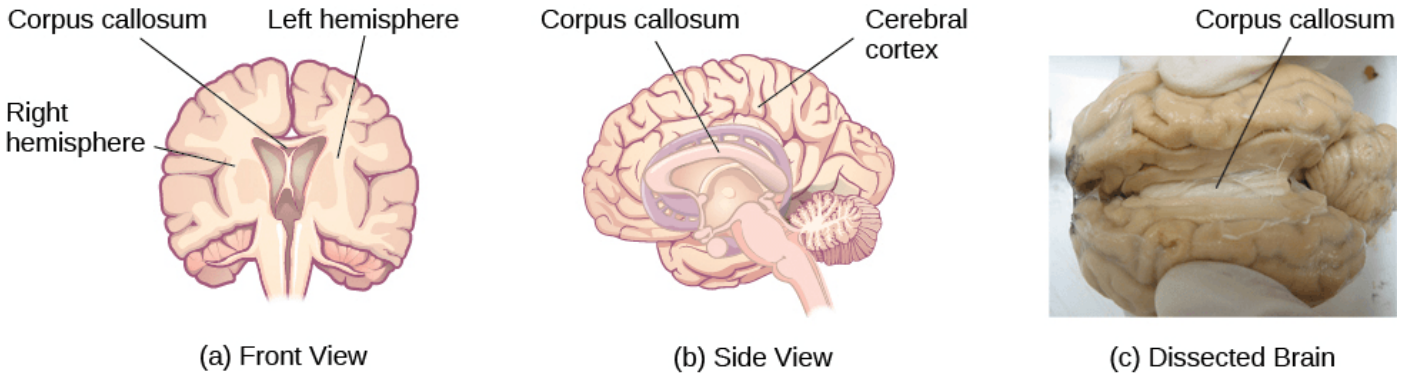


Figure **3.16** (a, b) The corpus callosum connects the left and right hemispheres of the brain. (c) A scientist spreads this dissected sheep brain apart to show the corpus callosum between the hemispheres. (credit c: modification of work by Aaron Bornstein)

Much of what we know about the functions of different areas of the brain comes from studying changes in the behavior and ability of individuals who have suffered damage to the brain. For example, researchers study the behavioral changes caused by strokes to learn about the functions of specific brain areas. A stroke, caused by an interruption of blood flow to a region in the brain, causes a loss of brain function in the affected region. The damage can be in a small area, and, if it is, this gives researchers the opportunity to link any resulting behavioral changes to a specific area. The types of deficits displayed after a stroke will be largely dependent on where in the brain the damage occurred.

Consider Theona, an intelligent, self-sufficient woman, who is 62 years old. Recently, she suffered a stroke in the front portion of her right hemisphere. As a result, she has great difficulty moving her left leg. (As you learned earlier, the right hemisphere controls the left side of the body; also, the brain's main motor centers are located at the front of the head, in the frontal lobe.) Theona has also experienced behavioral changes. For example, while in the produce section of the grocery store, she sometimes eats grapes, strawberries, and apples directly from their bins before paying for them. This behavior—which would have been very embarrassing to her before the stroke—is consistent with damage in another region in the frontal lobe—the prefrontal cortex, which is associated with judgment, reasoning, and impulse control.

Forebrain Structures

The two hemispheres of the cerebral cortex are part of the **forebrain** (Figure 3.17), which is the largest part of the brain. The forebrain contains the cerebral cortex and a number of other structures that lie beneath the cortex (called subcortical structures): thalamus, hypothalamus, pituitary gland, and the limbic system (a collection of structures). The cerebral cortex, which is the outer surface of the brain, is associated with higher level processes such as consciousness, thought, emotion, reasoning, language, and memory. Each cerebral hemisphere can be subdivided into four lobes, each associated with different functions.

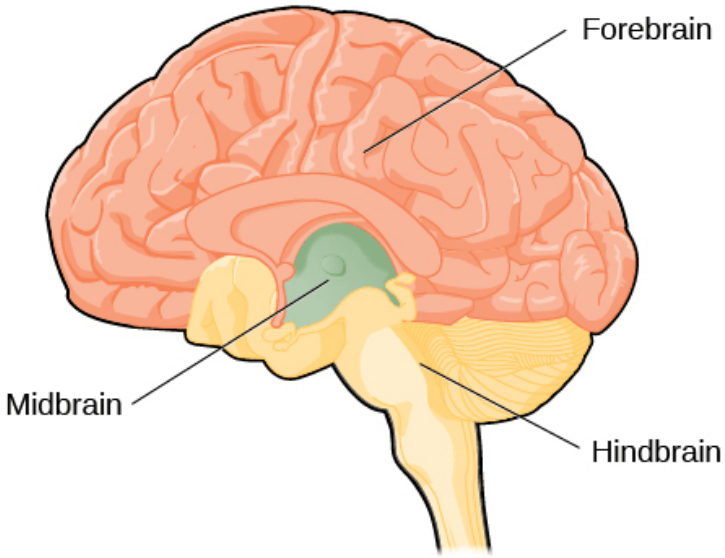


Figure **3.17** The brain and its parts can be divided into three main categories: the forebrain, midbrain, and hindbrain.

Lobes of the Brain

The four lobes of the brain are the frontal, parietal, temporal, and occipital lobes (Figure 3.18). The **frontal lobe** is located in the forward part of the brain, extending back to a fissure known as the central sulcus. The frontal lobe is involved in reasoning, motor control, emotion, and language. It contains the **motor cortex**, which is involved in planning and coordinating movement; the **prefrontal cortex**, which is responsible for higher-level cognitive functioning; and **Broca's area**, which is essential for language production.

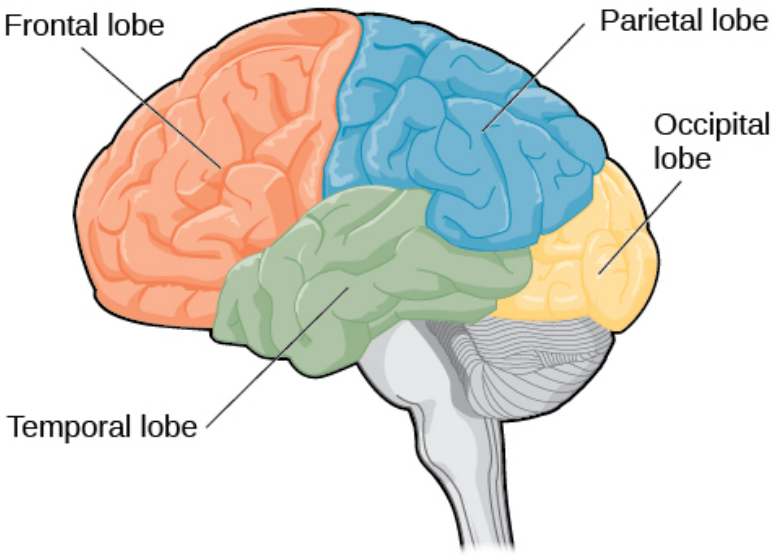


Figure **3.18** The lobes of the brain are shown.

People who suffer damage to Broca's area have great difficulty producing language of any form (Figure 3.18). For example, Padma was an electrical engineer who was socially active and a caring, involved parent. About twenty years ago, she was in a car accident and suffered damage to her Broca's area. She completely lost the ability to speak and form any kind of meaningful language. There is nothing wrong with her mouth or her vocal cords, but she is unable to produce words. She can follow directions but can't respond verbally, and she can read but no longer write. She can do routine tasks like running to the market to buy milk, but she could not communicate verbally if a situation called for it.

Probably the most famous case of frontal lobe damage is that of a man by the name of Phineas Gage. On September 13, 1848, Gage (age 25) was working as a railroad foreman in Vermont. He and his crew were using an iron rod to tamp explosives down into a blasting hole to remove rock along the railway's path. Unfortunately, the iron rod created a spark and caused the rod to explode out of the blasting hole, into Gage's face, and through his skull (Figure 3.19). Although lying in a pool of his own blood with brain matter emerging from his head, Gage was conscious and able to get up, walk, and speak. But in the months following his accident, people noticed that his personality had changed. Many of his friends described him as no longer being himself. Before the accident, it was said that Gage was a well-mannered, soft-spoken man, but he began to behave in odd and inappropriate ways after the accident. Such changes in personality would be consistent with loss of impulse control—a frontal lobe function.

Beyond the damage to the frontal lobe itself, subsequent investigations into the rod's path also identified probable damage to pathways between the frontal lobe and other brain structures, including the limbic system. With connections between the planning functions of the frontal lobe and the emotional processes of the limbic system severed, Gage had difficulty controlling his emotional impulses.

However, there is some evidence suggesting that the dramatic changes in Gage's personality were exaggerated and embellished. Gage's case occurred in the midst of a 19th century debate over localization—regarding whether certain areas of the brain are associated with particular functions. On the basis of extremely limited information about Gage, the extent of his injury, and his life before and after the accident, scientists tended to find support for their own views, on whichever side of the debate they fell (Macmillan, 1999).



Figure **3.19** (a) Phineas Gage holds the iron rod that penetrated his skull in an 1848 railroad construction accident. (b) Gage's prefrontal cortex was severely damaged in the left hemisphere. The rod entered Gage's face on the left side, passed behind his eye, and exited through the top of his skull, before landing about 80 feet away. (credit a: modification of work by Jack and Beverly Wilgus)

The brain's **parietal lobe** is located immediately behind the frontal lobe, and is involved in processing information from the body's senses. It contains the **somatosensory cortex**, which is essential for processing sensory information from across the body, such as touch, temperature, and pain. The somatosensory cortex is organized topographically, which means that spatial relationships that exist in the body are generally maintained on the surface of the somatosensory cortex (Figure 3.20). For example, the portion of the cortex that processes sensory information from the hand is adjacent to the portion that processes information from the wrist.

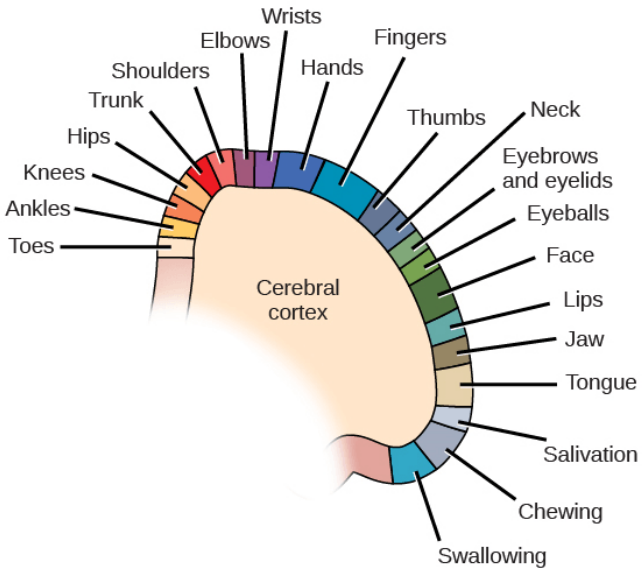


Figure **3.20** Spatial relationships in the body are mirrored in the organization of the somatosensory cortex.

The **temporal lobe** is located on the side of the head (temporal means "near the temples"), and is associated with hearing, memory, emotion, and some aspects of language. The **auditory cortex**, the main area responsible for processing auditory information, is located within the temporal lobe. **Wernicke's area**, important for speech comprehension, is also located here. Whereas individuals with damage to Broca's area have difficulty producing language, those with damage to Wernicke's area can produce sensible language, but they are unable to understand it (Figure 3.21).

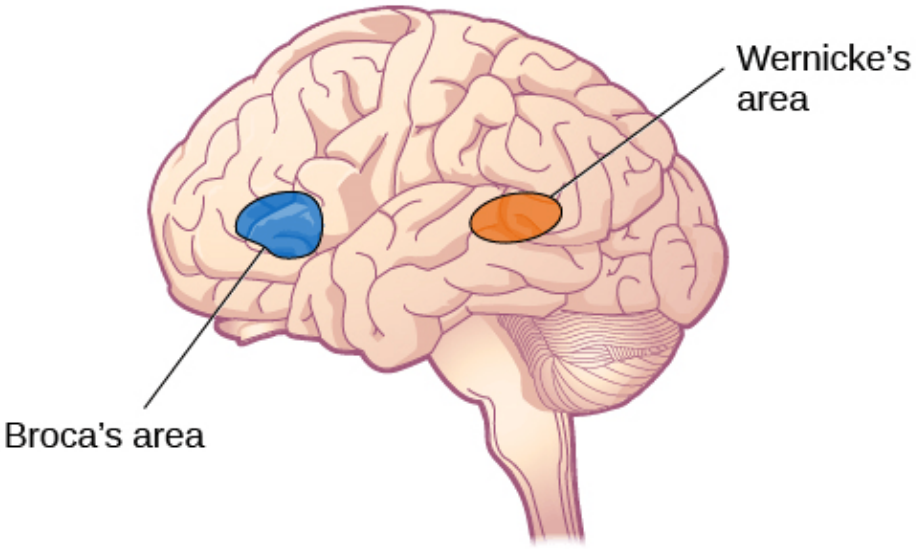


Figure **3.21** Damage to either Broca's area or Wernicke's area can result in language deficits. The types of deficits are very different, however, depending on which area is affected.

The **occipital lobe** is located at the very back of the brain, and contains the primary visual cortex, which is responsible for interpreting incoming visual information. The occipital cortex is organized retinotopically, which means there is a close relationship between the position of an object in a person's visual field and the position of that object's representation on the cortex. You will learn much more about how visual information is processed in the occipital lobe when you study sensation and perception.

Other Areas of the Forebrain

Other areas of the forebrain, located beneath the cerebral cortex, include the thalamus and the limbic system. The **thalamus** is a sensory relay for the brain. All of our senses, with the exception of smell, are routed through the thalamus before being directed to other areas of the brain for processing (Figure 3.22).

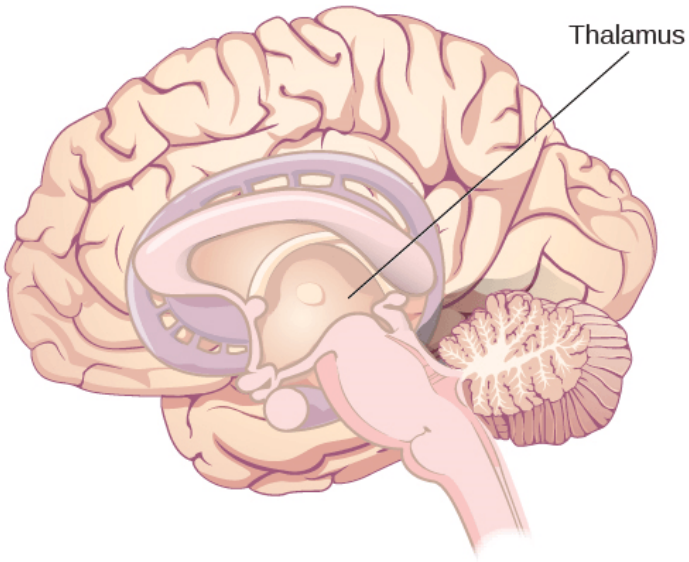


Figure **3.22** The thalamus serves as the relay center of the brain where most senses are routed for processing.

The **limbic system** is involved in processing both emotion and memory. Interestingly, the sense of smell projects directly to the limbic system; therefore, not surprisingly, smell can evoke emotional responses in ways that other sensory modalities cannot. The limbic system is made up of a number of different structures, but three of the most important are the hippocampus, the amygdala,

and the hypothalamus (Figure 3.23). The **hippocampus** is an essential structure for learning and memory. The **amygdala** is involved in our experience of emotion and in tying emotional meaning to our memories. The **hypothalamus** regulates a number of homeostatic processes, including the regulation of body temperature, appetite, and blood pressure. The hypothalamus also serves as an interface between the nervous system and the endocrine system and in the regulation of sexual motivation and behavior.

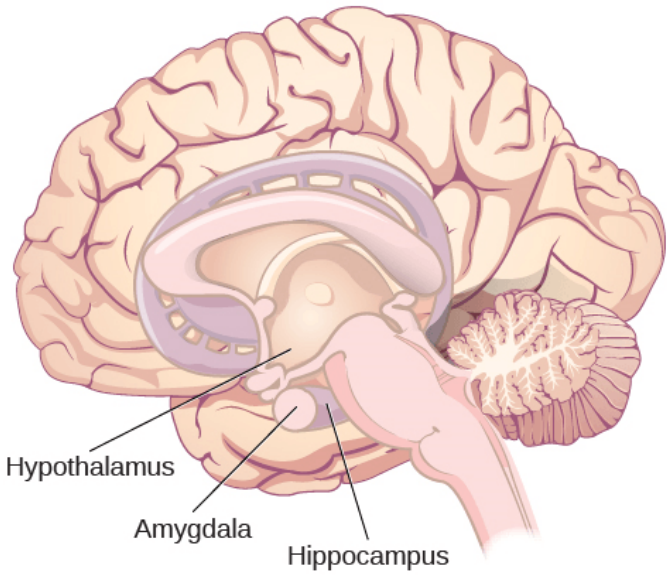


Figure **3.23** The limbic system is involved in mediating emotional response and memory.

The Case of Henry Molaison (H.M.)

In 1953, Henry Gustav Molaison (H. M.) was a 27-year-old man who experienced severe seizures. In an attempt to control his seizures, H. M. underwent brain surgery to remove his hippocampus and amygdala. Following the surgery, H.M's seizures became much less severe, but he also suffered some unexpected—and devastating—consequences of the surgery: he lost his ability to form many types of new memories. For example, he was unable to learn new facts, such as who was president of the United States. He was able to learn new skills, but afterward he had no recollection of learning them. For example, while he might learn to use a computer, he would have no conscious memory of ever having used one. He could not remember new faces, and he was unable to remember events, even immediately after they occurred. Researchers were fascinated by his experience, and he is considered one of the most studied cases in medical and psychological history (Hardt, Einarsson, & Nader, 2010; Squire, 2009). Indeed, his case has provided tremendous insight into the role that the hippocampus plays in the consolidation of new learning into explicit memory.

Link to Learning

Clive Wearing, an accomplished musician, lost the ability to form new memories when his hippocampus was damaged through illness. Check out the first few minutes of this documentary video about this man and his condition to learn more.

Midbrain and Hindbrain Structures

The **midbrain** is comprised of structures located deep within the brain, between the forebrain and the hindbrain. The **reticular formation** is centered in the midbrain, but it actually extends up into the forebrain and down into the hindbrain. The reticular formation is important in regulating the sleep/wake cycle, arousal, alertness, and motor activity.

The **substantia nigra** (Latin for "black substance") and the **ventral tegmental area (VTA)** are also located in the midbrain (Figure 3.24). Both regions contain cell bodies that produce the neurotransmitter dopamine, and both are critical for movement. Degeneration of the substantia nigra and VTA is involved in Parkinson's disease. In addition, these structures are involved in mood, reward, and addiction (Berridge & Robinson, 1998; Gardner, 2011; George, Le Moal, & Koob, 2012).

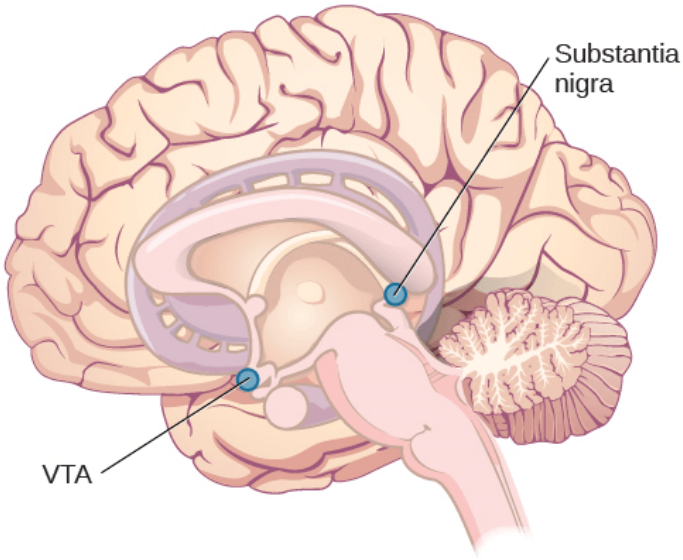


Figure **3.24** The substantia nigra and ventral tegmental area (VTA) are located in the midbrain.

The **hindbrain** is located at the back of the head and looks like an extension of the spinal cord. It contains the medulla, pons, and cerebellum (Figure 3.25). The **medulla** controls the automatic processes of the autonomic nervous system, such as breathing, blood pressure, and heart rate. The word pons literally means "bridge," and as the name suggests, the **pons** serves to connect the hindbrain to the rest of the brain. It also is involved in regulating brain activity during sleep. The medulla, pons, and various structures are known as the brainstem, and aspects of the brainstem span both the midbrain and the hindbrain.

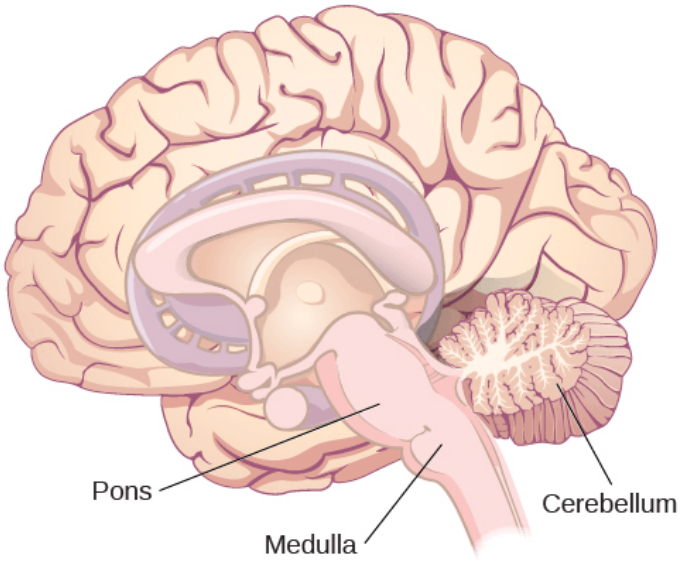


Figure **3.25** The pons, medulla, and cerebellum make up the hindbrain

The **cerebellum** (Latin for "little brain") receives messages from muscles, tendons, joints, and structures in our ear to control balance, coordination, movement, and motor skills. The cerebellum is also thought to be an important area for processing some types of memories. In particular, procedural memory, or memory involved in learning and remembering how to perform tasks, is thought to be associated with the cerebellum. Recall that H. M. was unable to form new explicit memories, but he could learn new tasks. This is likely due to the fact that H. M.'s cerebellum remained intact.

WHAT DO YOU THINK: Brain Dead and on Life Support

What would you do if your spouse or loved one was declared brain dead but his or her body was being kept alive by medical equipment? Whose decision should it be to remove a feeding tube? Should medical care costs be a factor?

On February 25, 1990, a Florida woman named Terri Schiavo went into cardiac arrest, apparently triggered by a bulimic episode. She was eventually revived, but her brain had been deprived of oxygen for a long time. Brain scans indicated that there was no activity in her cerebral cortex, and she suffered from severe and permanent cerebral atrophy. Basically, Schiavo was in a vegetative state. Medical professionals determined that she would never again be able to move, talk, or respond in any way. To remain alive, she required a feeding tube, and there was no chance that her situation would ever improve.

On occasion, Schiavo's eyes would move, and sometimes she would groan. Despite the doctors' insistence to the contrary, her parents believed that these were signs that she was trying to communicate with them.

After 12 years, Schiavo's husband argued that his wife would not have wanted to be kept alive with no feelings, sensations, or brain activity. Her parents, however, were very much against removing her feeding tube. Eventually, the case made its way to the courts, both in the state of Florida and at the federal level. By 2005, the courts found in favor of Schiavo's husband, and the feeding tube was removed on March 18, 2005. Schiavo died 13 days later.

Why did Schiavo's eyes sometimes move, and why did she groan? Although the parts of her brain that control thought, voluntary movement, and feeling were completely damaged, her brainstem was still intact. Her medulla and pons maintained her breathing and caused involuntary movements of her eyes and the occasional groans. Over the 15-year period that she was on a feeding tube, Schiavo's medical costs may have topped $7 million (Arnst, 2003).

These questions were brought to popular conscience decades ago in the case of Terri Schiavo, and they have persisted. In 2013, a 13-year-old girl who suffered complications after tonsil surgery was declared brain dead. There was a battle between her family, who wanted her to remain on life support, and the hospital's policies regarding persons declared brain dead. In another complicated 2013–14 case in Texas, a pregnant EMT professional declared brain dead was kept alive for weeks, despite her spouse's directives, which were based on her wishes should this situation arise. In this case, state laws designed to protect an unborn fetus came into consideration until doctors determined the fetus unviable.

Decisions surrounding the medical response to patients declared brain dead are complex. What do you think about these issues?

Brain Imaging

You have learned how brain injury can provide information about the functions of different parts of the brain. Increasingly, however, we are able to obtain that information using brain imaging techniques on individuals who have not suffered brain injury. In this section, we take a more in-depth look at some of the techniques that are available for imaging the brain, including techniques that rely on radiation, magnetic fields, or electrical activity within the brain.

Techniques Involving Radiation

A **computerized tomography (CT) scan** involves taking a number of x-rays of a particular section of a person's body or brain (Figure 3.26). The x-rays pass through tissues of different densities at different rates, allowing a computer to construct an overall image of the area of the body being scanned. A CT scan is often used to determine whether someone has a tumor or significant brain atrophy.

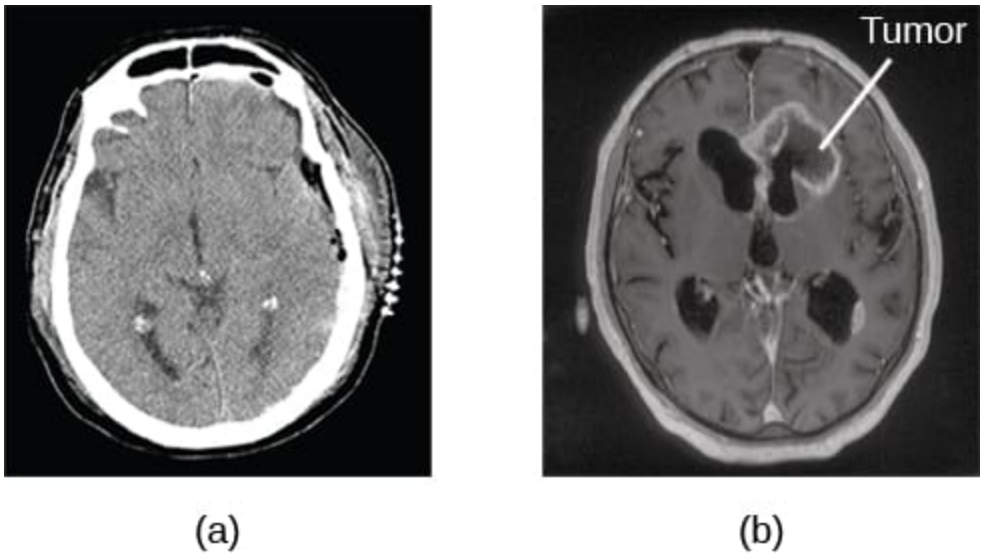


Figure **3.26** A CT scan can be used to show brain tumors. (a) The image on the left shows a healthy brain, whereas (b) the image on the right indicates a brain tumor in the left frontal lobe. (credit a: modification of work by "Aceofhearts1968"/Wikimedia Commons; credit b: modification of work by Roland Schmitt et al)

Positron emission tomography (PET) scans create pictures of the living, active brain (Figure 3.27). An individual receiving a PET scan drinks or is injected with a mildly radioactive substance, called a tracer. Once in the bloodstream, the amount of tracer in any given region of the brain can be monitored. As a brain area becomes more active, more blood flows to that area. A computer monitors the movement of the tracer and creates a rough map of active and inactive areas of the brain during a given behavior. PET scans show little detail, are unable to pinpoint events precisely in time, and require that the brain be exposed to radiation; therefore, this technique has been replaced by the fMRI as an alternative diagnostic tool. However, combined with CT, PET technology is still being used in certain contexts. For example, CT/PET scans allow better imaging of the activity of neurotransmitter receptors and open new avenues in schizophrenia research. In this hybrid CT/PET technology, CT contributes clear images of brain structures, while PET shows the brain's activity.

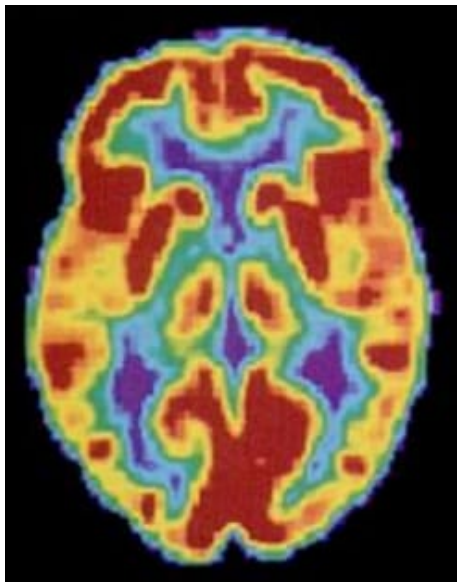


Figure **3.27** A PET scan is helpful for showing activity in different parts of the brain. (credit: Health and Human Services Department, National Institutes of Health)

Techniques Involving Magnetic Fields

In **magnetic resonance imaging (MRI)**, a person is placed inside a machine that generates a strong magnetic field. The magnetic field causes the hydrogen atoms in the body's cells to move. When the magnetic field is turned off, the hydrogen

atoms emit electromagnetic signals as they return to their original positions. Tissues of different densities give off different signals, which a computer interprets and displays on a monitor. **Functional magnetic resonance imaging (fMRI)** operates on the same principles, but it shows changes in brain activity over time by tracking blood flow and oxygen levels. The fMRI provides more detailed images of the brain's structure, as well as better accuracy in time, than is possible in PET scans (Figure 3.28). With their high level of detail, MRI and fMRI are often used to compare the brains of healthy individuals to the brains of individuals diagnosed with psychological disorders. This comparison helps determine what structural and functional differences exist between these populations.

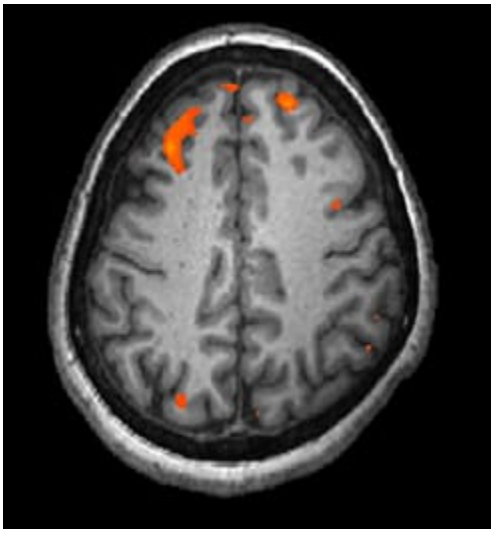


Figure **3.28** An fMRI shows activity in the brain over time. This image represents a single frame from an fMRI. (credit: modification of work by Kim J, Matthews NL, Park S.)

Link to Learning

Visit this virtual lab about MRI and fMRI to learn more.

Techniques Involving Electrical Activity

In some situations, it is helpful to gain an understanding of the overall activity of a person's brain, without needing information on the actual location of the activity. **Electroencephalography (EEG)** serves this purpose by providing a measure of a brain's electrical activity. An array of electrodes is placed around a person's head (Figure 3.29). The signals received by the electrodes result in a printout of the electrical activity of his or her brain, or brainwaves, showing both the frequency (number of waves per second) and amplitude (height) of the recorded brainwaves, with an accuracy within milliseconds. Such information is especially helpful to researchers studying sleep patterns among individuals with sleep disorders.

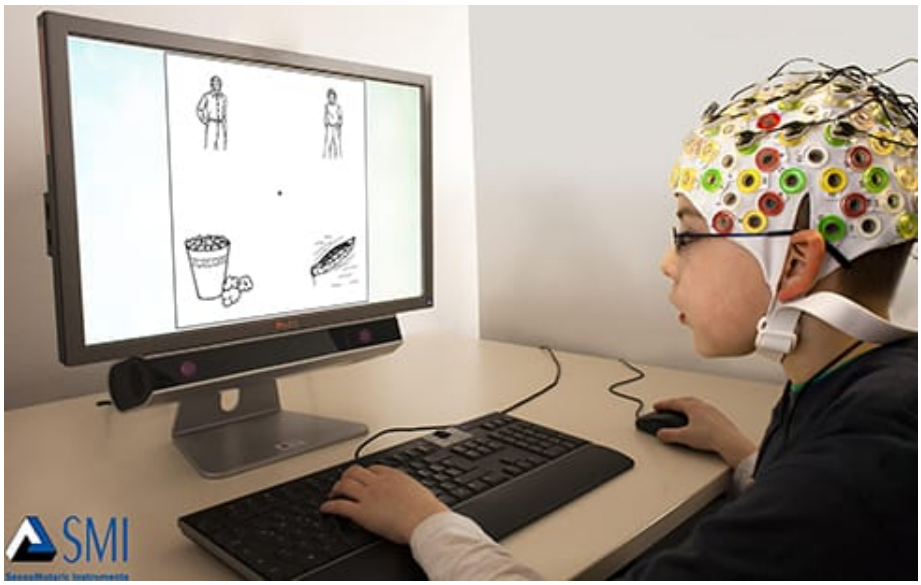


Figure **3.29** Using caps with electrodes, modern EEG research can study the precise timing of overall brain activities. (credit: SMI Eye Tracking)

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20.4: Debunking a common brain myth

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CHAPTER 21: UNDERSTANDING YOUR SENSES

21.1: Sensation versus Perception
21.2: Waves and Wavelengths
21.3: Seeing
21.4: Hearing
21.5: The Other Senses
21.6: Sensation and Perception

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21.1: Sensation versus Perception

Learning Objectives

- Distinguish between sensation and perception
- Describe the concepts of absolute threshold and difference threshold
- Discuss the roles attention, motivation, and sensory adaptation play in perception

Sensation

What does it mean to sense something? Sensory receptors are specialized neurons that respond to specific types of stimuli. When sensory information is detected by a sensory receptor, **sensation** has occurred. For example, light that enters the eye causes chemical changes in cells that line the back of the eye. These cells relay messages, in the form of action potentials (as you learned when studying biopsychology), to the central nervous system. The conversion from sensory stimulus energy to action potential is known as **transduction**.

You have probably known since elementary school that we have five senses: vision, hearing (audition), smell (olfaction), taste (gustation), and touch (somatosensation). It turns out that this notion of five senses is oversimplified. We also have sensory systems that provide information about balance (the vestibular sense), body position and movement (proprioception and kinesthesia), pain (nociception), and temperature (thermoception).

The sensitivity of a given sensory system to the relevant stimuli can be expressed as an absolute threshold. **Absolute threshold** refers to the minimum amount of stimulus energy that must be present for the stimulus to be detected 50% of the time. Another way to think about this is by asking how dim can a light be or how soft can a sound be and still be detected half of the time. The sensitivity of our sensory receptors can be quite amazing. It has been estimated that on a clear night, the most sensitive sensory cells in the back of the eye can detect a candle flame 30 miles away (Okawa & Sampath, 2007). Under quiet conditions, the hair cells (the receptor cells of the inner ear) can detect the tick of a clock 20 feet away (Galanter, 1962).

It is also possible for us to get messages that are presented below the threshold for conscious awareness—these are called **subliminal messages**. A stimulus reaches a physiological threshold when it is strong enough to excite sensory receptors and send nerve impulses to the brain: This is an absolute threshold. A message below that threshold is said to be subliminal: We receive it, but we are not consciously aware of it. Over the years there has been a great deal of speculation about the use of subliminal messages in advertising, rock music, and self-help audio programs. Research evidence shows that in laboratory settings, people can process and respond to information outside of awareness. But this does not mean that we obey these messages like zombies; in fact, hidden messages have little effect on behavior outside the laboratory (Kunst-Wilson & Zajonc, 1980; Rensink, 2004; Nelson, 2008; Radel, Sarrazin, Legrain, & Gobancé, 2009; Loersch, Durso, & Petty, 2013).

Absolute thresholds are generally measured under incredibly controlled conditions in situations that are optimal for sensitivity. Sometimes, we are more interested in how much difference in stimuli is required to detect a difference between them. This is known as the **just noticeable difference (jnd)** or **difference threshold**. Unlike the absolute threshold, the difference threshold changes depending on the stimulus intensity. As an example, imagine yourself in a very dark movie theater. If an audience member were to receive a text message that caused the cell phone screen to light up, chances are that many people would notice the change in illumination in the theater. However, if the same thing happened in a brightly lit arena during a basketball game, very few people would notice. The cell phone brightness does not change, but its ability to be detected as a change in illumination varies dramatically between the two contexts. Ernst Weber proposed this theory of change in difference threshold in the 1830s, and it has become known as Weber's law: The difference threshold is a constant fraction of the original stimulus, as the example illustrates.

Perception

While our sensory receptors are constantly collecting information from the environment, it is ultimately how we interpret that information that affects how we interact with the world. **Perception** refers to the way sensory information is organized, interpreted, and consciously experienced. Perception involves both bottom-up and top-down processing. **Bottom-up processing** refers to

sensory information from a stimulus in the environment driving a process, and **top-down processing** refers to knowledge and expectancy driving a process, as shown in Figure 5.2 (Egeth & Yantis, 1997; Fine & Minnery, 2009; Yantis & Egeth, 1999).

The figure includes two vertical arrows. The first arrow comes from the word “Top” and points downward to the word “Down.” The explanation reads, “Top-down processing occurs when previous experience and expectations are first used to recognize stimuli.” The second arrow comes from the word “bottom” and points upward to the word “up.” The explanation reads, “Bottom-up processing occurs when we sense basic features of stimuli and then integrate them.”

Figure **5.2** Top-down and bottom-up are ways we process our perceptions.

Imagine that you and some friends are sitting in a crowded restaurant eating lunch and talking. It is very noisy, and you are concentrating on your friend’s face to hear what she is saying, then the sound of breaking glass and clang of metal pans hitting the floor rings out. The server dropped a large tray of food. Although you were attending to your meal and conversation, that crashing sound would likely get through your attentional filters and capture your attention. You would have no choice but to notice it. That attentional capture would be caused by the sound from the environment: it would be bottom-up.

Alternatively, top-down processes are generally goal directed, slow, deliberate, effortful, and under your control (Fine & Minnery, 2009; Miller & Cohen, 2001; Miller & D'Esposito, 2005). For instance, if you misplaced your keys, how would you look for them? If you had a yellow key fob, you would probably look for yellowness of a certain size in specific locations, such as on the counter, coffee table, and other similar places. You would not look for yellowness on your ceiling fan, because you know keys are not normally lying on top of a ceiling fan. That act of searching for a certain size of yellowness in some locations and not others would be top-down—under your control and based on your experience.

One way to think of this concept is that sensation is a physical process, whereas perception is psychological. For example, upon walking into a kitchen and smelling the scent of baking cinnamon rolls, the *sensation* is the scent receptors detecting the odor of cinnamon, but the *perception* may be “Mmm, this smells like the bread Grandma used to bake when the family gathered for holidays.”

Although our perceptions are built from sensations, not all sensations result in perception. In fact, we often don’t perceive stimuli that remain relatively constant over prolonged periods of time. This is known as **sensory adaptation**. Imagine going to a city that you have never visited. You check in to the hotel, but when you get to your room, there is a road construction sign with a bright flashing light outside your window. Unfortunately, there are no other rooms available, so you are stuck with a flashing light. You decide to watch television to unwind. The flashing light was extremely annoying when you first entered your room. It was as if someone was continually turning a bright yellow spotlight on and off in your room, but after watching television for a short while, you no longer notice the light flashing. The light is still flashing and filling your room with yellow light every few seconds, and the photoreceptors in your eyes still sense the light, but you no longer perceive the rapid changes in lighting conditions. That you no longer perceive the flashing light demonstrates sensory adaptation and shows that while closely associated, sensation and perception are different.

There is another factor that affects sensation and perception: attention. Attention plays a significant role in determining what is sensed versus what is perceived. Imagine you are at a party full of music, chatter, and laughter. You get involved in an interesting conversation with a friend, and you tune out all the background noise. If someone interrupted you to ask what song had just finished playing, you would probably be unable to answer that question.

Link to Learning

See for yourself how inattentional blindness works by checking out this selective attention test from Simons and Chabris (1999).

One of the most interesting demonstrations of how important attention is in determining our perception of the environment occurred in a famous study conducted by Daniel Simons and Christopher Chabris (1999). In this study, participants watched a video of people dressed in black and white passing basketballs. Participants were asked to count the number of times the team dressed in white passed the ball. During the video, a person dressed in a black gorilla costume walks among the two teams. You would think that someone would notice the gorilla, right? Nearly half of the people who watched the video didn’t notice the gorilla at all, despite the fact that he was clearly visible for nine seconds. Because participants were so focused on the number of times the team dressed in white was passing the ball, they completely tuned out other visual information. **Inattentional blindness** is the failure to notice something that is completely visible because the person was actively attending to something else and did not pay attention to other things (Mack & Rock, 1998; Simons & Chabris, 1999).

In a similar experiment, researchers tested inattentional blindness by asking participants to observe images moving across a computer screen. They were instructed to focus on either white or black objects, disregarding the other color. When a red cross passed across the screen, about one third of subjects did not notice it (Figure 5.3) (Most, Simons, Scholl, & Chabris, 2000).



Figure **5.3** Nearly one third of participants in a study did not notice that a red cross passed on the screen because their attention was focused on the black or white figures. (credit: Cory Zanker)

Motivation can also affect perception. Have you ever been expecting a really important phone call and, while taking a shower, you think you hear the phone ringing, only to discover that it is not? If so, then you have experienced how motivation to detect a meaningful stimulus can shift our ability to discriminate between a true sensory stimulus and background noise. The ability to identify a stimulus when it is embedded in a distracting background is called **signal detection theory**. This might also explain why a mother is awakened by a quiet murmur from her baby but not by other sounds that occur while she is asleep. Signal detection theory has practical applications, such as increasing air traffic controller accuracy. Controllers need to be able to detect planes among many signals (blips) that appear on the radar screen and follow those planes as they move through the sky. In fact, the original work of the researcher who developed signal detection theory was focused on improving the sensitivity of air traffic controllers to plane blips (Swets, 1964).

Our perceptions can also be affected by our beliefs, values, prejudices, expectations, and life experiences. As you will see later in this chapter, individuals who are deprived of the experience of binocular vision during critical periods of development have trouble perceiving depth (Fawcett, Wang, & Birch, 2005). The shared experiences of people within a given cultural context can have pronounced effects on perception. For example, Marshall Segall, Donald Campbell, and Melville Herskovits (1963) published the results of a multinational study in which they demonstrated that individuals from Western cultures were more prone to experience certain types of visual illusions than individuals from non-Western cultures, and vice versa. One such illusion that Westerners were more likely to experience was the Müller-Lyer illusion (Figure 5.4): The lines appear to be different lengths, but they are actually the same length.

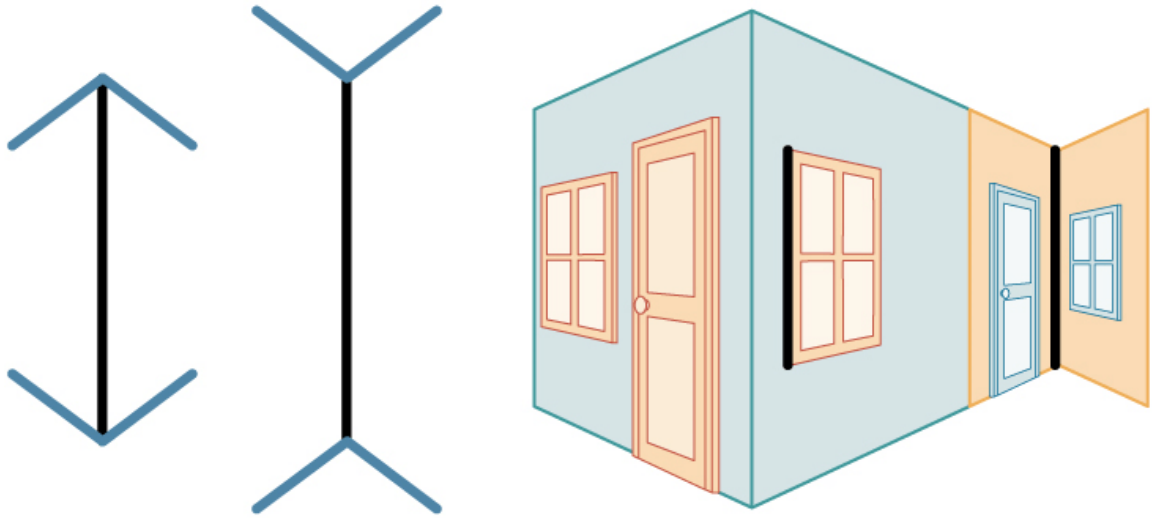


Figure **5.4** In the Müller-Lyer illusion, lines appear to be different lengths although they are identical. (a) Arrows at the ends of lines may make the line on the right appear longer, although the lines are the same length. (b) When applied to a three-dimensional image, the line on the right again may appear longer although both black lines are the same length.

These perceptual differences were consistent with differences in the types of environmental features experienced on a regular basis by people in a given cultural context. People in Western cultures, for example, have a perceptual context of buildings with straight lines, what Segall's study called a carpentered world (Segall et al., 1966). In contrast, people from certain non-Western cultures with an uncarpentered view, such as the Zulu of South Africa, whose villages are made up of round huts arranged in circles, are less susceptible to this illusion (Segall et al., 1999). It is not just vision that is affected by cultural factors. Indeed, research has demonstrated that the ability to identify an odor, and rate its pleasantness and its intensity, varies cross-culturally (Ayabe-Kanamura, Saito, Distel, Martínez-Gómez, & Hudson, 1998).

Children described as thrill seekers are more likely to show taste preferences for intense sour flavors (Liem, Westerbeek, Wolterink, Kok, & de Graaf, 2004), which suggests that basic aspects of personality might affect perception. Furthermore, individuals who hold positive attitudes toward reduced-fat foods are more likely to rate foods labeled as reduced fat as tasting better than people who have less positive attitudes about these products (Aaron, Mela, & Evans, 1994).

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21.2: Waves and Wavelengths

Learning Objectives

- Describe important physical features of wave forms
- Show how physical properties of light waves are associated with perceptual experience
- Show how physical properties of sound waves are associated with perceptual experience

Visual and auditory stimuli both occur in the form of waves. Although the two stimuli are very different in terms of composition, wave forms share similar characteristics that are especially important to our visual and auditory perceptions. In this section, we describe the physical properties of the waves as well as the perceptual experiences associated with them.

Amplitude and Wavelength

Two physical characteristics of a wave are amplitude and wavelength (Figure 5.5). The **amplitude** of a wave is the distance from the center line to the top point of the crest or the bottom point of the trough. **Wavelength** refers to the length of a wave from one peak to the next.

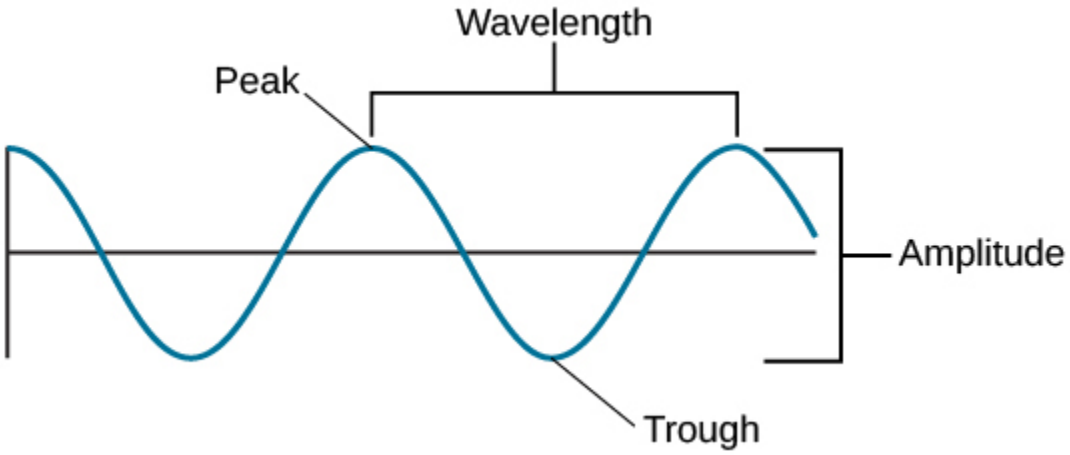


Figure **5.5** The amplitude or height of a wave is measured from the peak to the trough. The wavelength is measured from peak to peak.

Wavelength is directly related to the frequency of a given wave form. **Frequency** refers to the number of waves that pass a given point in a given time period and is often expressed in terms of **hertz (Hz)**, or cycles per second. Longer wavelengths will have lower frequencies, and shorter wavelengths will have higher frequencies (Figure 5.6).

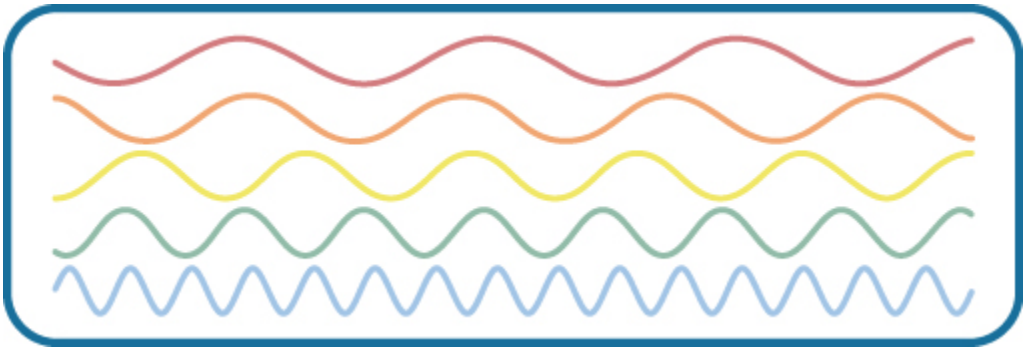


Figure **5.6** This figure illustrates waves of differing wavelengths/frequencies. At the top of the figure, the red wave has a long wavelength/short frequency. Moving from top to bottom, the wavelengths decrease and frequencies increase.

Light Waves

The **visible spectrum** is the portion of the larger **electromagnetic spectrum** that we can see. As Figure 5.7 shows, the electromagnetic spectrum encompasses all of the electromagnetic radiation that occurs in our environment and includes gamma rays, x-rays, ultraviolet light, visible light, infrared light, microwaves, and radio waves. The visible spectrum in humans is associated with wavelengths that range from 380 to 740 nm—a very small distance, since a nanometer (nm) is one billionth of a meter. Other species can detect other portions of the electromagnetic spectrum. For instance, honeybees can see light in the ultraviolet range (Wakakuwa, Stavenga, & Arikawa, 2007), and some snakes can detect infrared radiation in addition to more traditional visual light cues (Chen, Deng, Brauth, Ding, & Tang, 2012; Hartline, Kass, & Loop, 1978).

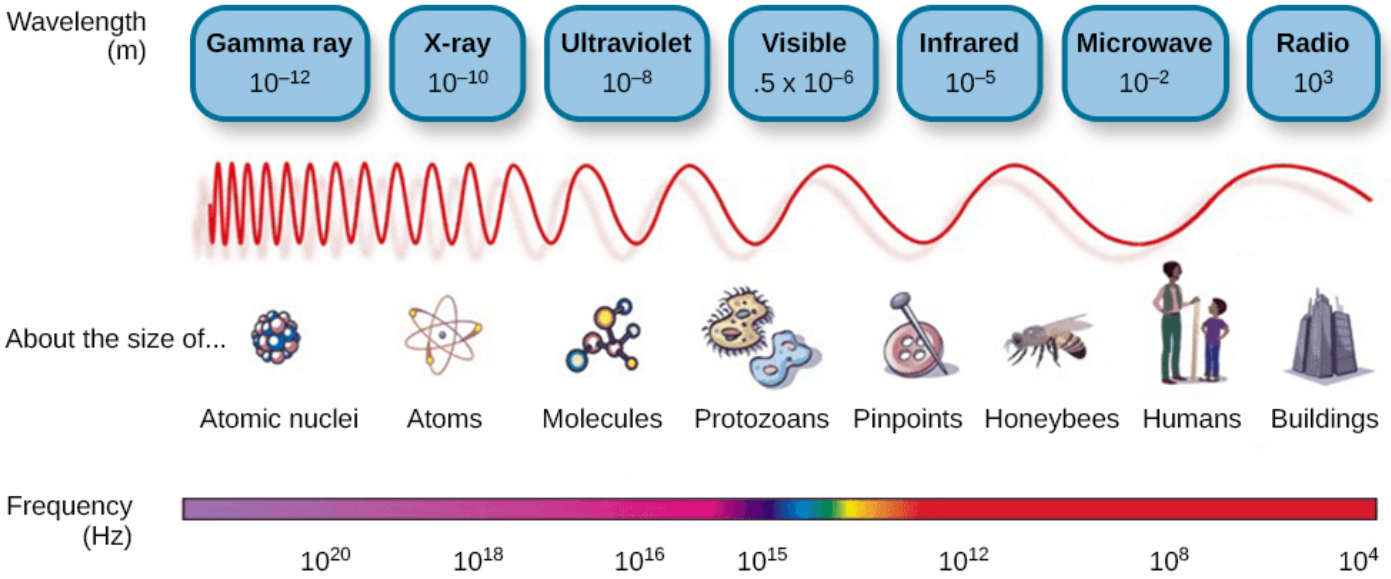


Figure **5.7** Light that is visible to humans makes up only a small portion of the electromagnetic spectrum.

In humans, light wavelength is associated with perception of color (Figure 5.8). Within the visible spectrum, our experience of red is associated with longer wavelengths, greens are intermediate, and blues and violets are shorter in wavelength. (An easy way to remember this is the mnemonic ROYGBIV: **r**ed, **o**range, **y**ellow, **g**reen, **b**lue, **i**ndigo, **v**iolet.) The amplitude of light waves is associated with our experience of brightness or intensity of color, with larger amplitudes appearing brighter.

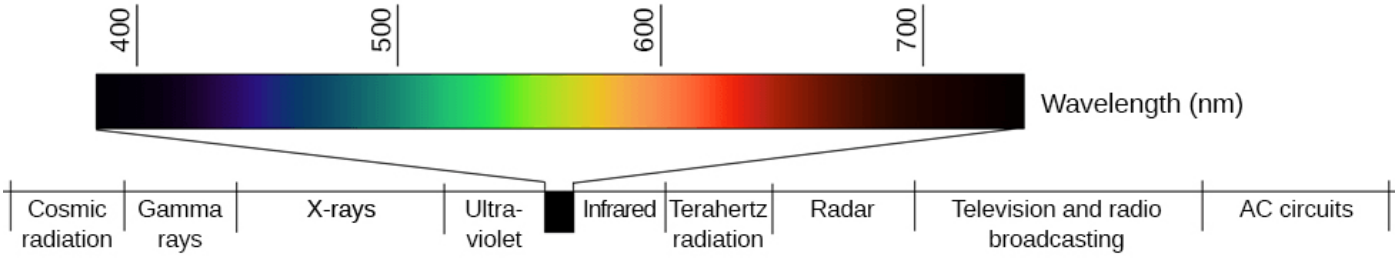


Figure **5.8** Different wavelengths of light are associated with our perception of different colors. (credit: modification of work by Johannes Ahlmann)

Sound Waves

Like light waves, the physical properties of sound waves are associated with various aspects of our perception of sound. The frequency of a sound wave is associated with our perception of that sound's **pitch**. High-frequency sound waves are perceived as high-pitched sounds, while low-frequency sound waves are perceived as low-pitched sounds. The audible range of sound frequencies is between 20 and 20000 Hz, with greatest sensitivity to those frequencies that fall in the middle of this range.

As was the case with the visible spectrum, other species show differences in their audible ranges. For instance, chickens have a very limited audible range, from 125 to 2000 Hz. Mice have an audible range from 1000 to 91000 Hz, and the beluga whale's audible range is from 1000 to 123000 Hz. Our pet dogs and cats have audible ranges of about 70–45000 Hz and 45–64000 Hz,

respectively (Strain, 2003).

The loudness of a given sound is closely associated with the amplitude of the sound wave. Higher amplitudes are associated with louder sounds. Loudness is measured in terms of **decibels (dB)**, a logarithmic unit of sound intensity. A typical conversation would correlate with 60 dB; a rock concert might check in at 120 dB (Figure 5.9). A whisper 5 feet away or rustling leaves are at the low end of our hearing range; sounds like a window air conditioner, a normal conversation, and even heavy traffic or a vacuum cleaner are within a tolerable range. However, there is the potential for hearing damage from about 80 dB to 130 dB: These are sounds of a food processor, power lawnmower, heavy truck (25 feet away), subway train (20 feet away), live rock music, and a jackhammer. About one-third of all hearing loss is due to noise exposure, and the louder the sound, the shorter the exposure needed to cause hearing damage (Le, Straatman, Lea, & Westerberg, 2017). Listening to music through earbuds at maximum volume (around 100–105 decibels) can cause noise-induced hearing loss after 15 minutes of exposure. Although listening to music at maximum volume may not seem to cause damage, it increases the risk of age-related hearing loss (Kujawa & Liberman, 2006). The threshold for pain is about 130 dB, a jet plane taking off or a revolver firing at close range (Dunkle, 1982).

This illustration has a vertical bar in the middle labeled Decibels (dB) numbered 0 to 150 in intervals from the bottom to the top. To the left of the bar, the “sound intensity” of different sounds is labeled: “Hearing threshold” is 0; “Whisper” is 30, “soft music” is 40, “Refrigerator” is 45, “Safe” and “normal conversation” is 60, “Heavy city traffic” with “permanent damage after 8 hours of exposure” is 85, “Motorcycle” with “permanent damage after 6 hours exposure” is 95, “Earbuds max volume” with “permanent damage after 15 miutes exposure” is 105, “Risk of hearing loss” is 110, “pain threshold” is 130, “harmful” is 140, and “firearms” with “immediate permanent damage” is 150. To the right of the bar are photographs depicting “common sound”: At 20 decibels is a picture of rustling leaves; At 60 is two people talking, at 85 is traffic, at 105 is ear buds, at 120 is a music concert, and at 130 are jets.

Figure **5.9** This figure illustrates the loudness of common sounds. (credit "planes": modification of work by Max Pfandl; credit "crowd": modification of work by Christian Holmér; credit: "earbuds": modification of work by "Skinny Guy Lover_Flickr"/Flickr; credit "traffic": modification of work by "quinntheislander_Pixabay"/Pixabay; credit "talking": modification of work by Joi Ito; credit "leaves": modification of work by Aurelijus Valeiša)

Although wave amplitude is generally associated with loudness, there is some interaction between frequency and amplitude in our perception of loudness within the audible range. For example, a 10 Hz sound wave is inaudible no matter the amplitude of the wave. A 1000 Hz sound wave, on the other hand, would vary dramatically in terms of perceived loudness as the amplitude of the wave increased.

Link to Learning

Watch this brief video about our perception of frequency and amplitude to learn more.

Of course, different musical instruments can play the same musical note at the same level of loudness, yet they still sound quite different. This is known as the timbre of a sound. **Timbre** refers to a sound’s purity, and it is affected by the complex interplay of frequency, amplitude, and timing of sound waves.

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21.3: Seeing

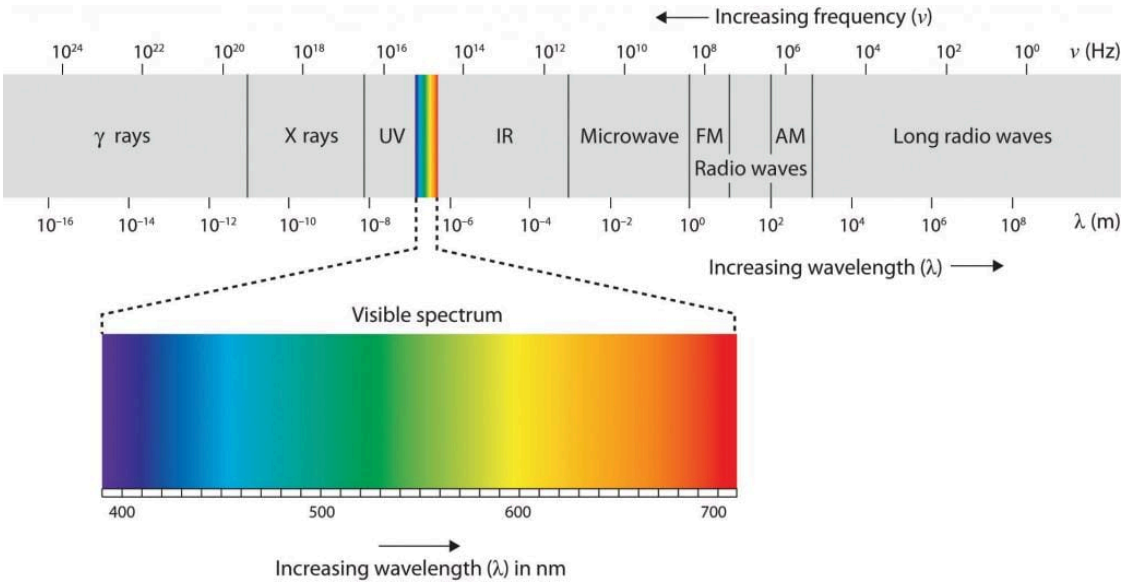
Learning Objectives

1. Identify the key structures of the eye and the role they play in vision.
2. Summarize how the eye and the visual cortex work together to sense and perceive the visual stimuli in the environment, including processing colors, 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 colors, 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 21.3.6, 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 21.3.6 The Electromagnetic Spectrum



Only a small fraction of the electromagnetic energy that surrounds us (the visible spectrum) is detectable by the human eye.

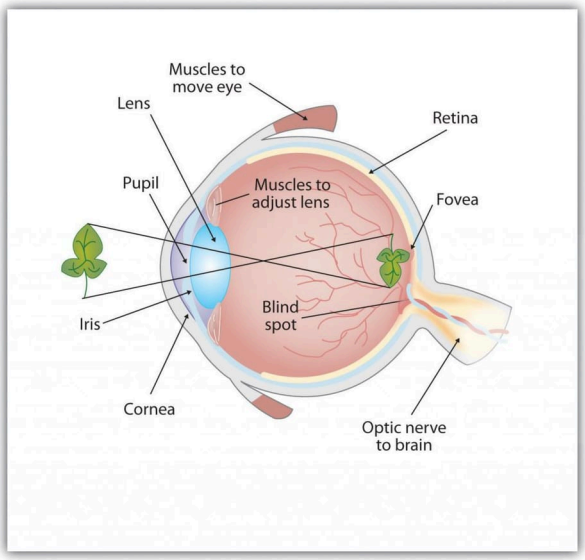
The Sensing Eye and the Perceiving Visual Cortex

As you can see in Figure 21.3.7, 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 center of the eye*. The pupil is surrounded by the iris, *the colored 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 theater 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.

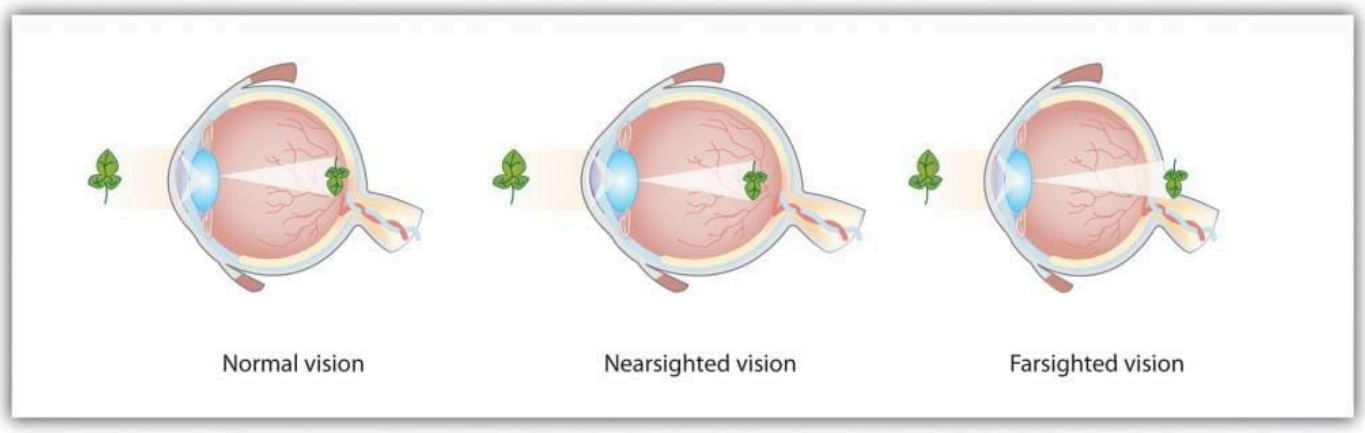
Figure 21.3.7 Anatomy of the Human Eye



Light enters the eye through the transparent cornea, passing through the pupil at the center 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, and in some cases the light that is hitting the retina is a bit out of focus. As you can see in Figure 21.3.8, 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 21.3.8 Normal, Nearsighted, and Farsighted Eyes

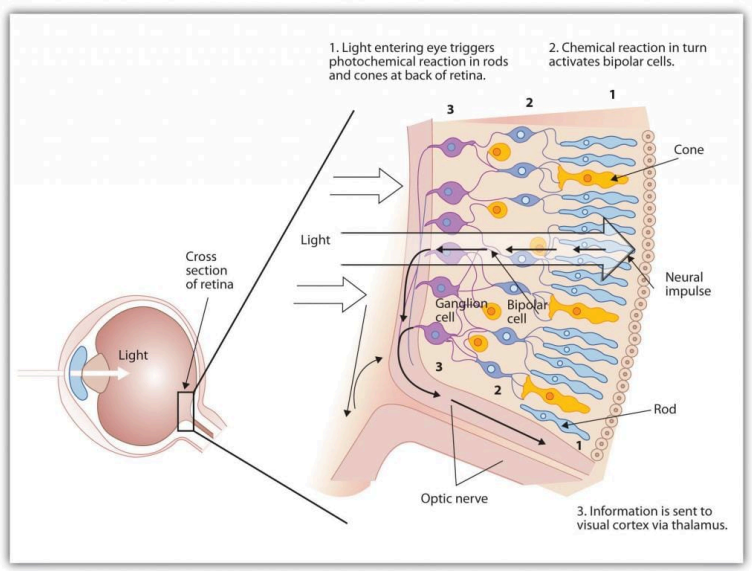


For people with normal vision (left), the lens properly focuses incoming light on the retina. For people who are nearsighted (center), images from far objects focus too far in front of the retina, whereas for people who are farsighted (right), images from near objects focus too far behind the retina. Eyeglasses solve the problem by adding a secondary, corrective, lens.

The retina contains layers of neurons specialized to respond to light (Figure 21.3.9). 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 not inappropriate to think of these structures as an extension of the brain itself.

Figure 21.3.9 The Retina With Its Specialized Cells

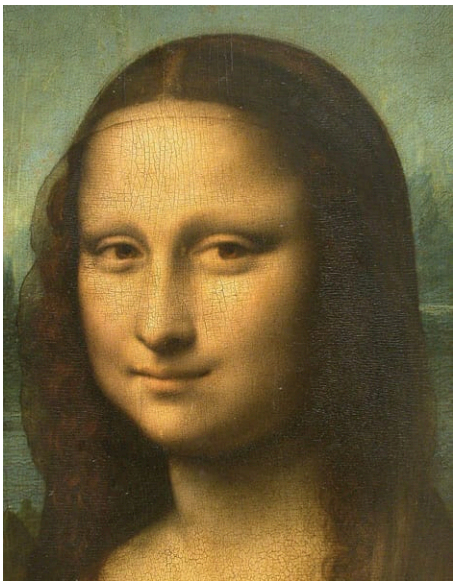


When light falls on the retina, it creates a photochemical reaction in the rods and cones at the back of the retina. The reactions then continue to the bipolar cells, the ganglion cells, and eventually to the optic nerve.

Rods are *visual neurons that specialize in detecting black, white, and gray colors*. 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 colors*. The 5 million or so cones in each eye enable us to see in color, 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.

Figure 21.3.10 Mona Lisa's Smile

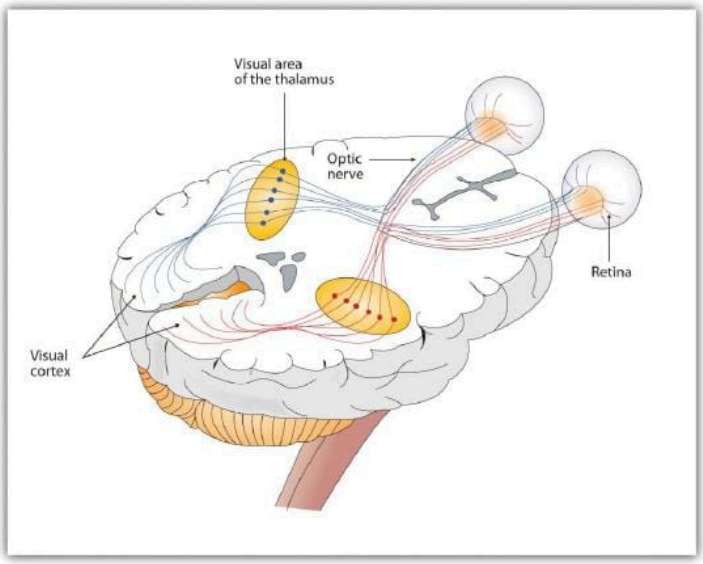


Margaret Livingstone (2002) found an interesting effect that demonstrates the different processing capacities of the eye's rods and cones—namely, that the Mona Lisa's smile, which is widely referred to as "elusive," is perceived differently depending on how one looks at the painting. Because Leonardo 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."

Photo courtesy of the Louvre Museum.

As you can see in Figure 21.3.11, 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 21.3.11 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 (Figure 21.3.12). 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.

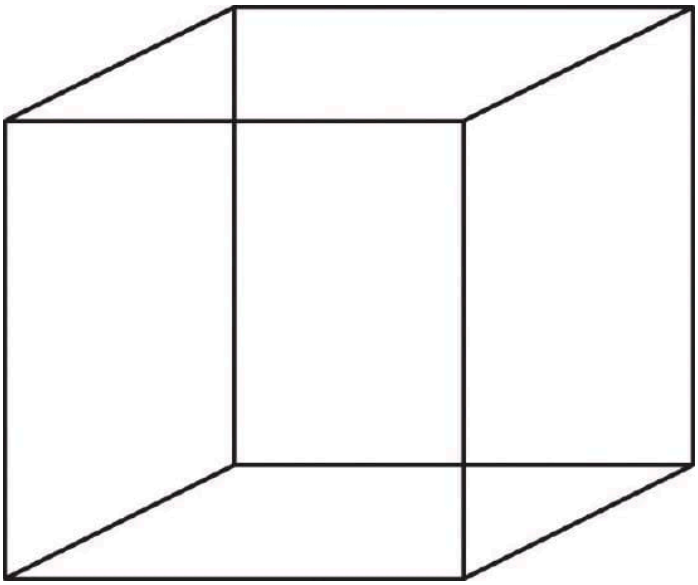
Figure 21.3.12 Blind Spot Demonstration



You can get an idea of the extent of your blind spot (the place where the optic nerve leaves the retina) by trying this demonstration. 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 color 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).

Figure 21.3.13 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, for instance, 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).

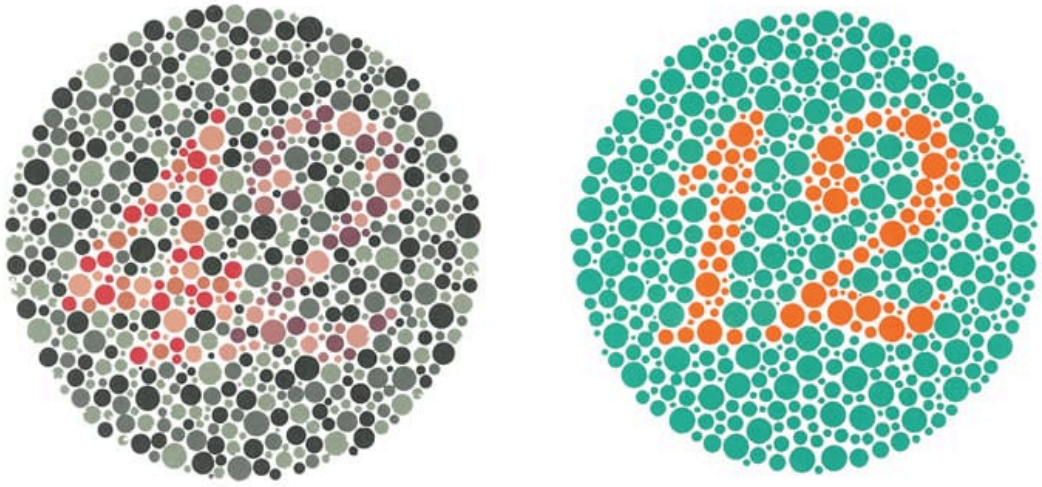
Perceiving Color

It has been estimated that the human visual system can detect and discriminate among 7 million color variations (Geldard, 1972), but these variations are all created by the combinations of the three primary colors: red, green, and blue. *The shade of a color*, 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). 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 color vision, Hermann von Helmholtz (1821–1894) theorized that color 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 color. According to this Young-Helmholtz trichromatic color theory, *what color 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 color blindness—*the inability to detect either green and/or red colors*. About 1 in 50 people, mostly men, lack functioning in the red- or green-sensitive cones, leaving them only able to experience either one or two colors (Figure 21.3.14).

Figure 21.3.14



People with normal color 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 color blind cannot see the numbers at all.

Wikimedia Commons.

YouTube Video

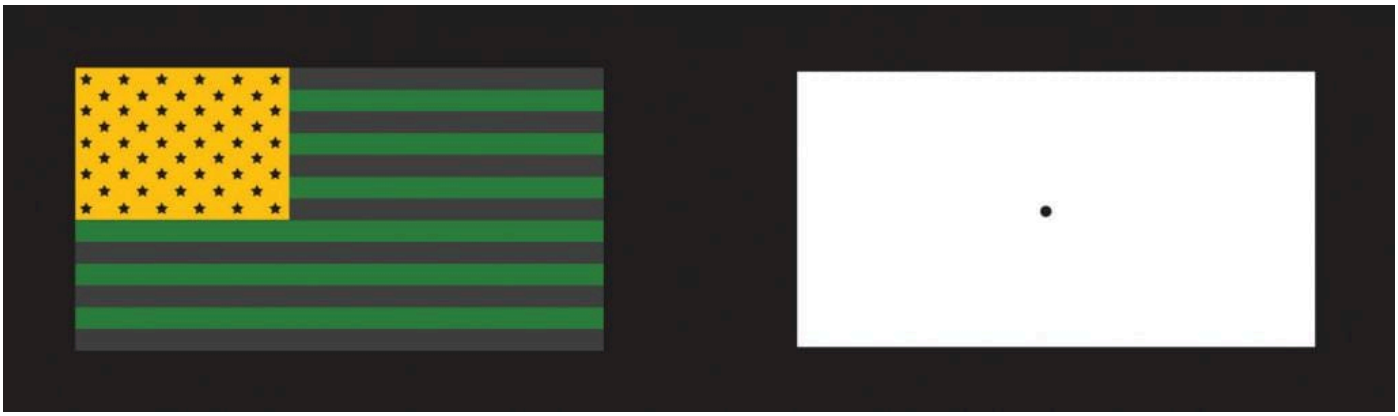
This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

The trichromatic color theory cannot explain all of human vision, however. For one, although the color purple does appear to us as a mixing of red and blue, yellow does not appear to be a mix of red and green. And people with color 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 color theory, *proposes that we analyze sensory information not in terms of three colors but rather in three sets of "opponent colors": 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 color (e.g., red) but inhibited by another color (e.g., green).

One example of opponent processing occurs in the experience of an afterimage. If you stare at the flag on the left side of Figure 21.3.15 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. When we stare at the green stripes, 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 21.3.15 U.S. Flag



The presence of an afterimage is best explained by the opponent-process theory of color perception. Stare at the flag for a few seconds, and then move your gaze to the blank space next to it. Do you see the afterimage?

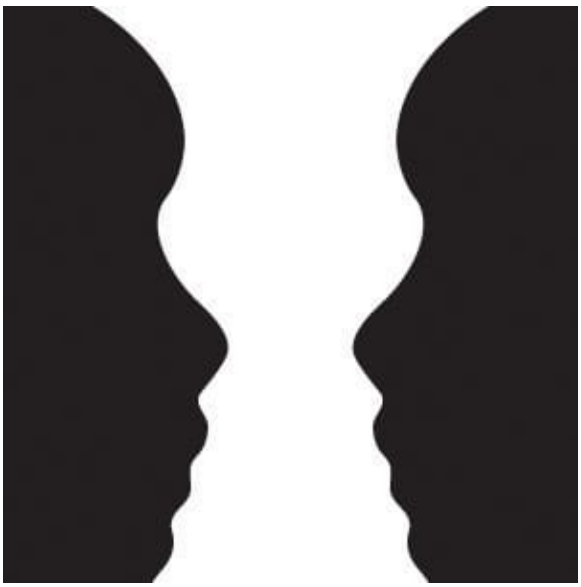
Mike Swanson – U.S. Flag (inverted) – public domain.

The tricolor and the opponent-process mechanisms work together to produce color 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 color 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 21.3.1.

Table 21.3.1 *Summary of Gestalt Principles of Form Perception*

Principle	Description	Example	Image
Figure and ground	We structure input such 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.	Figure 21.3.1 

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.

Figure 21.3.1



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.

Figure 21.3.1



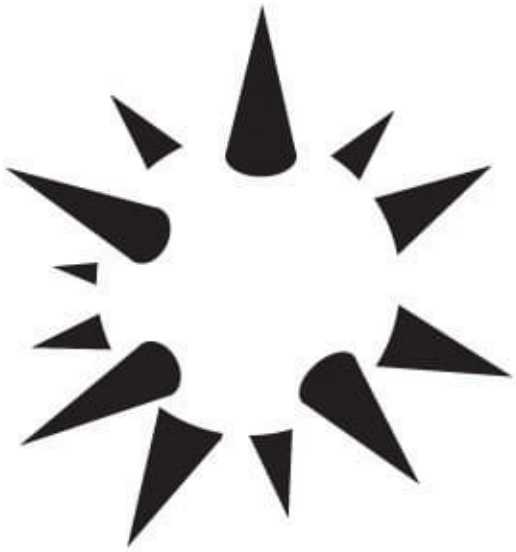
Continuity We tend to perceive stimuli in smooth, continuous ways rather than in more discontinuous ways. At right, most people see a line of dots that moves from the lower left to the upper right, rather than a line that moves from the left and then suddenly turns down. The principle of continuity leads us to see most lines as following the smoothest possible path.

Figure 21.3.1



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.

Figure 21.3.1



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 6- 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 21.3.22). 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).

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 thus which 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 21.3.2.

Table 21.3.2 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.	Figure 21.3.2  Andrew Huff – Rotted Fence – CC BY 2.0.

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.

Figure 21.3.2


Allan Ferguson – Trolley Crosses Freeway – CC BY 2.0.

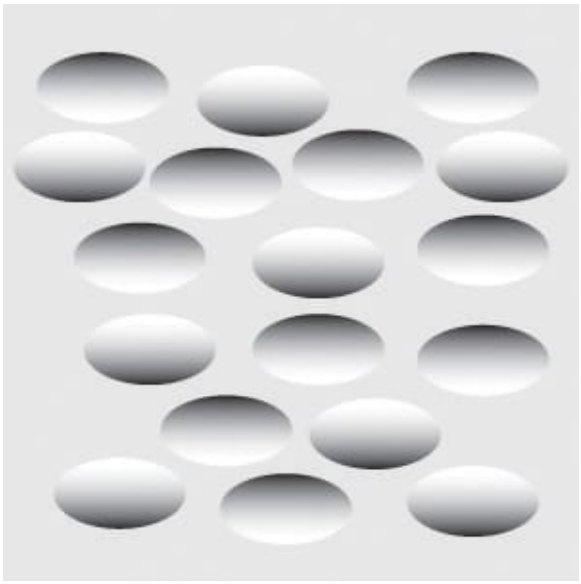
Linear perspective Parallel lines appear to converge at a distance. We know that the tracks at right are parallel. When they appear closer together, we determine they are farther away.

Figure 21.3.2

 Bo Insogna, TheLightningMan.com – Lightning Striking By The Train Tracks – CC BY-NC-ND 2.0.

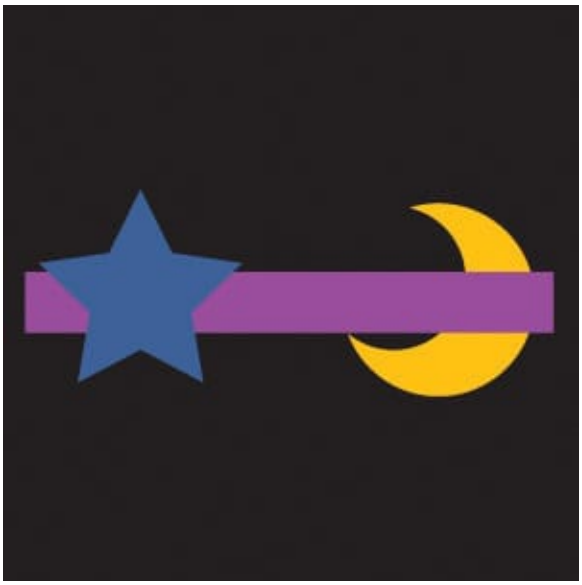
Light and shadow The eye receives more reflected light from objects that are closer to us. Normally, light comes from above, so darker images are in shadow. We see the images at right as extending and indented according to their shadowing. If we invert the picture, the images will reverse.

Figure 21.3.2



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.

Figure 21.3.2



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 distant hills more hazy and thus appear farther away.

Figure 21.3.2


Frans Koppelaar – Landscape near Bologna – CC BY-SA 2.5.

Photo sources: TBD

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* (Note 4.43 “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 color 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: upload.wikimedia.org/Wikipedia/commons/6/6e/Lilac-Chaser.gif

Beta effect: 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, color, motion, and depth.
- Light enters the eye through the transparent cornea and passes through the pupil at the center 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. Color 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 color theory proposes that color perception is the result of the signals sent by the three types of cones, whereas the opponent-process color theory proposes that we perceive color as three sets of opponent colors: red-green, yellow-blue, and white-black.
- The ability to perceive depth occurs through 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?

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21.4: Hearing

Learning Objectives

1. Draw a picture of the ear and label its key structures and functions, and describe the role they play in hearing.
2. 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, ranging 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 identity of the caller.

The Ear

Just as the eye detects light waves, the ear detects sound waves. Vibrating objects (such as the human vocal chords 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 mediums such as air, water, or metal, and it is the changes in pressure associated with these mediums 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 (Figure 21.4.29). 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.

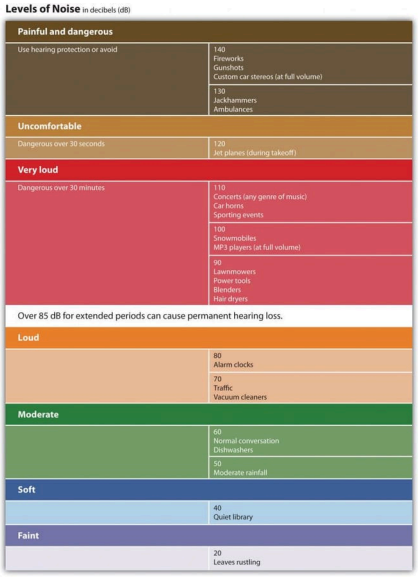


Figure 21.4.29: Sounds in Everyday Life

The human ear can comfortably hear sounds up to 80 decibels. Prolonged exposure to sounds above 80 decibels can cause hearing loss.

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*. The vibrations cause the oval window, *the membrane covering the opening of the cochlea*, to vibrate, disturbing the fluid inside the cochlea.

The movements of the fluid in the cochlea bend the hair cells of the inner ear, much in 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 fibers 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 at the width of an atom is equivalent to the tip of the Eiffel Tower swaying by half an inch (Corey et al., 2004).

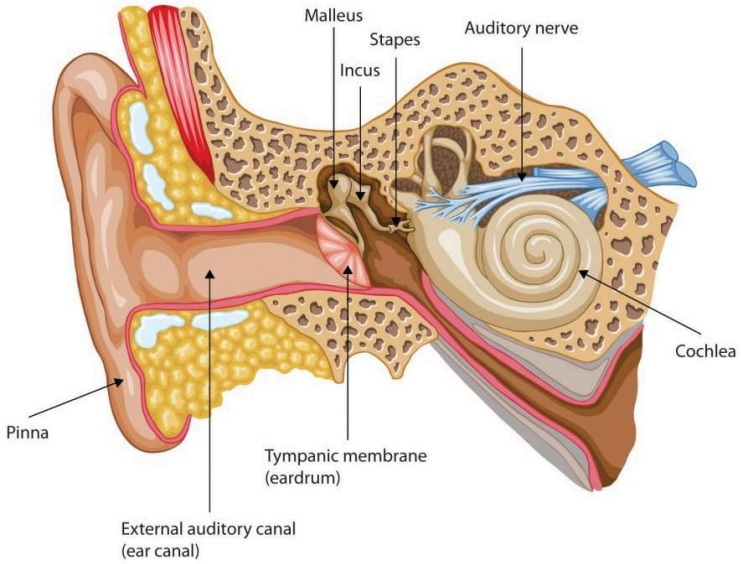


Figure 21.4.30 The Human Ear

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 6 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

More than 31 million Americans suffer from some kind of hearing impairment (Kochkin, 2005). *Conductive hearing loss* is caused by physical damage to the ear (such as to the eardrums or ossicles) that reduce 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 sound 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 hear who would normally be deaf, and if the device is implanted early enough, these children can frequently learn to speak, often as well as normal children do (Dettman, Pinder, Briggs, Dowell, & Leigh, 2007; Dorman & Wilson, 2004).

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

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Key Takeaways

- Sound waves vibrating through mediums 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 behavior to reduce the likelihood of suffering damage?

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21.5: The Other Senses

Learning Objectives

- Describe the basic functions of the chemical senses
- Explain the basic functions of the somatosensory, nociceptive, and thermoceptive sensory systems
- Describe the basic functions of the vestibular, proprioceptive, and kinesthetic sensory systems

Vision and hearing have received an incredible amount of attention from researchers over the years. While there is still much to be learned about how these sensory systems work, we have a much better understanding of them than of our other sensory modalities. In this section, we will explore our chemical senses (taste and smell) and our body senses (touch, temperature, pain, balance, and body position).

The Chemical Senses

Taste (gustation) and smell (olfaction) are called chemical senses because both have sensory receptors that respond to molecules in the food we eat or in the air we breathe. There is a pronounced interaction between our chemical senses. For example, when we describe the flavor of a given food, we are really referring to both gustatory and olfactory properties of the food working in combination.

Taste (Gustation)

You have learned since elementary school that there are four basic groupings of taste: sweet, salty, sour, and bitter. Research demonstrates, however, that we have at least six taste groupings. Umami is our fifth taste. **Umami** is actually a Japanese word that roughly translates to yummy, and it is associated with a taste for monosodium glutamate (Kinnamon & Vandenbeuch, 2009). There is also a growing body of experimental evidence suggesting that we possess a taste for the fatty content of a given food (Mizushige, Inoue, & Fushiki, 2007).

Molecules from the food and beverages we consume dissolve in our saliva and interact with taste receptors on our tongue and in our mouth and throat. **Taste buds** are formed by groupings of taste receptor cells with hair-like extensions that protrude into the central pore of the taste bud (Figure 5.21). Taste buds have a life cycle of ten days to two weeks, so even destroying some by burning your tongue won't have any long-term effect; they just grow right back. Taste molecules bind to receptors on this extension and cause chemical changes within the sensory cell that result in neural impulses being transmitted to the brain via different nerves, depending on where the receptor is located. Taste information is transmitted to the medulla, thalamus, and limbic system, and to the gustatory cortex, which is tucked underneath the overlap between the frontal and temporal lobes (Maffei, Haley, & Fontanini, 2012; Roper, 2013).

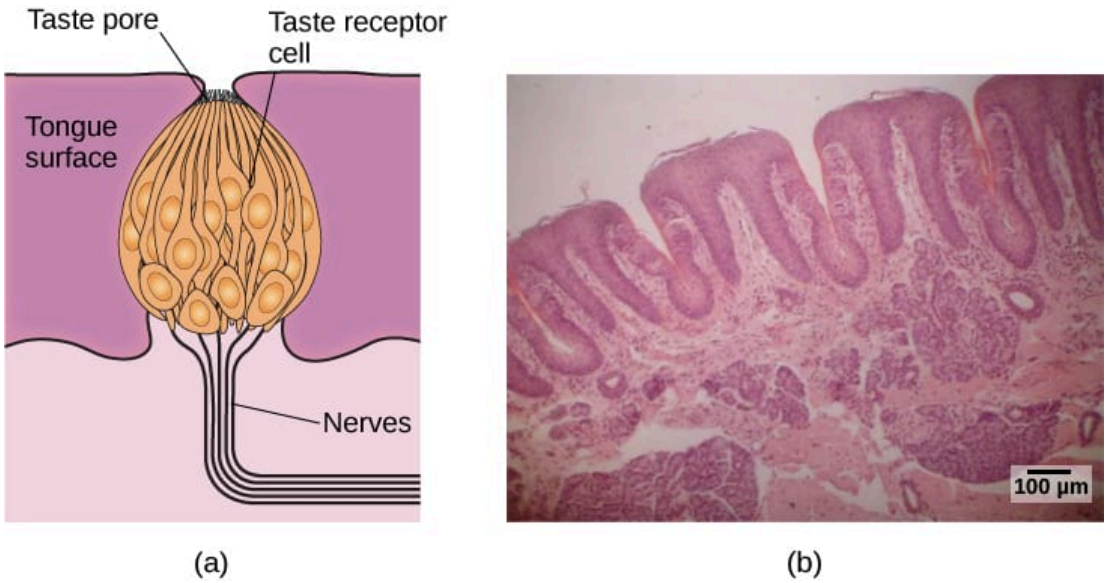


Figure **5.21** (a) Taste buds are composed of a number of individual taste receptors cells that transmit information to nerves. (b) This micrograph shows a close-up view of the tongue's surface. (credit a: modification of work by Jonas Töle; credit b: scale-bar data from Matt Russell)

Smell (Olfaction)

Olfactory receptor cells are located in a mucous membrane at the top of the nose. Small hair-like extensions from these receptors serve as the sites for odor molecules dissolved in the mucus to interact with chemical receptors located on these extensions (Figure 5.22). Once an odor molecule has bound a given receptor, chemical changes within the cell result in signals being sent to the **olfactory bulb**: a bulb-like structure at the tip of the frontal lobe where the olfactory nerves begin. From the olfactory bulb, information is sent to regions of the limbic system and to the primary olfactory cortex, which is located very near the gustatory cortex (Lodovichi & Belluscio, 2012; Spors et al., 2013).

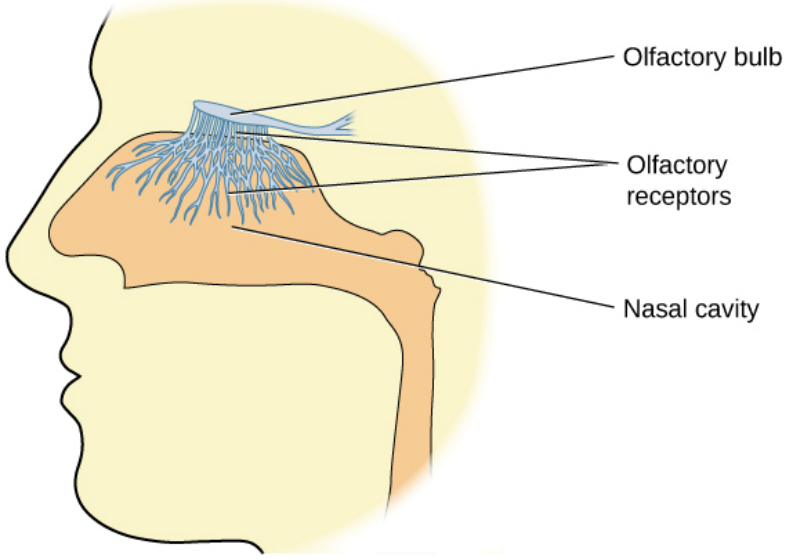


Figure **5.22** Olfactory receptors are the hair-like parts that extend from the olfactory bulb into the mucous membrane of the nasal cavity.

There is tremendous variation in the sensitivity of the olfactory systems of different species. We often think of dogs as having far superior olfactory systems than our own, and indeed, dogs can do some remarkable things with their noses. There is some evidence to suggest that dogs can "smell" dangerous drops in blood glucose levels as well as cancerous tumors (Wells, 2010). Dogs' extraordinary olfactory abilities may be due to the increased number of functional genes for olfactory receptors (between 800 and 1200), compared to the fewer than 400 observed in humans and other primates (Niimura & Nei, 2007).

Many species respond to chemical messages, known as **pheromones**, sent by another individual (Wysocki & Preti, 2004). Pheromonal communication often involves providing information about the reproductive status of a potential mate. So, for example, when a female rat is ready to mate, she secretes pheromonal signals that draw attention from nearby male rats. Pheromonal activation is actually an important component in eliciting sexual behavior in the male rat (Furlow, 1996, 2012; Purvis & Haynes, 1972; Sachs, 1997). There has also been a good deal of research (and controversy) about pheromones in humans (Comfort, 1971; Russell, 1976; Wolfgang-Kimball, 1992; Weller, 1998).

Touch, Thermoception, and Nociception

A number of receptors are distributed throughout the skin to respond to various touch-related stimuli (Figure 5.23). These receptors include Meissner's corpuscles, Pacinian corpuscles, Merkel's disks, and Ruffini corpuscles. **Meissner's corpuscles** respond to pressure and lower frequency vibrations, and **Pacinian corpuscles** detect transient pressure and higher frequency vibrations. **Merkel's disks** respond to light pressure, while **Ruffini corpuscles** detect stretch (Abraira & Ginty, 2013).

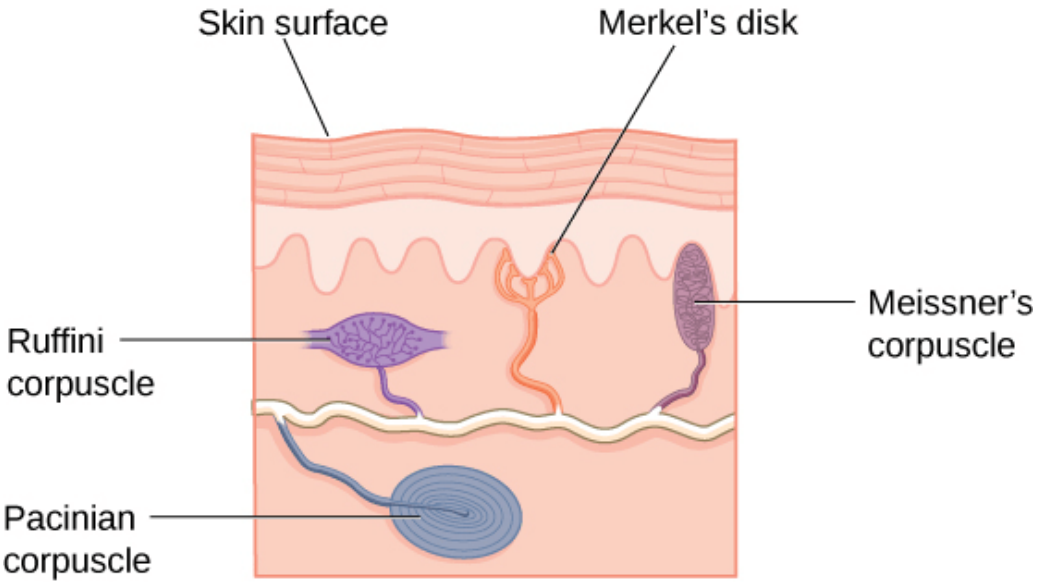


Figure **5.23** There are many types of sensory receptors located in the skin, each attuned to specific touch-related stimuli.

In addition to the receptors located in the skin, there are also a number of free nerve endings that serve sensory functions. These nerve endings respond to a variety of different types of touch-related stimuli and serve as sensory receptors for both **thermoception** (temperature perception) and **nociception** (a signal indicating potential harm and maybe pain) (Garland, 2012; Petho & Reeh, 2012; Spray, 1986). Sensory information collected from the receptors and free nerve endings travels up the spinal cord and is transmitted to regions of the medulla, thalamus, and ultimately to somatosensory cortex, which is located in the postcentral gyrus of the parietal lobe.

Pain Perception

Pain is an unpleasant experience that involves both physical and psychological components. Feeling pain is quite adaptive because it makes us aware of an injury, and it motivates us to remove ourselves from the cause of that injury. In addition, pain also makes us less likely to suffer additional injury because we will be gentler with our injured body parts.

Generally speaking, pain can be considered to be neuropathic or inflammatory in nature. Pain that signals some type of tissue damage is known as **inflammatory pain**. In some situations, pain results from damage to neurons of either the peripheral or central nervous system. As a result, pain signals that are sent to the brain get exaggerated. This type of pain is known as **neuropathic pain**. Multiple treatment options for pain relief range from relaxation therapy to the use of analgesic medications to deep brain stimulation. The most effective treatment option for a given individual will depend on a number of considerations, including the severity and persistence of the pain and any medical/psychological conditions.

Some individuals are born without the ability to feel pain. This very rare genetic disorder is known as **congenital insensitivity to pain** (or **congenital analgesia**). While those with congenital analgesia can detect differences in temperature and pressure, they

cannot experience pain. As a result, they often suffer significant injuries. Young children have serious mouth and tongue injuries because they have bitten themselves repeatedly. Not surprisingly, individuals suffering from this disorder have much shorter life expectancies due to their injuries and secondary infections of injured sites (U.S. National Library of Medicine, 2013).

Link to Learning

Watch this video about congenital insensitivity to pain to learn more.

The Vestibular Sense, Proprioception, and Kinesthesia

The **vestibular sense** contributes to our ability to maintain balance and body posture. As Figure 5.24 shows, the major sensory organs (utricle, saccule, and the three semicircular canals) of this system are located next to the cochlea in the inner ear. The vestibular organs are fluid-filled and have hair cells, similar to the ones found in the auditory system, which respond to movement of the head and gravitational forces. When these hair cells are stimulated, they send signals to the brain via the vestibular nerve. Although we may not be consciously aware of our vestibular system's sensory information under normal circumstances, its importance is apparent when we experience motion sickness and/or dizziness related to infections of the inner ear (Khan & Chang, 2013).

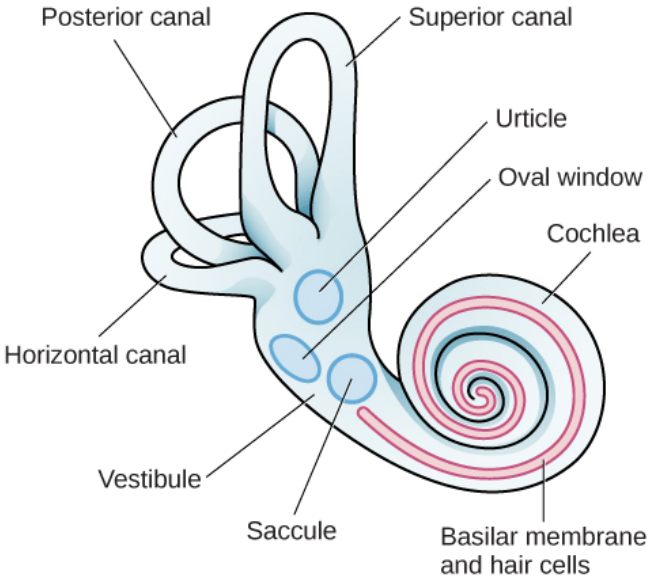


Figure **5.24** The major sensory organs of the vestibular system are located next to the cochlea in the inner ear. These include the utricle, saccule, and the three semicircular canals (posterior, superior, and horizontal).

In addition to maintaining balance, the vestibular system collects information critical for controlling movement and the reflexes that move various parts of our bodies to compensate for changes in body position. Therefore, both **proprioception** (perception of body position) and **kinesthesia** (perception of the body's movement through space) interact with information provided by the vestibular system.

These sensory systems also gather information from receptors that respond to stretch and tension in muscles, joints, skin, and tendons (Lackner & DiZio, 2005; Proske, 2006; Proske & Gandevia, 2012). Proprioceptive and kinesthetic information travels to the brain via the spinal column. Several cortical regions in addition to the cerebellum receive information from and send information to the sensory organs of the proprioceptive and kinesthetic systems.

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21.6: Sensation and Perception

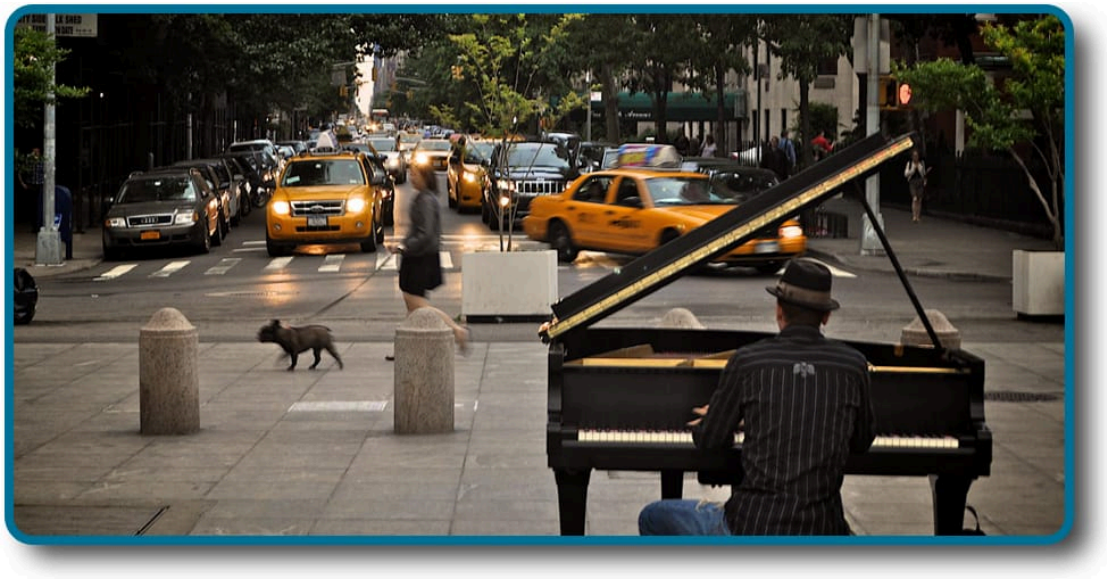


Figure 5.1 If you were standing in the midst of this street scene, you would be absorbing and processing numerous pieces of sensory input. (credit: modification of work by Cory Zanker)

Imagine standing on a city street corner. You might be struck by movement everywhere as cars and people go about their business, by the sound of a street musician's melody or a horn honking in the distance, by the smell of exhaust fumes or of food being sold by a nearby vendor, and by the sensation of hard pavement under your feet.

We rely on our sensory systems to provide important information about our surroundings. We use this information to successfully navigate and interact with our environment so that we can find nourishment, seek shelter, maintain social relationships, and avoid potentially dangerous situations.

This chapter will provide an overview of how sensory information is received and processed by the nervous system and how that affects our conscious experience of the world. We begin by learning the distinction between sensation and perception. Then we consider the physical properties of light and sound stimuli, along with an overview of the basic structure and function of the major sensory systems. The chapter will close with a discussion of a historically important theory of perception called Gestalt.

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CHAPTER 22: MENTAL HEALTH

22.1: Mental Health
22.2: Diagnosing and Classifying Psychological Disorders
22.3: Anxiety Disorders
22.4: Mood and Related Disorders
22.5: Schizophrenia- The Edge of Reality and Consciousness
22.6: Relationships and Well-being
22.7: Personality Disorders

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22.1: Mental Health

Learning Objectives

1. Define “psychological disorder” and summarize the general causes of disorder.
2. 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.
3. Describe the stigma of psychological disorders and their impact on those who suffer from them.

People with psychological disorders are often 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 22.1.1 shows the prevalence (i.e., *the frequency of occurrence of a given condition in a population at a given time*) of some of the major psychological disorders in the United States.

Table 22.1.1: One-Year Prevalence Rates for Psychological Disorders in the United States, 2001–2003

Disease	Percentage affected	Number affected
Any mental disorder	26.2	81,744,000
Any anxiety disorder	18.1	56,472,000
Specific phobia	8.7	27,144,000
Social phobia	6.8	21,216,000
Agoraphobia	0.8	2,496,000
Generalized anxiety disorder	3.1	9,672,000
Panic disorder	2.7	8,424,000
Obsessive-compulsive disorder	1.0	3,120,000
Posttraumatic stress disorder	3.5	10,920,000
Any mood disorder	9.5	29,640,000
Major depressive disorder	6.7	20,904,000
Bipolar disorder	2.6	8,112,000
Schizophrenia	1.0	3,120,000
Personality disorders		
Antisocial personality disorder	1.5	4,680,000
Borderline personality disorder	1.5	4,680,000
Anorexia nervosa	0.1	312,000
Any substance abuse disorder	3.8	11,856,000
Alcohol use disorder	4.4	13,728,000
Drug use disorder	1.8	5,616,000
All cancers*	5.4	16,848,000

*** These nonpsychological conditions are included for comparison. Sources: Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month *DSM-IV* disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6), 617–627; Narrow, W. E., Rae, D. S., Robins, L. N., & Regier, D. A. (2002). Revised prevalence based estimates of mental disorders in the United States: Using a clinical significance criterion to reconcile 2 surveys’ estimates. *Archives of General Psychiatry, 59*(2), 115–123.**

Disease	Percentage affected	Number affected
Diabetes*	10.7	33,348,000

*** These nonpsychological conditions are included for comparison. Sources: Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month *DSM-IV* disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6), 617–627; Narrow, W. E., Rae, D. S., Robins, L. N., & Regier, D. A. (2002). Revised prevalence based estimates of mental disorders in the United States: Using a clinical significance criterion to reconcile 2 surveys' estimates. *Archives of General Psychiatry, 59*(2), 115–123.**

Defining Disorder

A psychological disorder is *an ongoing dysfunctional pattern of thought, emotion, and behavior 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 22.1.1). 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.

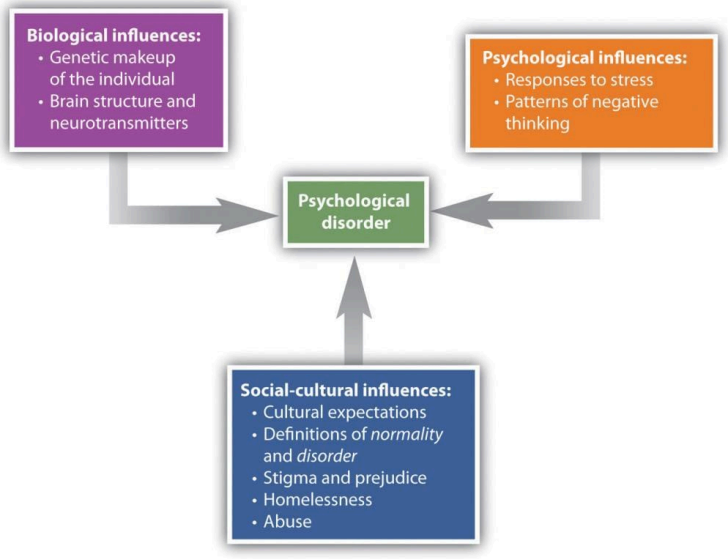


Figure 22.1.1: The Bio-Psycho-Social Model. The bio-psycho-social model of disorder proposes that disorders are caused by biological, psychological, and social-cultural factors.

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 experiences, as well as social factors such as whether or not he is exposed to stressful environments in adolescence and whether or not he has support from people who care about him (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 behaviors that the individual engages in. These observations find that emotional states and behaviors operate on a continuum, ranging from more "normal" and "accepted" to more "deviant," "abnormal," and "unaccepted." The behaviors that are associated with disorder are in many cases the same behaviors we that engage in 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, but Robert's struggle with his personal appearance, as discussed at the beginning of this chapter, was clearly unusual, unhealthy, and distressing to him.



Figure 22.1.2: How Thin Is Too Thin? This dancer needs to be thin for her career, but when does her dieting turn into a psychological disorder? Psychologists believe this happens when the behavior becomes *distressing* and *dysfunctional* to the person. Jean-François Chénier – Trust – CC BY-NC 2.0.

Whether a given behavior is considered a psychological disorder is determined not only by whether a behavior is *unusual* (e.g., whether it is "mild" anxiety versus "extreme" anxiety) but also by whether a behavior 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, 2000)[1]. 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 behaviors 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 behaviors of the people listed in Table 22.1.2. For each, indicate whether you think the behavior 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 22.1.2: 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 OK.
			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 neighborhood. But mostly he fears mice, checking under his bed frequently to see if any are present.

Yes	No	Need more information	Description
			A worshipper 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 22.1.2 because although the behaviors 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 Behavior

Every culture and society has its own views on what constitutes abnormal behavior 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) to release the demons.

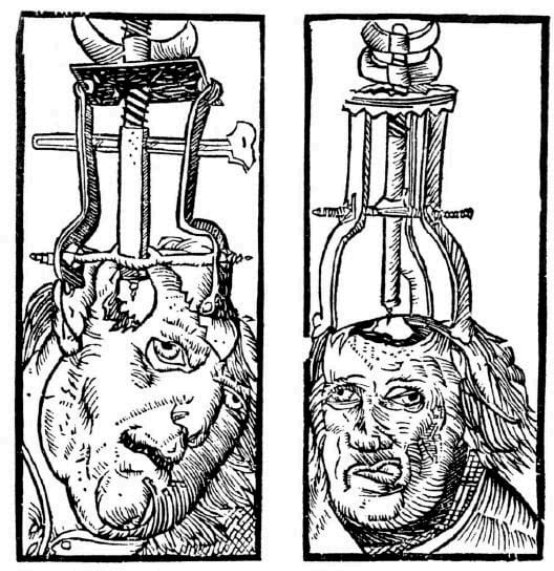


Figure 22.1.3: Trepanation (drilling holes in the skull) has been used since prehistoric times in attempts to cure epilepsy, schizophrenia, and other psychological disorders. Peter Treveris – Wikimedia Commons – public domain.

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. In America, the reformers Benjamin Rush (1745–1813) and Dorothea Dix (1802–1887) were instrumental in creating mental hospitals that treated patients humanely and attempted to cure them if possible. These reformers saw mental illness as an underlying psychological disorder, which was diagnosed according to its symptoms and which could be cured through treatment.

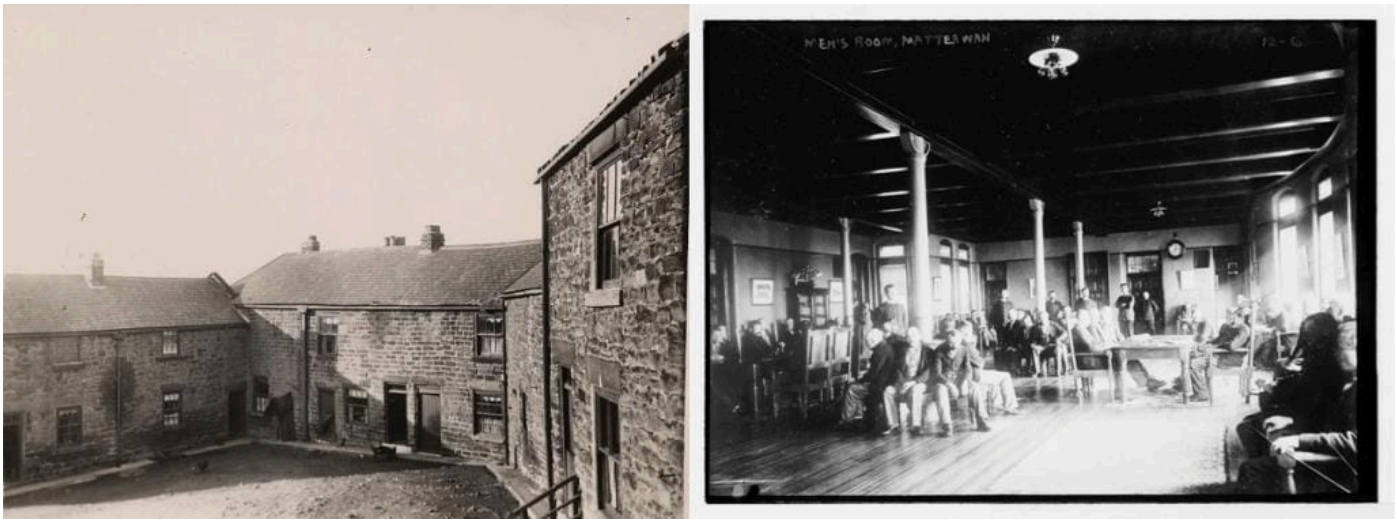


Figure 22.1.4: Until the early 1900s people with mental disorders were often imprisoned in asylums such as these. U.S. Library of Congress – Wikimedia Commons – public domain.

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."

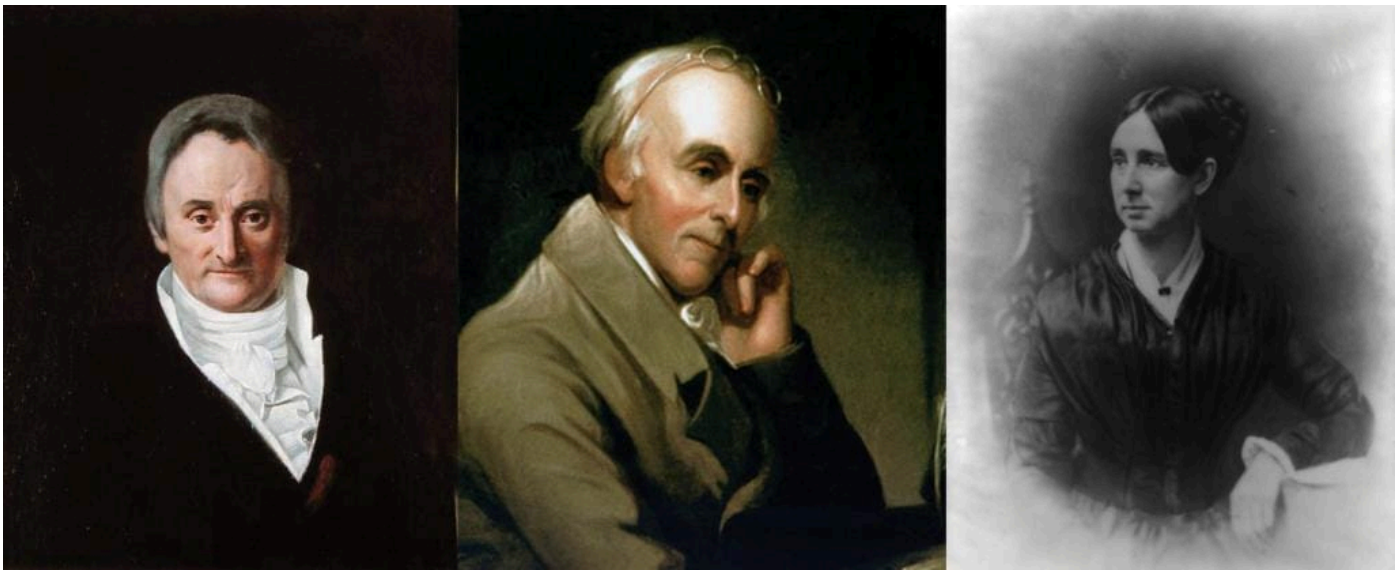


Figure 22.1.5: The reformers Philippe Pinel, Benjamin Rush, and Dorothea Dix fought the often brutal treatment of the mentally ill and were instrumental in changing perceptions and treatment of them. Anna Mérimée – Pinel – public domain; Charles Wilson Peale – Rush – public domain; U.S. Library of Congress – Dix – public domain.

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 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 National Alliance on Mental Illness (NAMI; n.d.)[2], for example, work to reduce the negative impact of stigma through education, community action, individual support, and other techniques.

Diagnosing Disorder: The *DSM*

Psychologists have developed criteria that help them determine whether behavior should be considered a psychological disorder and which of the many disorders particular behaviors 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, 2000)[1]. The *DSM* is used by therapists, researchers, drug companies, health insurance companies, and policymakers in the United States to determine what services are appropriately provided for treating patients with given symptoms. 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.

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 multiple times. Each revision of the *DSM* takes into consideration new knowledge as well as changes in cultural norms about disorder. The current edition is the *DSM-V-TR* (5th edition with text revision) which was published in 2013 with the text revision released in 2022.

Key Takeaways

- More psychologists are involved in the diagnosis and treatment of psychological disorder than in any other endeavor, 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 behavior 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.

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22.2: Diagnosing and Classifying Psychological Disorders

Learning Objectives

- Explain why classification systems are necessary in the study of psychopathology
- Describe the basic features of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)
- Discuss changes in the DSM over time, including criticisms of the current edition
- Identify which disorders are generally the most common

A first step in the study of psychological disorders is carefully and systematically discerning significant signs and symptoms. How do mental health professionals ascertain whether or not a person's inner states and behaviors truly represent a psychological disorder? Arriving at a proper **diagnosis**—that is, appropriately identifying and labeling a set of defined symptoms—is absolutely crucial. This process enables professionals to use a common language with others in the field and aids in communication about the disorder with the patient, colleagues and the public. A proper diagnosis is an essential element to guide proper and successful treatment. For these reasons, classification systems that organize psychological disorders systematically are necessary.

The Diagnostic and Statistical Manual of Mental Disorders (DSM)

Although a number of classification systems have been developed over time, the one that is used by most mental health professionals in the United States is the ***Diagnostic and Statistical Manual of Mental Disorders*** **(DSM-5)**, published by the American Psychiatric Association (2013). (Note that the American Psychiatric Association differs from the American Psychological Association; both are abbreviated APA.) The first edition of the DSM, published in 1952, classified psychological disorders according to a format developed by the U.S. Army during World War II (Clegg, 2012). In the years since, the DSM has undergone numerous revisions and editions. The most recent edition, published in 2013, is the DSM-5 (APA, 2013). The DSM-5 includes many categories of disorders (e.g., anxiety disorders, depressive disorders, and dissociative disorders). Each disorder is described in detail, including an overview of the disorder (diagnostic features), specific symptoms required for diagnosis (diagnostic criteria), prevalence information (what percent of the population is thought to be afflicted with the disorder), and risk factors associated with the disorder. Figure 15.4 shows lifetime prevalence rates—the percentage of people in a population who develop a disorder in their lifetime—of various psychological disorders among U.S. adults. These data were based on a national sample of $9,282$ U.S. residents (National Comorbidity Survey, 2007).

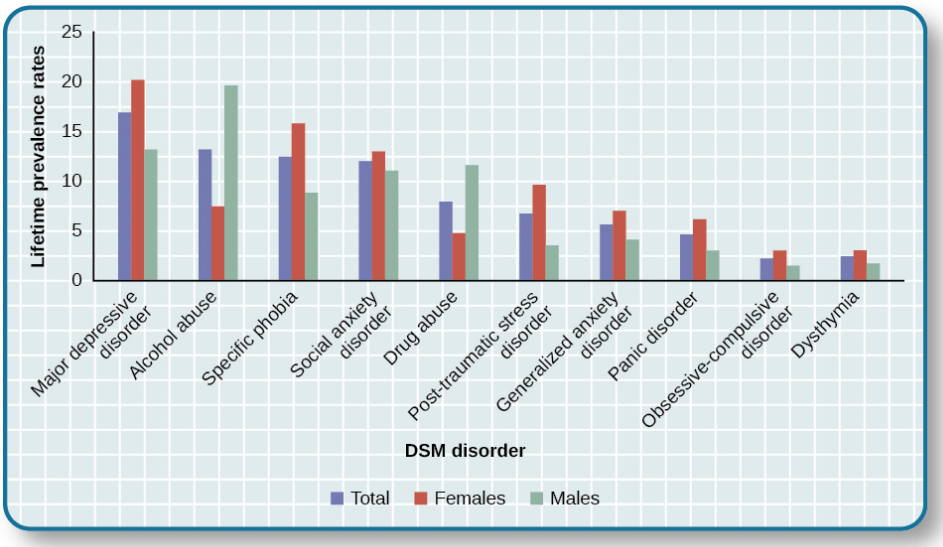


Figure 15.4 The graph shows the breakdown of psychological disorders, comparing the percentage prevalence among adult males and adult females in the United States. Because the data is from 2007, the categories shown here are from the DSM-IV, which has been supplanted by the DSM-5. Most categories remain the same; however, alcohol abuse now falls under a broader Alcohol Use Disorder category.

The DSM-5 also provides information about **comorbidity**; the co-occurrence of two disorders. For example, the DSM-5 mentions that 41% of people with obsessive-compulsive disorder (OCD) also meet the diagnostic criteria for major depressive disorder (See figure 15.5). Drug use is highly comorbid with other mental illnesses; 6 out of 10 people who have a substance use disorder also suffer from another form of mental illness (National Institute on Drug Abuse [NIDA], 2007).

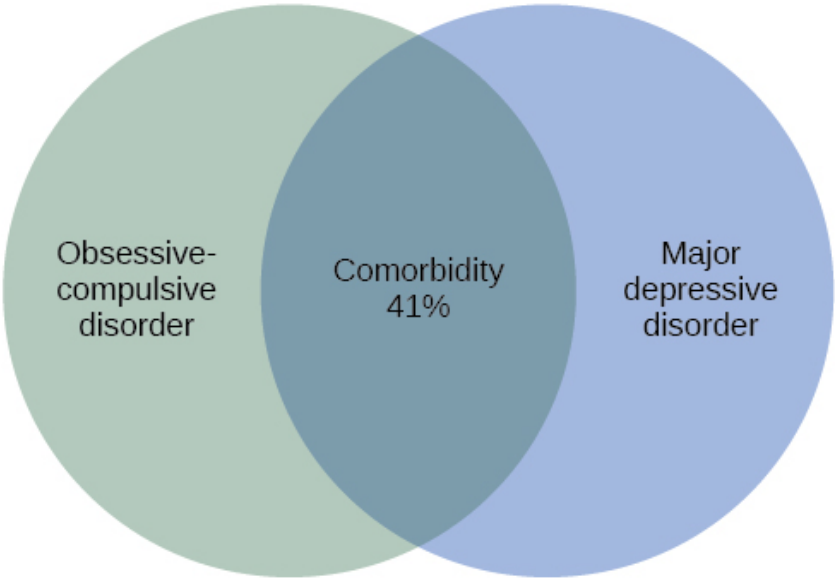


Figure 15.5 Obsessive-compulsive disorder and major depressive disorder frequently occur in the same person.

Connect the Concepts: Comorbidity

As you've learned in the text, comorbidity refers to situations in which an individual suffers from more than one disorder, and often the symptoms of each can interact in negative ways. Co-occurrence and comorbidity of psychological disorders are quite common, and some of the most pervasive comorbidities involve substance use disorders that co-occur with psychological disorders. Indeed, some estimates suggest that around a quarter of people who suffer from the most severe cases of mental illness exhibit substance use disorder as well. Conversely, around 10 percent of individuals seeking treatment for substance use disorder have serious mental illnesses. Observations such as these have important implications for treatment options that are available. When people with a mental illness are also habitual drug users, their symptoms can be exacerbated and resistant to treatment. Furthermore, it is not always clear whether the symptoms are due to drug use, the mental illness, or a combination of the two. Therefore, it is recommended that behavior is observed in situations in which the individual has ceased using drugs and is no longer experiencing withdrawal from the drug in order to make the most accurate diagnosis (NIDA, 2018).

Obviously, substance use disorders are not the only possible comorbidities. In fact, some of the most common psychological disorders tend to co-occur. For instance, more than half of individuals who have a primary diagnosis of depressive disorder are estimated to exhibit some sort of anxiety disorder. The reverse is also true for those diagnosed with a primary diagnosis of an anxiety disorder. Further, anxiety disorders and major depression have a high rate of comorbidity with several other psychological disorders (Al-Asadi, Klein, & Meyer, 2015).

The DSM has changed considerably in the half-century since it was originally published. The first two editions of the DSM, for example, listed homosexuality as a disorder; however, in 1973, the APA voted to remove it from the manual (Silverstein, 2009). Additionally, beginning with the DSM-III in 1980, mental disorders have been described in much greater detail, and the number of diagnosable conditions has grown steadily, as has the size of the manual itself. DSM-I included 106 diagnoses and was 130 total pages, whereas DSM-III included more than 2 times as many diagnoses (265) and was nearly seven times its size (886 total pages) (Mayes & Horowitz, 2005). Although DSM-5 is longer than DSM-IV, the volume includes only 237 disorders, a decrease from the 297 disorders that were listed in DSM-IV. The latest edition, DSM-5, includes revisions in the organization and naming of categories and in the diagnostic criteria for various disorders (Regier, Kuhl, & Kupfer, 2012), while emphasizing careful consideration of the importance of gender and cultural difference in the expression of various symptoms (Fisher, 2010).

Some believe that establishing new diagnoses might overpathologize the human condition by turning common human problems

into mental illnesses (The Associated Press, 2013). Indeed, the finding that nearly half of all Americans will meet the criteria for a DSM disorder at some point in their life (Kessler et al., 2005) likely fuels much of this skepticism. The DSM-5 is also criticized on the grounds that its diagnostic criteria have been loosened, thereby threatening to "turn our current diagnostic inflation into diagnostic hyperinflation" (Frances, 2012, para. 22). For example, DSM-IV specified that the symptoms of major depressive disorder must not be attributable to normal bereavement (loss of a loved one). The DSM-5, however, has removed this bereavement exclusion, essentially meaning that grief and sadness after a loved one's death can constitute major depressive disorder.

The International Classification of Diseases

A second classification system, the ***International Classification of Diseases* (ICD)**, is also widely recognized. Published by the World Health Organization (WHO), the ICD was developed in Europe shortly after World War II and, like the DSM, has been revised several times. The categories of psychological disorders in both the DSM and ICD are similar, as are the criteria for specific disorders; however, some differences exist. Although the ICD is used for clinical purposes, this tool is also used to examine the general health of populations and to monitor the prevalence of diseases and other health problems internationally (WHO, 2013). The ICD is in its 10th edition (ICD-10); however, efforts are now underway to develop a new edition (ICD-11) that, in conjunction with the changes in DSM-5, will help harmonize the two classification systems as much as possible (APA, 2013).

A study that compared the use of the two classification systems found that worldwide the ICD is more frequently used for clinical diagnosis, whereas the DSM is more valued for research (Mezzich, 2002). Most research findings concerning the etiology and treatment of psychological disorders are based on criteria set forth in the DSM (Oltmanns & Castonguay, 2013). The DSM also includes more explicit disorder criteria, along with an extensive and helpful explanatory text (Regier et al., 2012). The DSM is the classification system of choice among U.S. mental health professionals, and this chapter is based on the DSM paradigm.

The Compassionate View of Psychological Disorders

As these disorders are outlined, please bear two things in mind. First, remember that psychological disorders represent *extremes* of inner experience and behavior. If, while reading about these disorders, you feel that these descriptions begin to personally characterize you, do not worry—this moment of enlightenment probably means nothing more than you are normal. Each of us experiences episodes of sadness, anxiety, and preoccupation with certain thoughts—times when we do not quite feel ourselves. These episodes should not be considered problematic unless the accompanying thoughts and behaviors become extreme and have a disruptive effect on one's life. Second, understand that people with psychological disorders are far more than just embodiments of their disorders. We do not use terms such as schizophrenics, depressives, or phobics because they are labels that objectify people who suffer from these conditions, thus promoting biased and disparaging assumptions about them. It is important to remember that a psychological disorder is not what a person *is*; it is something that a person *has*—through no fault of his or her own. As is the case with cancer or diabetes, those with psychological disorders suffer debilitating, often painful conditions that are not of their own choosing. These individuals deserve to be viewed and treated with compassion, understanding, and dignity.

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22.3: Anxiety Disorders

Learning Objectives

1. Outline and describe the different types of anxiety disorders.
2. Explain the biological and environmental causes of anxiety 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 behavioral 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 6 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 10 million Americans 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 7 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 behavioral 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. Panic disorder affects about 3% of the American population in a given year.

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)[1]. 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 affect about 9% of American adults, and they 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 22.3.4 presents a list of the common phobias that are diagnosed by psychologists.

Table 22.3.4 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 soccer star 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 behavior is not unusual. We all get a little obsessive at times. We may continuously replay a favorite 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.

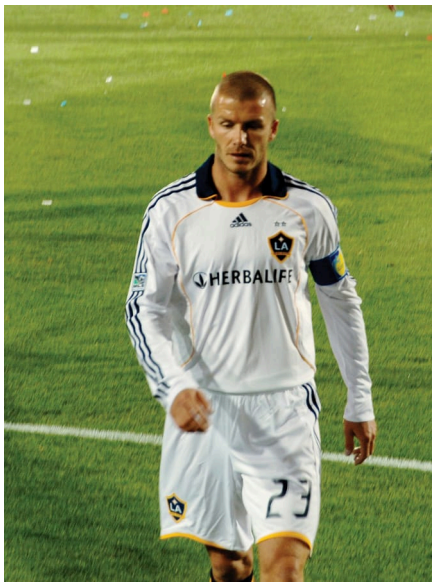


Figure 22.3.8: The soccer star David Beckham suffers from obsessive-compulsive disorder (OCD). Raj Patel – Beckham LA Galaxy – CC BY 2.0.

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 behaviors) in an attempt to calm these thoughts*. OCD is diagnosed when the obsessive thoughts are so disturbing and the compulsive behaviors 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 behavior 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.

Posttraumatic Stress Disorder (PTSD)

"If you imagine burnt pork and plastic; I can still taste it," says Chris Duggan, on his experiences as a soldier in the Falklands War in 1982. "These helicopters were coming in and we were asked to help get the boys off...when they opened the doors the stench was horrendous."
When he left the army in 1986, he suffered from PTSD. "I was a bit psycho," he says. "I was verbally aggressive, very uncooperative. I was arguing with my wife, and eventually we divorced. I decided to change the kitchen around one day, get all new stuff, so I

threw everything out of the window. I was 10 stories up in a flat. I poured brandy all over the video and it melted. I flooded the bathroom." (Gould, 2007)

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 *posttraumatic 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 affects about 5 million Americans, including victims of the 9/11 terrorist attacks, the wars in Afghanistan and Iraq, and Hurricane Katrina. Sixteen percent of Iraq war veterans, for example, reported experiencing symptoms of PTSD (Hoge & Castro, 2006). 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).

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).

Explaining Anxiety 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. Behaviors 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 behavior.

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 their compulsive behaviors 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.
- Both nature and nurture contribute to the development of anxiety disorders.

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22.4: Mood and Related Disorders

Learning Objectives

- Distinguish normal states of sadness and euphoria from states of depression and mania
- Describe the symptoms of major depressive disorder and bipolar disorder
- Understand the differences between major depressive disorder and persistent depressive disorder, and identify two subtypes of depression
- Define the criteria for a manic episode
- Understand genetic, biological, and psychological explanations of major depressive disorder
- Discuss the relationship between mood disorders and suicidal ideation, as well as factors associated with suicide

Blake cries all day and feeling that he is worthless and his life is hopeless, he cannot get out of bed. Crystal stays up all night, talks very rapidly, and went on a shopping spree in which she spent $\$3,000$ on furniture, although she cannot afford it. Maria recently had a baby, and she feels overwhelmed, teary, anxious, and panicked, and believes she is a terrible mother—practically every day since the baby was born. All these individuals demonstrate symptoms of a potential mood disorder.

Mood disorders (See figure 15.15) are characterized by severe disturbances in mood and emotions—most often depression, but also mania and elation (Rothschild, 1999). All of us experience fluctuations in our moods and emotional states, and often these fluctuations are caused by events in our lives. We become elated if our favorite team wins the World Series and dejected if a romantic relationship ends or if we lose our job. At times, we feel fantastic or miserable for no clear reason. People with mood disorders also experience mood fluctuations, but their fluctuations are extreme, distort their outlook on life, and impair their ability to function.



Figure 15.15 Mood disorders are characterized by massive disruptions in mood. Symptoms can range from the extreme sadness and hopelessness of depression to the extreme elation and irritability of mania. (credit: Kiran Foster)

The DSM-5 lists two general categories of mood disorders. **Depressive disorders** are a group of disorders in which **depression** is the main feature. Depression is a vague term that, in everyday language, refers to an intense and persistent sadness. Depression is a heterogeneous mood state—it consists of a broad spectrum of symptoms that range in severity. Depressed people feel sad, discouraged, and hopeless. These individuals lose interest in activities once enjoyed, often experience a decrease in drives such as hunger and sex, and frequently doubt personal worth. Depressive disorders vary by degree, but this chapter highlights the most well-known: major depressive disorder (sometimes called unipolar depression).

Bipolar and related disorders are a group of disorders in which mania is the defining feature. **Mania** is a state of extreme elation and agitation. When people experience mania, they may become extremely talkative, behave recklessly, or attempt to take

on many tasks simultaneously. The most recognized of these disorders is bipolar disorder.

Major Depressive Disorder

According to the DSM-5, the defining symptoms of major depressive disorder include “depressed mood most of the day, nearly every day” (feeling sad, empty, hopeless, or appearing tearful to others), and loss of interest and pleasure in usual activities (APA, 2013). In addition to feeling overwhelmingly sad most of each day, people with depression will no longer show interest or enjoyment in activities that previously were gratifying, such as hobbies, sports, sex, social events, time spent with family, and so on. Friends and family members may notice that the person has completely abandoned previously enjoyed hobbies; for example, an avid tennis player who develops major depressive disorder no longer plays tennis (Rothschild, 1999).

To receive a diagnosis of major depressive disorder, a person must, for at least two weeks, have a depressed mood and/or a loss of interest or pleasure in most activities. In addition, the person will show signs and symptoms of several of the following: significant weight loss or weight gain, insomnia or hypersomnia, psychomotor agitation (such as fidgeting, inability to sit, pacing, hand-wringing) or psychomotor retardation (such as talking and moving slowly), fatigue, feelings of worthlessness or guilt, difficulty concentrating or indecisiveness, and suicidal ideation.

Major depressive disorder is considered episodic: its symptoms are typically present at their full magnitude for a certain period of time and then gradually abate. Approximately 50%–60% of people who experience an episode of major depressive disorder will have a second episode at some point in the future; those who have had two episodes have a 70% chance of having a third episode, and those who have had three episodes have a 90% chance of having a fourth episode (Rothschild, 1999). Although the episodes can last for months, a majority of people diagnosed with this condition (around 70%) recover within a year. However, a substantial number do not recover; around 12% show serious signs of impairment associated with major depressive disorder after 5 years (Boland & Keller, 2009). In the long-term, many who do recover will still show minor symptoms that fluctuate in their severity (Judd, 2012).

Results of Major Depressive Disorder

Major depressive disorder is a serious and incapacitating condition that can have a devastating effect on the quality of one’s life. The person suffering from this disorder lives a profoundly miserable existence that often results in unavailability for work or education, abandonment of promising careers, and lost wages; occasionally, the condition requires hospitalization. The majority of those with major depressive disorder report having faced some kind of discrimination, and many report that having received such treatment has stopped them from initiating close relationships, applying for jobs for which they are qualified, and applying for education or training (Lasalvia et al., 2013). Major depressive disorder also takes a toll on health. Depression is a risk factor for the development of heart disease in healthy patients, as well as adverse cardiovascular outcomes in patients with preexisting heart disease (Whooley, 2006).

Risk Factors for Major Depressive Disorder

Major depressive disorder is often referred to as the common cold of psychiatric disorders. Around 6.6% of the U.S. population experiences major depressive disorder each year; 16.9% will experience the disorder during their lifetime (Kessler & Wang, 2009). It is more common among women than among men, affecting approximately 20% of women and 13% of men at some point in their life (National Comorbidity Survey, 2007). The greater risk among women is not accounted for by a tendency to report symptoms or to seek help more readily, suggesting that gender differences in the rates of major depressive disorder may reflect biological and gender-related environmental experiences (Kessler, 2003).

Lifetime rates of major depressive disorder tend to be highest in North and South America, Europe, and Australia; they are considerably lower in Asian countries (Hasin, Fenton, & Weissman, 2011). The rates of major depressive disorder are higher among younger age cohorts than among older cohorts, perhaps because people in younger age cohorts are more willing to admit depression (Kessler & Wang, 2009).

A number of risk factors are associated with major depressive disorder: unemployment (including homemakers); earning less than $\$20,000$ per year; living in urban areas; or being separated, divorced, or widowed (Hasin et al., 2011). Comorbid disorders include anxiety disorders and substance abuse disorders (Kessler & Wang, 2009).

Subtypes of Depression

The DSM-5 lists several different subtypes of depression. These subtypes—what the DSM-5 refer to as specifiers—are not specific disorders; rather, they are labels used to indicate specific patterns of symptoms or to specify certain periods of time in which the symptoms may be present. One subtype, **seasonal pattern**, applies to situations in which a person experiences the symptoms of major depressive disorder only during a particular time of year (e.g., fall or winter). In everyday language, people often refer to this subtype as the winter blues.

Another subtype, **peripartum onset** (commonly referred to as **postpartum depression**), applies to women who experience major depression during pregnancy or in the four weeks following the birth of their child (APA, 2013). These women often feel very anxious and may even have panic attacks. They may feel guilty, agitated, and be weepy. They may not want to hold or care for their newborn, even in cases in which the pregnancy was desired and intended. In extreme cases, the mother may have feelings of wanting to harm her child or herself. In a horrific illustration, a woman named Andrea Yates, who suffered from extreme peripartum-onset depression (as well as other mental illnesses), drowned her five children in a bathtub (Roche, 2002). Most women with peripartum-onset depression do not physically harm their children, but most do have difficulty being adequate caregivers (Fields, 2010). A surprisingly high number of women experience symptoms of peripartum-onset depression. A study of $10,000$ women who had recently given birth found that 14% screened positive for peripartum-onset depression, and that nearly 20% reported having thoughts of wanting to harm themselves (Wisner et al., 2013).

People with **persistent depressive disorder** (previously known as dysthymia) experience depressed moods most of the day nearly every day for at least two years, as well as at least two of the other symptoms of major depressive disorder. People with persistent depressive disorder are chronically sad and melancholy, but do not meet all the criteria for major depression. However, episodes of full-blown major depressive disorder can occur during persistent depressive disorder (APA, 2013).

Bipolar Disorder

A person with **bipolar disorder** (commonly known as **manic depression**) often experiences mood states that vacillate between depression and mania; that is, the person's mood is said to alternate from one emotional extreme to the other (in contrast to unipolar, which indicates a persistently sad mood).

To be diagnosed with bipolar disorder, a person must have experienced a manic episode at least once in his life; although major depressive episodes are common in bipolar disorder, they are not required for a diagnosis (APA, 2013). According to the DSM-5, a **manic episode** is characterized as a "distinct period of abnormally and persistently elevated, expansive, or irritable mood and abnormally and persistently increased activity or energy lasting at least one week," that lasts most of the time each day (APA, 2013, p. 124). During a manic episode, some experience a mood that is almost euphoric and become excessively talkative, sometimes spontaneously starting conversations with strangers; others become excessively irritable and complain or make hostile comments. The person may talk loudly and rapidly, exhibiting **flight of ideas**, abruptly switching from one topic to another. These individuals are easily distracted, which can make a conversation very difficult. They may exhibit grandiosity, in which they experience inflated but unjustified self-esteem and self-confidence. For example, they might quit a job in order to "strike it rich" in the stock market, despite lacking the knowledge, experience, and capital for such an endeavor. They may take on several tasks at the same time (e.g., several time-consuming projects at work) and yet show little, if any, need for sleep; some may go for days without sleep. Patients may also recklessly engage in pleasurable activities that could have harmful consequences, including spending sprees, reckless driving, making foolish investments, excessive gambling, or engaging in sexual encounters with strangers (APA, 2013).

During a manic episode, individuals usually feel as though they are not ill and do not need treatment. However, the reckless behaviors that often accompany these episodes—which can be antisocial, illegal, or physically threatening to others—may require involuntary hospitalization (APA, 2013). Some patients with bipolar disorder will experience a rapid-cycling subtype, which is characterized by at least four manic episodes (or some combination of at least four manic and major depressive episodes) within one year.

Link to Learning

In the 1997 independent film *Sweetheart*, actress Janeane Garofalo plays the part of Jasmine, a young woman with bipolar disorder. Watch this firsthand account from a person living with bipolar disorder to learn more.

Risk Factors for Bipolar Disorder

Bipolar disorder is considerably less frequent than major depressive disorder. In the United States, 1 out of every 167 people meets the criteria for bipolar disorder each year, and 1 out of 100 meet the criteria within their lifetime (Merikangas et al., 2011). The rates are higher in men than in women, and about half of those with this disorder report onset before the age of 25 (Merikangas et al., 2011). Around 90% of those with bipolar disorder have a comorbid disorder, most often an anxiety disorder or a substance abuse problem. Unfortunately, close to half of the people suffering from bipolar disorder do not receive treatment (Merikangas & Tohen, 2011). Suicide rates are extremely high among those with bipolar disorder: around 36% of individuals with this disorder attempt suicide at least once in their lifetime (Novick, Swartz, & Frank, 2010), and between $15\% - 19\%$ complete suicide (Newman, 2004).

The Biological Basis of Mood Disorders

Mood disorders have been shown to have a strong genetic and biological basis. Relatives of those with major depressive disorder have double the risk of developing major depressive disorder, whereas relatives of patients with bipolar disorder have over nine times the risk (Merikangas et al., 2011). The rate of concordance for major depressive disorder is higher among identical twins than fraternal twins (50% vs. 38%, respectively), as is that of bipolar disorder (67% vs. 16%, respectively), suggesting that genetic factors play a stronger role in bipolar disorder than in major depressive disorder (Merikangas et al. 2011).

People with mood disorders often have imbalances in certain neurotransmitters, particularly norepinephrine and serotonin (Thase, 2009). These neurotransmitters are important regulators of the bodily functions that are disrupted in mood disorders, including appetite, sex drive, sleep, arousal, and mood. Medications that are used to treat major depressive disorder typically boost serotonin and norepinephrine activity, whereas lithium—used in the treatment of bipolar disorder—blocks norepinephrine activity at the synapses (See figure 15.16 below).

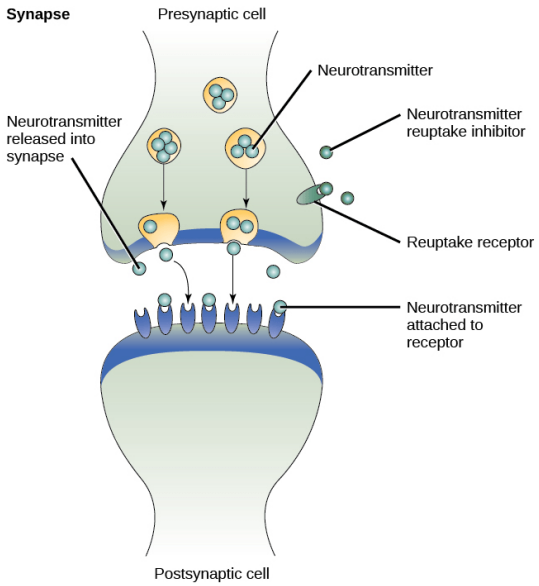


Figure 15.16 Many medications designed to treat mood disorders work by altering neurotransmitter activity in the neural synapse.

Depression is linked to abnormal activity in several regions of the brain (Fitzgerald, Laird, Maller, & Daskalakis, 2008) including those important in assessing the emotional significance of stimuli and experiencing emotions (amygdala), and in regulating and controlling emotions (like the prefrontal cortex, or PFC) (LeMoult, Castonguay, Joormann, & McAleavey, 2013). Depressed individuals show elevated amygdala activity (Drevets, Bogers, & Raichle, 2002), especially when presented with negative emotional stimuli, such as photos of sad faces (See figure 15.17) (Surguladze et al., 2005). Interestingly, heightened amygdala activation to negative emotional stimuli among depressed persons occurs even when stimuli are presented outside of conscious awareness (Victor, Furey, Fromm, Öhman, & Drevets, 2010), and it persists even after the negative emotional stimuli are no longer present (Siegle, Thompson, Carter, Steinhauer, & Thase, 2007). Additionally, depressed individuals exhibit less activation in the prefrontal, particularly on the left side (Davidson, Pizzagalli, & Nitschke, 2009). Because the PFC can dampen amygdala activation, thereby enabling one to suppress negative emotions (Phan et al., 2005), decreased activation in certain regions of the PFC may inhibit its ability to override negative emotions that might then lead to more negative mood states (Davidson et al.,

2009). These findings suggest that depressed persons are more prone to react to emotionally negative stimuli, yet have greater difficulty controlling these reactions.



Figure 15.17 Depressed individuals react to negative emotional stimuli, such as sad faces, with greater amygdala activation than do non-depressed individuals. (credit: Ian Munroe)

Since the 1950s, researchers have noted that depressed individuals have abnormal levels of cortisol, a stress hormone released into the blood by the neuroendocrine system during times of stress (Mackin & Young, 2004). When cortisol is released, the body initiates a fight-or-flight response in reaction to a threat or danger. Many people with depression show elevated cortisol levels (Holsboer & Ising, 2010), especially those reporting a history of early life trauma such as the loss of a parent or abuse during childhood (Baes, Tofoli, Martins, & Juruena, 2012). Such findings raise the question of whether high cortisol levels are a cause or a consequence of depression. High levels of cortisol are a risk factor for future depression (Halligan, Herbert, Goodyer, & Murray, 2007), and cortisol activates activity in the amygdala while deactivating activity in the PFC (McEwen, 2005)—both brain disturbances are connected to depression. Thus, high cortisol levels may have a causal effect on depression, as well as on its brain function abnormalities (van Praag, 2005). Also, because stress results in increased cortisol release (Michaud, Matheson, Kelly, Anisman, 2008), it is equally reasonable to assume that stress may precipitate depression.

A Diathesis-Stress Model and Major Depressive Disorders

Indeed, it has long been believed that stressful life events can trigger depression, and research has consistently supported this conclusion (Mazure, 1998). Stressful life events include significant losses, such as death of a loved one, divorce or separation, and serious health and money problems; life events such as these often precede the onset of depressive episodes (Brown & Harris, 1989). In particular, exit events—instances in which an important person departs (e.g., a death, divorce or separation, or a family member leaving home)—often occur prior to an episode (Paykel, 2003). Exit events are especially likely to trigger depression if these happenings occur in a way that humiliates or devalues the individual. For example, people who experience the breakup of a relationship initiated by the other person develop major depressive disorder at a rate more than 2 times that of people who experience the death of a loved one (Kendler, Hettema, Butera, Gardner, & Prescott, 2003).

Likewise, individuals who are exposed to traumatic stress during childhood—such as separation from a parent, family turmoil, and maltreatment (physical or sexual abuse)—are at a heightened risk of developing depression at any point in their lives (Kessler, 1997). A recent review of 16 studies involving over $23,000$ subjects concluded that those who experience childhood maltreatment are more than 2 times as likely to develop recurring and persistent depression (Nanni, Uher, & Danese, 2012).

Of course, not everyone who experiences stressful life events or childhood adversities succumbs to depression—indeed, most do not. Clearly, a diathesis-stress interpretation of major depressive disorder, in which certain predispositions or vulnerability factors influence one's reaction to stress, would seem logical. If so, what might such predispositions be? A study by Caspi and others (2003) suggests that an alteration in a specific gene that regulates **serotonin** (the 5-HTTLPR gene) might be one culprit. These investigators found that people who experienced several stressful life events were significantly more likely to experience episodes of major depression if they carried one or two short versions of this gene than if they carried two long versions. Those who carried one or two short versions of the 5-HTTLPR gene were unlikely to experience an episode, however, if they had experienced few or no stressful life events. Numerous studies have replicated these findings, including studies of people who experienced maltreatment during childhood (Goodman & Brand, 2009). In a recent investigation conducted in the United Kingdom (Brown & Harris, 2013), researchers found that childhood maltreatment before age 9 elevated the risk of chronic adult depression (a depression episode lasting for at least 12 months) among those individuals having one (LS) or two (SS) short versions of the

5-HTTLPR gene (See figure 15.18). Childhood maltreatment did not increase the risk for chronic depression for those have two long (LL) versions of this gene. Thus, genetic vulnerability may be one mechanism through which stress potentially leads to depression.

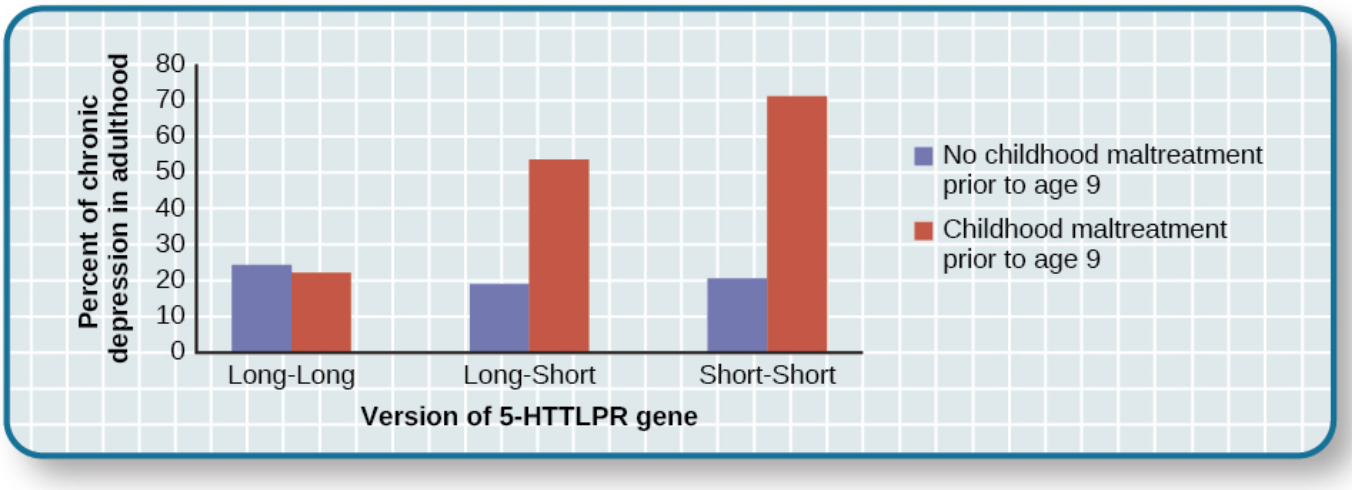


Figure 15.18 A study on gene-environment interaction in people experiencing chronic depression in adulthood suggests a much higher incidence in individuals with a short version of the gene in combination with childhood maltreatment (Brown & Harris, 2013).

Cognitive Theories of Depression

Cognitive theories of depression take the view that depression is triggered by negative thoughts, interpretations, self-evaluations, and expectations (Joormann, 2009). These **diathesis-stress models** propose that depression is triggered by a "cognitive vulnerability" (negative and maladaptive thinking) and by precipitating stressful life events (Gotlib & Joormann, 2010). Perhaps the most well-known cognitive theory of depression was developed in the 1960s by psychiatrist Aaron Beck, based on clinical observations and supported by research (Beck, 2008). Beck theorized that depression-prone people possess depressive schemas, or mental predispositions to think about most things in a negative way (Beck, 1976). Depressive schemas contain themes of loss, failure, rejection, worthlessness, and inadequacy, and may develop early in childhood in response to adverse experiences, then remain dormant until they are activated by stressful or negative life events. Depressive schemas prompt dysfunctional and pessimistic thoughts about the self, the world, and the future. Beck believed that this dysfunctional style of thinking is maintained by cognitive biases, or errors in how we process information about ourselves, which lead us to focus on negative aspects of experiences, interpret things negatively, and block positive memories (Beck, 2008). A person whose depressive schema consists of a theme of rejection might be overly attentive to social cues of rejection (more likely to notice another's frown), and he might interpret this cue as a sign of rejection and automatically remember past incidents of rejection. Longitudinal studies have supported Beck's theory, in showing that a preexisting tendency to engage in this negative, self-defeating style of thinking—when combined with life stress—over time predicts the onset of depression (Dozois & Beck, 2008). Cognitive therapies for depression, aimed at changing a depressed person's negative thinking, were developed as an expansion of this theory (Beck, 1976).

Another cognitive theory of depression, **hopelessness theory**, postulates that a particular style of negative thinking leads to a sense of hopelessness, which then leads to depression (Abramson, Metalsky, & Alloy, 1989). According to this theory, hopelessness is an expectation that unpleasant outcomes will occur or that desired outcomes will not occur, and there is nothing one can do to prevent such outcomes. A key assumption of this theory is that hopelessness stems from a tendency to perceive negative life events as having stable ("It's never going to change") and global ("It's going to affect my whole life") causes, in contrast to unstable ("It's fixable") and specific ("It applies only to this particular situation") causes, especially if these negative life events occur in important life realms, such as relationships, academic achievement, and the like. Suppose a student who wishes to go to law school does poorly on an admissions test. If the student infers negative life events as having stable and global causes, she may believe that her poor performance has a stable and global cause ("I lack intelligence, and it's going to prevent me from ever finding a meaningful career"), as opposed to an unstable and specific cause ("I was sick the day of the exam, so my low score was a fluke"). Hopelessness theory predicts that people who exhibit this cognitive style in response to undesirable life events will view such events as having negative implications for their future and self-worth, thereby increasing the likelihood of hopelessness—the primary cause of depression (Abramson et al., 1989). One study testing hopelessness theory measured the tendency to make negative inferences for bad life effects in participants who were experiencing uncontrollable stressors. Over

the ensuing six months, those with scores reflecting high cognitive vulnerability were 7 times more likely to develop depression compared to those with lower scores (Kleim, Gonzalo, & Ehlers, 2011).

A third cognitive theory of depression focuses on how people's thoughts about their distressed moods—depressed symptoms in particular—can increase the risk and duration of depression. This theory, which focuses on rumination in the development of depression, was first described in the late 1980s to explain the higher rates of depression in women than in men (Nolen-Hoeksema, 1987). **Rumination** is the repetitive and passive focus on the fact that one is depressed and dwelling on depressed symptoms, rather that distracting one's self from the symptoms or attempting to address them in an active, problem-solving manner (Nolen-Hoeksema, 1991). When people ruminate, they have thoughts such as "Why am I so unmotivated? I just can't get going. I'm never going to get my work done feeling this way" (Nolen-Hoeksema & Hilt, 2009, p. 393). Women are more likely than men to ruminate when they are sad or depressed (Butler & Nolen-Hoeksema, 1994), and the tendency to ruminate is associated with increases in depression symptoms (Nolen-Hoeksema, Larson, & Grayson, 1999), heightened risk of major depressive episodes (Abela & Hankin, 2011), and chronicity of such episodes (Robinson & Alloy, 2003)

Suicide

For some people with mood disorders, the extreme emotional pain they experience becomes unendurable. Overwhelmed by hopelessness, devastated by incapacitating feelings of worthlessness, and burdened with the inability to adequately cope with such feelings, they may consider suicide to be a reasonable way out. **Suicide**, defined by the CDC as "death caused by self-directed injurious behavior with any intent to die as the result of the behavior" (CDC, 2013a), in a sense represents an outcome of several things going wrong all at the same time Crosby, Ortega, & Melanson, 2011). Not only must the person be biologically or psychologically vulnerable, but he must also have the means to perform the suicidal act, and he must lack the necessary protective factors (e.g., social support from friends and family, religion, coping skills, and problem-solving skills) that provide comfort and enable one to cope during times of crisis or great psychological pain (Berman, 2009).

Suicide is not listed as a disorder in the DSM-5; however, suffering from a mental disorder—especially a mood disorder—poses the greatest risk for suicide. Around 90% of those who complete suicides have a diagnosis of at least one mental disorder, with mood disorders being the most frequent (Fleischman, Bertolote, Belfer, & Beautrais, 2005). In fact, the association between major depressive disorder and suicide is so strong that one of the criteria for the disorder is thoughts of suicide, as discussed above (APA, 2013).

Suicide rates can be difficult to interpret because some deaths that appear to be accidental may in fact be acts of suicide (e.g., automobile crash). Nevertheless, investigations into U.S. suicide rates have uncovered these facts:

- Suicide was the 10th leading cause of death for all ages in 2010 (Centers for Disease Control and Prevention [CDC], 2012).
- There were $38,364$ suicides in 2010 in the United States—an average of 105 each day (CDC, 2012).
- Suicide among males is 4 times higher than among females and accounts for 79% of all suicides; firearms are the most commonly used method of suicide for males, whereas poisoning is the most commonly used method for females (CDC, 2012).
- From 1991 to 2003, suicide rates were consistently higher among those 65 years and older. Since 2001, however, suicide rates among those ages $25-64$ have risen consistently, and, since 2006, suicide rates have been greater for those ages 65 and older (CDC, 2013b). This increase in suicide rates among middle-aged Americans has prompted concern in some quarters that baby boomers (individuals born between 1946–1964) who face economic worry and easy access to prescription medication may be particularly vulnerable to suicide (Parker-Pope, 2013).
- The highest rates of suicide within the United States are among American Indians/Alaskan natives and Non-Hispanic Whites (CDC, 2013b).
- Suicide rates vary across the United States, with the highest rates consistently found in the mountain states of the west (Alaska, Montana, Nevada, Wyoming, Colorado, and Idaho) (Berman, 2009).

Contrary to popular belief, suicide rates peak during the springtime (April and May), not during the holiday season or winter. In fact, suicide rates are generally lowest during the winter months (Postolache et al., 2010).

Risk Factors for Suicide

Suicidal risk is especially high among people with substance abuse problems. Individuals with alcohol dependence are at 10 times greater risk for suicide than the general population (Wilcox, Conner, & Caine, 2004). The risk of suicidal behavior is especially high among those who have made a prior suicide attempt. Among those who attempt suicide, 16% make another attempt within a year and over 21% make another attempt within four years (Owens, Horrocks, & House, 2002). Suicidal individuals

may be at high risk for terminating their life if they have a lethal means in which to act, such as a firearm in the home (Brent & Bridge, 2003). Withdrawal from social relationships, feeling as though one is a burden to others, and engaging in reckless and risk-taking behaviors may be precursors to suicidal behavior (Berman, 2009). A sense of entrapment or feeling unable to escape one's miserable feelings or external circumstances (e.g., an abusive relationship with no perceived way out) predicts suicidal behavior (O'Connor, Smyth, Ferguson, Ryan, & Williams, 2013). Tragically, reports of suicides among adolescents following instances of cyberbullying have emerged in recent years. In one widely-publicized case a few years ago, Phoebe Prince, a 15-year-old Massachusetts high school student, committed suicide following incessant harassment and taunting from her classmates via texting and Facebook (McCabe, 2010).

Suicides can have a contagious effect on people. For example, another's suicide, especially that of a family member, heightens one's risk of suicide (Agerbo, Nordentoft, & Mortensen, 2002). Additionally, widely-publicized suicides tend to trigger copycat suicides in some individuals. One study examining suicide statistics in the United States from 1947–1967 found that the rates of suicide skyrocketed for the first month after a suicide story was printed on the front page of the *New York Times* (Phillips, 1974). Austrian researchers found a significant increase in the number of suicides by firearms in the three weeks following extensive reports in Austria's largest newspaper of a celebrity suicide by gun (Etzersdorfer, Voracek, & Sonneck, 2004). A review of 42 studies concluded that media coverage of celebrity suicides is more than 14 times more likely to trigger copycat suicides than is coverage of non-celebrity suicides (Stack, 2000). This review also demonstrated that the medium of coverage is important: televised stories are considerably less likely to prompt a surge in suicides than are newspaper stories. Research suggests that a trend appears to be emerging whereby people use online social media to leave suicide notes, although it is not clear to what extent suicide notes on such media might induce copycat suicides (Ruder, Hatch, Ampanozi, Thali, & Fischer, 2011). Nevertheless, it is reasonable to conjecture that suicide notes left by individuals on social media may influence the decisions of other vulnerable people who encounter them (Luxton, June, & Fairall, 2012).

One possible contributing factor in suicide is brain chemistry. Contemporary neurological research shows that disturbances in the functioning of **serotonin** are linked to suicidal behavior (Pompili et al., 2010). Low levels of serotonin predict future suicide attempts and suicide completions, and low levels have been observed post-mortem among suicide victims (Mann, 2003). Serotonin dysfunction, as noted earlier, is also known to play an important role in depression; low levels of serotonin have also been linked to aggression and impulsivity (Stanley et al., 2000). The combination of these three characteristics constitutes a potential formula for suicide—especially violent suicide. A classic study conducted during the 1970s found that patients with major depressive disorder who had very low levels of serotonin attempted suicide more frequently and more violently than did patients with higher levels (Asberg, Thorén, Träskman, Bertilsson, & Ringberger, 1976; Mann, 2003).

Suicidal thoughts, plans, and even off-hand remarks ("I might kill myself this afternoon") should always be taken extremely seriously. People who contemplate terminating their life need immediate help. Below are links to two excellent websites that contain resources (including hotlines) for people who are struggling with suicidal ideation, have loved ones who may be suicidal, or who have lost loved ones to suicide: http://www.afsp.org and http://suicidology.org.

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22.5: Schizophrenia- The Edge of Reality and Consciousness

Learning Objectives

1. Categorize and describe the three major symptoms of schizophrenia.
2. Differentiate the five types of schizophrenia and their characteristics.
3. 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 behavior*.

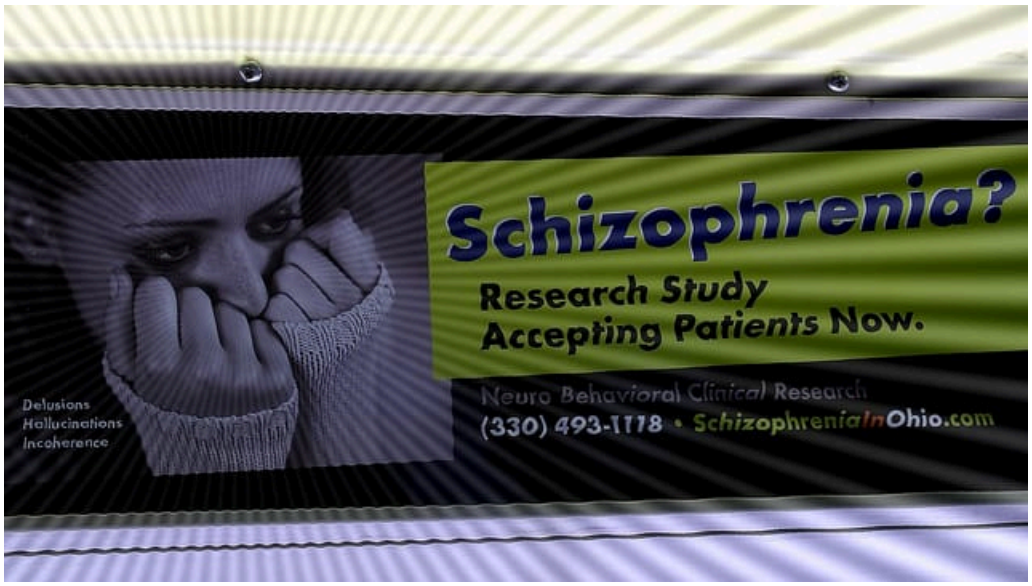


Figure 22.5.14: People with schizophrenia may exhibit disorganized behavior, as this person does. Mark Turnauckas – Got Schizophrenia? – CC BY 2.0.

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 3 million people in the United States (National Institute of Mental Health, 2010)[1]. 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; Nicholson, 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 22.5.5, the symptoms are divided into *positive symptoms*, *negative symptoms*, and *cognitive symptoms* (American Psychiatric Association, 2008; National Institute of Mental Health, 2010)[2]. Positive symptoms refer to the presence of abnormal behaviors 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 behaviors 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 22.5.5 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 behavior	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 behavior, 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 behavior* including inappropriate sexual behavior, 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, for instance, to repeat 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 22.5.15, the likelihood of developing schizophrenia increases dramatically if a close relative also has the disease.

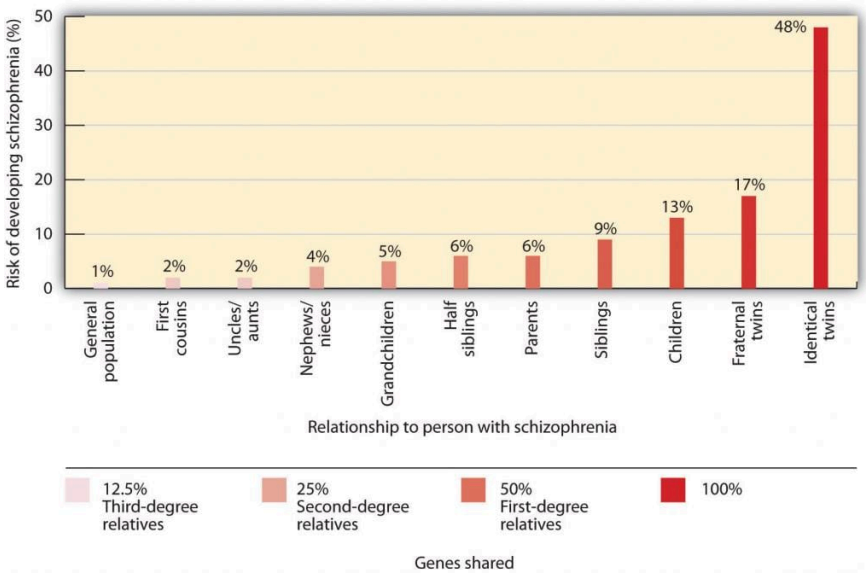


Figure 22.5.15 Genetic Disposition to Develop Schizophrenia. The risk of developing schizophrenia increases substantially if a person has a relative with the disease. Adapted from Gottesman, I. I. (1991). *Schizophrenia genesis: The origins of madness*. New York, NY: W. H. Freeman.

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, he still has less than a 50% chance of getting it himself, 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 behavior, 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.

Exercise and Critical Thinking

1. How should society deal with people with schizophrenia? Is it better to keep patients in psychiatric facilities against their will, but where they can be observed and supported, or to allow them to live in the community, where they may commit violent crimes against themselves or others? What factors influence your opinion?

[1]National Institute of Mental Health. (2010, April 26). What is schizophrenia? Retrieved from http://www.nimh.nih.gov/health/topics/schizophrenia/index.shtml

[2]American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author; National Institute of Mental Health. (2010, April 26). What is schizophrenia? Retrieved from http://www.nimh.nih.gov/health/topics/schizophrenia/index.shtml

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22.6: Relationships and Well-being

The relationships we cultivate in our lives are essential to our well-being—namely, happiness and health. Why is that so? We begin to answer this question by exploring the types of relationships—family, friends, colleagues, and lovers—we have in our lives and how they are measured. We also explore the different aspects of happiness and health, and show how the quantity and quality of relationships can affect our happiness and health.

learning objectives

- Understand why relationships are key to happiness and health.
- Define and list different forms of relationships.
- List different aspects of well-being.
- Explain how relationships can enhance well-being.
- Explain how relationships might not enhance well-being.

Introduction



One of the most basic human needs is the need to belong. [Image: CC0 Public Domain, goo.gl/m25gce]

In Daniel Defoe's classic novel *Robinson Crusoe*(1719), the main character is shipwrecked. For years he lives alone, creating a shelter for himself and marking the passage of time on a wooden calendar. It is a lonely existence, and Crusoe describes climbing a hilltop in the hopes of seeing a passing ship and possible rescue. He scans the horizon until, in his own words, he is "almost blind." Then, without hope, he sits and weeps.

Although it is a work of fiction, *Robinson Crusoe*contains themes we can all relate to. One of these is the idea of loneliness. Humans are social animals and we prefer living together in groups. We cluster in families, in cities, and in groups of friends. In fact, most people spend relatively few of their waking hours alone. Even introverts report feeling happier when they are with others! Yes, being surrounded by people and feeling connected to others appears to be a natural impulse.

In this module we will discuss relationships in the context of well-being. We will begin by defining well-being and then presenting research about different types of relationships. We will explore how both the quantity and quality of our relationships affect us, as well as take a look at a few popular conceptions (or misconceptions) about relationships and happiness.

The Importance of Relationships

If you were to reflect on the best moments of your life, chances are they involved other people. We feel good sharing our experiences with others, and our desire for high quality relationships may be connected to a deep-seated psychological impulse: the need to belong (Baumeister & Leary, 1995). Aristotle commented that humans are fundamentally social in nature. Modern society is full of evidence that Aristotle was right. For instance, people often hold strong opinions about single child families—usually concerning what are often viewed as problematic "only child" characteristics—and most parents choose to have multiple kids. People join book clubs to make a solitary activity—reading—into a social activity. Prisons often punish offenders by putting them in solitary confinement, depriving them of the company of others. Perhaps the most obvious expression of the need to belong in contemporary life is the prevalence of social media. We live in an era when, for the first time in history, people effectively have two overlapping sets of social relationships: those in the real world and those in the virtual world.

It may seem intuitive that our strong urge to connect with others has to do with the boost we receive to our own well-being from relationships. After all, we derive considerable meaning from our relational bonds—as seen in the joy a newborn brings to its parents, the happiness of a wedding, and the good feelings of having reliable, supportive friendships. In fact, this intuition is borne out by research suggesting that relationships can be sources of intimacy and closeness (Reis, Clark & Holmes, 2004), comfort and relief from stress (Collins & Feeney, 2000), and accountability—all of which help toward achieving better health outcomes (Tay, Tan, Diener, & Gonzalez, 2013; Taylor, 2010). Indeed, scholars have long considered social relationships to be fundamental to happiness and well-being (Argyle, 2001; Myers, 2000). If the people in our lives are as important to our happiness as the research suggests, it only makes sense to investigate how relationships affect us.

The Question of Measurement

Despite the intuitive appeal of the idea that good relationships translate to more happiness, researchers must collect and analyze data to arrive at reliable conclusions. This is particularly difficult with the concepts of relationships and happiness, because both can be difficult to define. What counts as a relationship? A pet? An old friend from childhood you haven't seen in ten years? Similarly, it is difficult to pinpoint exactly what qualifies as happiness. It is vital to define these terms, because their definitions serve as the guidelines by which they can be measured, a process called **operationalization**. Scientifically speaking, the two major questions any researcher needs to answer before he or she can begin to understand how relationships and well-being interact are, "How do I best measure relationships?" and "How do I best measure well-being?"



Scientists are interested in objective measures such as the number of friends a person has and subjective measures such as feelings of social support. [Image: CC0 Public Domain, goo.gl/m25gce]

Let's begin with relationships. There are both *objective* and *subjective* ways to measure social relationships. **Objective social variables** are factors that are based on evidence rather than opinions. They focus on the *presence* and *frequency* of different types of relationships, and the *degree of contact* and *amount of shared activities* between people. Examples of these measures include participants' marital status, their number of friends and work colleagues, and the size of their social networks. Each

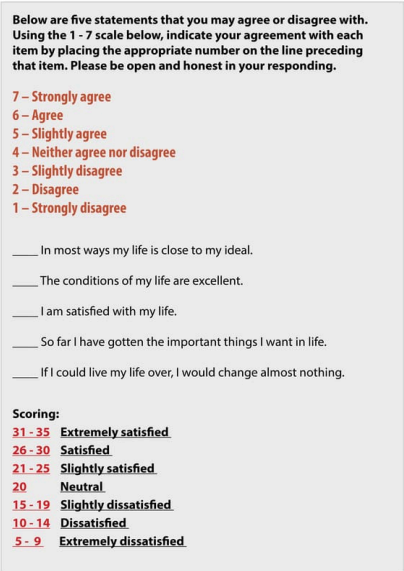
of these variables is factually based (e.g., you have *x* number of coworkers, etc.). Another objective social variable is **social integration**, or one's degree of integration into social networks. This can be measured by looking at the frequency and amount of social activity or contact one has with others (see Okun, Stock, Haring, & Witter, 1984; Pinquart & Sorensen, 2000). The strength of objective measures is that they generally have a single correct answer. For example, a person is either married or not; there is no in-between.

Subjective social variables, as the name suggests, are those that focus on the subjective qualities of social relationships. These are the products of personal opinions and feelings rather than facts. A key subjective variable is **social support**—the extent to which individuals feel cared for, can receive help from others, and are part of a supportive network. Measures of social support ask people to report on their perceived levels of support as well as their satisfaction with the support they receive (see Cohen, Underwood, & Gottlieb, 2000). Other subjective social variables assess the nature and quality of social relationships themselves—that is, what types of relationships people have, and whether these social relationships are good or bad. These can include measures that ask about the quality of a marriage (e.g., Dyadic Adjustment Scale; Spanier, 1976), the amount of conflict in a relationship (e.g., Conflict Tactics Scale; Straus, 1979), or the quality of each relationship in one's social network (e.g., Network of Relationships Inventory (NRI); Furman & Buhrmester, 1985). The strength of subjective measures is that they provide insight into people's personal experience. A married person, for example, might love or hate his/her marriage; subjective measures tell us which of these is the case.

Objective and subjective measures are often administered in a way that asks individuals to make a global assessment of their relationships (i.e., "How much social support do you receive?"). However, scientists have more recently begun to study social relationships and activity using methods such as daily diary methodology (Bolger, Davis, & Rafaeli, 2003), whereby individuals report on their relationships on a regular basis (e.g., three times a day). This allows researchers to examine in-the-moment instances and/or day-to-day trends of how social relationships affect happiness and well-being compared to more global measures. Many researchers try to include multiple types of measurement—objective, subjective, and daily diaries—to overcome the weaknesses associated with any one measurement technique.

Just as researchers must consider how to best measure relationships, they must also face the issue of measuring well-being. Well-being is a topic many people have an opinion about. If you and nine other people were to write down your own definitions of happiness, or of well-being, there's a good chance you'd end up with ten unique answers. Some folks define happiness as a sense of peace, while others think of it as being healthy. Some people equate happiness with a sense of purpose, while others think of it as just another word for joy. Modern researchers have wrestled with this topic for decades. They acknowledge that both psychological and physical approaches are relevant to defining well-being, and that many dimensions—satisfaction, joy, meaning—are all important.

One prominent psychological dimension of well-being is happiness. In psychology, the scientific term for happiness is **subjective well-being**, which is defined by three different components: high *life satisfaction*, which refers to positive evaluations of one's life in general (e.g., "Overall, I am satisfied with my life"); *positive feelings*, which refers to the amount of positive emotions one experiences in life (e.g., peace, joy); and *low negative feelings*, which refers to the amount of negative emotions one experiences in life (e.g., sadness, anger) (Diener, 1984). These components are commonly measured using subjective self-report scales.



Below are five statements that you may agree or disagree with. Using the 1 - 7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

7 – Strongly agree
6 – Agree
5 – Slightly agree
4 – Neither agree nor disagree
3 – Slightly disagree
2 – Disagree
1 – Strongly disagree

____ In most ways my life is close to my ideal.

____ The conditions of my life are excellent.

____ I am satisfied with my life.

____ So far I have gotten the important things I want in life.

____ If I could live my life over, I would change almost nothing.

Scoring:

31 - 35	Extremely satisfied
26 - 30	Satisfied
21 - 25	Slightly satisfied
20	Neutral
15 - 19	Slightly dissatisfied
10 - 14	Dissatisfied
5 - 9	Extremely dissatisfied

The Satisfaction with Life Scale is one of the most widely used measures of well-being in the world

The physical dimension of well-being is best thought of as one's **health**. Health is a broad concept and includes, at least in part, being free of illness or infirmity. There are several aspects of physical health that researchers commonly consider when thinking about well-being and relationships. For example, health can be defined in terms of (A) injury, (B) disease, and (C) mortality. Health can also include physiological indicators, such as blood pressure or the strength of a person's immune system. Finally, there are **health behaviors** to be considered, such as dietary consumption, exercise, and smoking. Researchers often examine a variety of health variables in order to better understand the possible benefits of good relationships.

Presence and Quality of Relationships and Well-Being

If you wanted to investigate the connection between social relationships and well-being, where would you start? Would you focus on teenagers? Married couples? Would you interview religious people who have taken a vow of silence? These are the types of considerations well-being researchers face. It is impossible for a single study to look at all types of relationships across all age groups and cultures. Instead, researchers narrow their focus to specific variables. They tend to consider two major elements: the presence of relationships, and the quality of relationships.

Presence of relationships

The first consideration when trying to understand how relationships influence well-being is the presence of relationships. Simply put, researchers need to know whether or not people have relationships. Are they married? Do they have many friends? Are they a member of a club? Finding this out can be accomplished by looking at objective social variables, such as the size of a person's social network, or the number of friends they have. Researchers have discovered that the more social relationships people have, in general, the more positively their sense of well-being is impacted (Lucas, Dyrenforth, & Diener 2008). In one study of more than 200 undergraduate students, psychologists Ed Diener and Martin Seligman (2002) compared the happiest 10% to the unhappiest 10%. The researchers were curious to see what differentiated these two groups. Was it gender? Exercise habits? Religion? The answer turned out to be relationships! The happiest students were much more satisfied with their relationships, including with close friends, family, and romantic partnerships, than the unhappiest. They also spent less time alone.

Some people might be inclined to dismiss the research findings above because they focused primarily on college students. However, in a worldwide study of people of all ages from 123 nations, results showed that having even a few high quality social relationships was consistently linked with subjective well-being (Tay & Diener, 2011). This is an important finding because it means that a person doesn't have to be a social butterfly in order to be happy. Happiness doesn't depend necessarily on having dozens of friends, but rather on having at least a few close connections.

Another way of gaining an understanding of the presence of relationships is by looking at the *absence* of relationships. A lack of social connections can lead to loneliness and depression. People lose well-being when social relationships are denied—as in cases of **ostracism**. In many societies, withholding social relationships is used as a form of punishment. For example, in some

Western high schools, people form social groups known as “cliques,” in which people share interests and a sense of identity. Unlike clubs, cliques do not have explicit rules for membership but tend to form organically, as exclusive group friendships. When one member of a clique conflicts with the others, the offending member may be socially rejected.



Ostracism is a form of social rejection and isolation that has a negative impact on well-being. [Image: CC0 Public Domain, goo.gl/m25gce]

Similarly, some small societies practice **shunning**, a temporary period during which members withhold emotion, communication, and other forms of social contact as a form of punishment for wrongdoing. The Amish—a group of traditional Christian communities in North America who reject modern conveniences such as electricity—occasionally practice shunning (Hostetler, 1993). Members who break important social rules, for example, are made to eat alone rather than with their family. This typically lasts for one to two weeks. Individuals’ well-being has been shown to dramatically suffer when they are ostracized in such a way (Williams, 2009). Research has even shown that the areas of the brain that process physical pain when we are injured are the same areas that process emotional pain when we are ostracized (Eisenberger, Lieberman, & Williams, 2003).

Quality of relationships

Simply having a relationship is not, in itself, sufficient to produce well-being. We’re all familiar with instances of awful relationships: Cinderella and her step-sisters, loveless marriages, friends who have frequent falling-outs (giving birth to the word “frenemy”). In order for a relationship to improve well-being it has to be a good one. Researchers have found that higher friendship quality is associated with increased happiness (Demir & Weitekamp, 2007). Friendships aren’t the only relationships that help, though. Researchers have found that high quality relationships between parents and children are associated with increased happiness, both for teenagers (Gohm, Oishi, Darlington, & Diener, 1998) and adults (Amato & Afifi, 2006).

Finally, an argument can be made for looking at relationships’ effects on each of the distinct components of subjective well-being. Walen and Luchman (2000) investigated a mix of relationships, including family, friends, and romantic partners. They found that social support and conflict were associated with all three aspects of subjective well-being (life satisfaction, positive affect, and negative affect). Similarly, in a cross-cultural study comparing college students in Iran, Jordan, and the United States, researchers found that social support was linked to higher life satisfaction, higher positive affect, and lower negative affect (Brannan, Biswas-Diener, Mohr, Mortazavi, & Stein, 2012).

It may seem like common sense that good relationships translate to more happiness. You may be surprised to learn, however, that good relationships also translate to better health. Interestingly, both the *quality* and *quantity* of social relationships can affect a person’s health (Cohen 1988; House, Landis, & Umberson, 1988). Research has shown that having a larger social network and high quality relationships can be beneficial for health, whereas having a small social network and poor quality relationships can actually be *detrimental* to health (Uchino, 2006). Why might it be the case that good relationships are linked to health? One reason is that friends and romantic partners might share health behaviors, such as wearing seat belts, exercising, or abstaining from heavy alcohol consumption. Another reason is that people who experience social support might feel less stress. Stress, it turns out, is associated with a variety of health problems. Other discussions on social relationships and health can also be found in Noba (http://noba.to/4tm85z2x).

Relationships as treatment and healing?

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

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Fact or Myth: Are Social Relationships the Secret to Happiness?

If you read pop culture magazines or blogs, you've likely come across many supposed "secrets" to happiness. Some articles point to exercise as a sure route to happiness, while others point to gratitude as a crucial piece of the puzzle. Perhaps the most written about "secret" to happiness is having high quality social relationships. Some researchers argue that social relationships are central to subjective well-being (Argyle, 2001), but others contend that social relationships' effects on happiness have been exaggerated. This is because, when looking at the **correlations**—the size of the associations—between social relationships and well-being, they are typically small (Lucas & Dyrenforth, 2006; Lucas et al., 2008). Does this mean that social relationships are not actually important for well-being? It would be premature to draw such conclusions, because even though the effects are small, they are robust and reliable across different studies, as well as other domains of well-being. There may be no single secret to happiness but there may be a recipe, and, if so, good social relationships would be one ingredient.

Outside Resources

Article: The New Yorker Magazine—"Hellhole" article on solitary confinement
http://www.newyorker.com/magazine/2009/03/30/hellhole

Blog: The Gottman Relationship Blog
https://www.gottman.com/blog/

Helen Fisher on Millennials' Dating Trends
https://www.theatlantic.com/video/index/504626/tinder-wont-change-love/

Web: Science of Relationship's website on social relationships and health
http://www.scienceofrelationships.co...rceived-p.html

Web: Science of Relationship's website on social relationships and well-being
www.scienceofrelationships.co...ell-being.html

Discussion Questions

1. What is more important to happiness: the quality or quantity of your social relationships?
2. What do you think has more influence on happiness: friends or family relationships? Do you think that the effect of friends and family on happiness will change with age? What about relationship duration?
3. Do you think that single people are likely to be unhappy?
4. Do you think that same-sex couples who get married will have the same benefits, in terms of happiness and well-being, compared to heterosexual couples?
5. What elements of subjective well-being do you think social relationships have the largest impact on: life satisfaction, positive affect, or negative affect?
6. Do you think that if you are unhappy you can have good quality relationships?
7. Do you think that social relationships are important for happiness more so for women compared to men?

Vocabulary

Confidante
A trusted person with whom secrets and vulnerabilities can be shared.

Correlation
A measure of the association between two variables, or how they go together.

Health
The complete state of physical, mental, and social well-being—not just the absence of disease or infirmity.

Health behaviors
Behaviors that are associated with better health. Examples include exercising, not smoking, and wearing a seat belt while in a vehicle.

Machiavellianism
Being cunning, strategic, or exploitative in one's relationships. Named after Machiavelli, who outlined this way of relating in his book, The Prince.

Narcissism
A pervasive pattern of grandiosity (in fantasy or behavior), a need for admiration, and lack of empathy.

Objective social variables
Targets of research interest that are factual and not subject to personal opinions or feelings.

Operationalization
The process of defining a concept so that it can be measured. In psychology, this often happens by identifying related concepts or behaviors that can be more easily measured.

Ostracism
Being excluded and ignored by others.

Psychopathy
A pattern of antisocial behavior characterized by an inability to empathize, egocentricity, and a desire to use relationships as tools for personal gain.

Shunning
The act of avoiding or ignoring a person, and withholding all social interaction for a period of time. Shunning generally occurs as a punishment and is temporary.

Social integration
Active engagement and participation in a broad range of social relationships.

Social support
A social network's provision of psychological and material resources that benefit an individual.

Subjective social variables
Targets of research interest that are not necessarily factual but are related to personal opinions or feelings

Subjective well-being
The scientific term used to describe how people experience the quality of their lives in terms of life satisfaction and emotional judgments of positive and negative affect.

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22.7: Personality Disorders

Learning Objectives

1. Categorize the different types of personality disorders and differentiate antisocial personality disorder from borderline personality disorder.
2. 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 that fall on Axis I of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*) categorization system. In comparison to the Axis I disorders, which may frequently be severe and dysfunctional and are often brought on by stress, the disorders that fall on Axis II are longer-term disorders that are less likely to be severely incapacitating. Axis II consists primarily of *personality disorders*. 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 than are Axis I disorders.

The personality disorders are summarized in Table 22.7.6. They are categorized into three types: those characterized by *odd or eccentric behavior*, those characterized by *dramatic or erratic behavior*, and those characterized by *anxious or inhibited* behavior. As you consider the personality types described in Table 22.7.6, 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 doesn't 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 whom we interact with every day—yet they may become problematic when they are rigid, overused, or interfere with everyday behavior (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 22.7.6: Descriptions of the Personality Disorders (Axis II)

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. Humorless, 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 behavior. 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.

Cluster	Personality disorder	Characteristics
	Narcissistic	Inflated sense of self-importance, absorbed by fantasies of self and success. Exaggerates own achievement, assumes others will recognize they are superior. 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.)

Source: American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

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 Axis I 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 behavior. 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 behavior. 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 behaviors 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 behaviors (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 behavior, 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 defense against fear of abandonment, borderline people are compulsively social. But their behaviors, including their intense anger, demands, and suspiciousness, repel people.

People with BPD often deal with stress by engaging in self-destructive behaviors, for instance by being sexually promiscuous, getting into fights, binge eating and purging, engaging in self-mutilation or drug abuse, and threatening suicide. These behaviors 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 as well as 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 behaviors. 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 posttraumatic 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 22.7.16 shows the comparison of the level of brain activity in the emotional centers in the amygdala (left panel) and the prefrontal cortex (right panel). In comparison to the controls, the borderline 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 behavioral volatility of borderline patients.

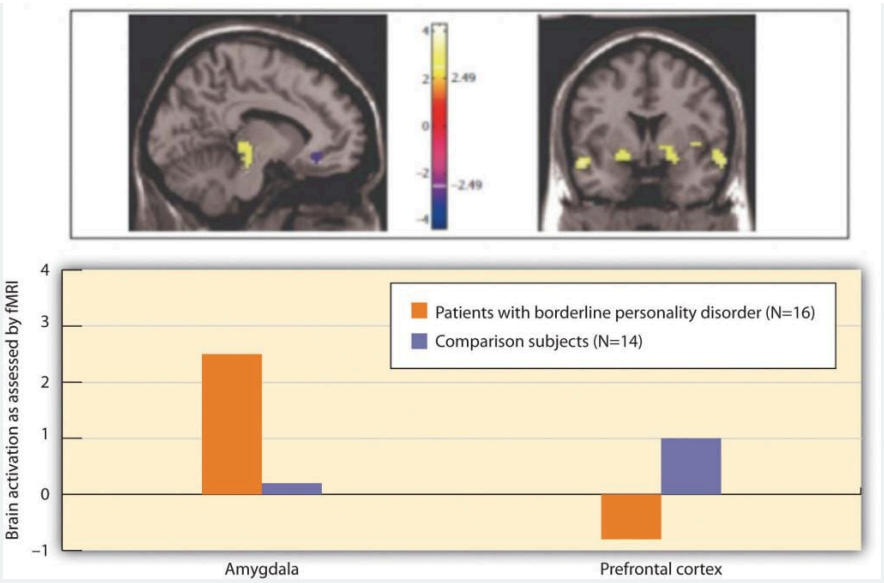


Figure 22.7.16: Results From Posner et al., 2003. Individuals with BPD showed less cognitive and greater emotional brain activity in response to negative emotional words. Adapted from Posner, M., Rothbart, M., Vizueta, N., Thomas, K., Levy, K., Fossella, J.,...Kernberg, O. (2003). An approach to the psychobiology of personality disorders. *Development and Psychopathology*, *15*(4), 1093–1106. doi:10.1017/S0954579403000506.

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 modeling (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: those characterized by odd or eccentric behavior, dramatic or erratic behavior, and anxious or inhibited behavior.
- 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 behaviors do they engage in, and why are these behaviors so harmful to them and others?

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CHAPTER 23: TREATMENT

23.1: Treatment
23.2: Reducing Disorder by Confronting It - Psychotherapy
23.3: Reducing Disorder Biologically- Drug and Brain Therapy
23.4: Practice skills

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23.1: Treatment



Figure 16.1 Many forms of therapy have been developed to treat a wide array of problems. These marines who served in Iraq and Afghanistan, together with community mental health volunteers, are part of the Ocean Therapy program at Camp Pendleton, a program in which learning to surf is combined with group discussions. The program helps vets recover, especially vets who suffer from post-traumatic stress disorder (PTSD).

What comes to mind when you think about therapy for mental health issues? You might picture someone lying on a couch talking about his childhood while the therapist sits and takes notes, à la Sigmund Freud. But can you envision a therapy session in which someone is wearing virtual reality headgear to conquer a fear of snakes?

In this chapter, you will see that approaches to therapy include both psychological and biological interventions, all with the goal of alleviating distress. Because psychological problems can originate from various sources—biology, genetics, childhood experiences, conditioning, and sociocultural influences—psychologists have developed many different therapeutic techniques and approaches. The Ocean Therapy program shown in Figure 16.1 uses multiple approaches to support the mental health of veterans in the group.

There are many misconceptions and assumptions about therapy and treatment. In the same way that mental health and psychological disorders are often misunderstood and may be discounted, seeking help for problems can be a difficult and scary time for people. There is no one method that works for everyone, and those seeking help are displaying strength and courage in their decision to address a highly stigmatized and challenging issue. The goal of treatment is not to change whom a person is, but to address symptoms and/or underlying conditions.

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23.2: Reducing Disorder by Confronting It - Psychotherapy

Learning Objectives

1. Outline and differentiate the psychodynamic, humanistic, behavioral, and cognitive approaches to psychotherapy.
2. Explain the behavioral and cognitive aspects of cognitive-behavioral therapy and how CBT is used to reduce psychological disorders.

Treatment for psychological disorder begins when the individual who is experiencing distress visits a counselor or therapist, perhaps in a church, a community center, 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) 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, which 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.

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, 2000)[1]:

A. **Six or more of the following symptoms of inattention have been present for at least 6 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 behavior 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 6 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 practiced by thousands of psychologists and other trained practitioners in the United States 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 practiced, it is in the minority. It is estimated that there are over 400 different kinds of therapy practiced by people in many fields, and the most important of these are shown in Figure 23.2.2. 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.

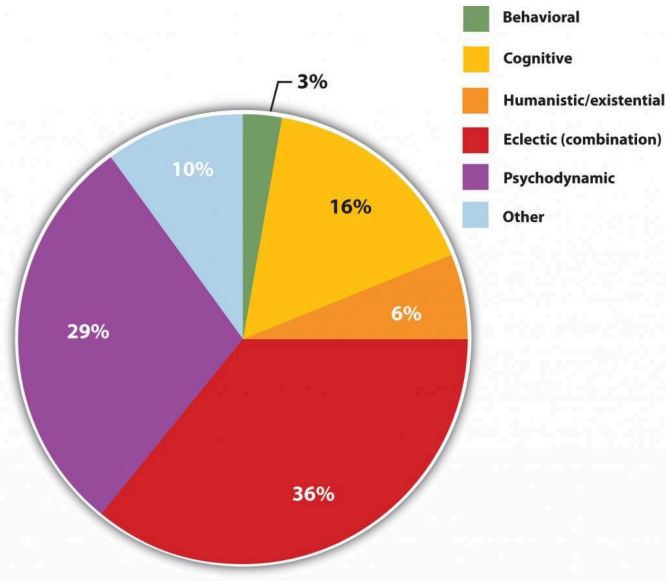


Figure 23.2.2: The Many Types of Therapy Practiced in the United States. These data show the proportion of psychotherapists who reported practicing each type of therapy. Adapted from Norcross, J. C., Hedges, M., & Castle, P. H. (2002). Psychologists conducting psychotherapy in 2001: A study of the Division 29 membership. *Psychotherapy: Theory, Research, Practice, Training, 39*(1), 97–102.

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 (U.S. Department of Health and Human Services, 1999)[2].

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” behavior. Most generally, you will know that you or others need help when the person’s psychological state is negatively influencing his or her everyday behavior, when the behavior 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 counseling centers and pastoral counseling. You may want to *ask friends and family members for recommendations*. You’ll probably be surprised at how many people have been to counseling, 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 center 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 principles as developed by the American Psychological Association (2010)[3].

- Psychologists inform their clients/patients as early as possible in the therapeutic relationship about the nature and anticipated course of therapy, fees, involvement of third parties, and limits of confidentiality, and provide sufficient opportunity for the client/patient to ask questions and receive answers.
- Psychologists inform their clients/patients of the developing nature of the treatment, the potential risks involved, alternative treatments that may be available, and about the voluntary nature of their participation.
- When the therapist is a trainee, the client/patient is informed that the therapist is in training and is being supervised, and is given the name of the supervisor.
- When psychologists agree to provide services to several persons who have a relationship (such as spouses, significant others, or parents and children), they take reasonable steps to clarify at the outset which of the individuals are clients/patients and the relationship the psychologist will have with each person.
- If it becomes apparent that a psychologist may be called on to perform potentially conflicting roles (such as family therapist and then witness for one party in divorce proceedings), the psychologist takes reasonable steps to clarify and modify, or withdraw from, roles appropriately.
- When psychologists provide services to several persons in a group setting, they describe at the outset the roles and responsibilities of all parties and the limits of confidentiality.
- Psychologists do not engage in sexual intimacies with current therapy clients/patients, or with individuals they know to be close relatives, guardians, or significant others of current clients/patients. Psychologists do not terminate therapy to circumvent this standard. Psychologists do not accept as therapy clients/patients persons with whom they have engaged in sexual intimacies, nor do they have sexual intimacies with former clients/patients for at least 2 years after cessation or termination of therapy.
- Psychologists terminate therapy when it becomes reasonably clear that the client/patient no longer needs the service, is not likely to benefit, or is being harmed by continued service.

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 defense 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 defense 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 developed person-centered therapy (or client-centered 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., 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., that he or she actively listens to and accurately perceives the personal feelings that the client experiences).*

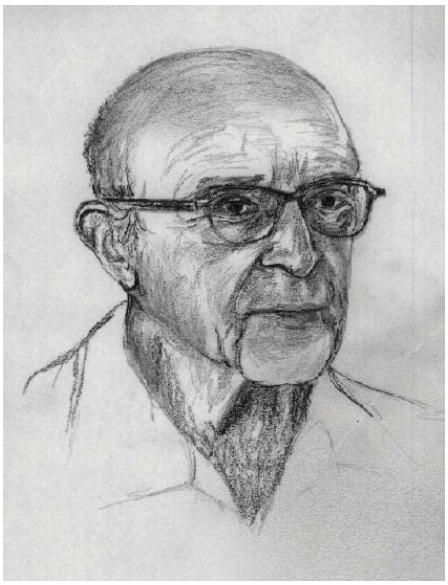


Figure 23.2.3: Carl Rogers was among the founders of the humanistic approach to therapy and developed the fundamentals of person-centered therapy. Didius – Carl Ransom Rogers – CC BY 2.5.

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).

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 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-behavior therapy (CBT) is *a structured approach to treatment that attempts to reduce psychological disorders through systematic procedures based on cognitive and behavioral principles*. As you can see in Figure 23.2.4, CBT is based on the idea that there is a recursive link among our thoughts, our feelings, and our behavior. 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 behaviors (lethargy, disinterest, lack of studying). When we or other people look at the negative behavior, 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 behavior amplify and distort each other.

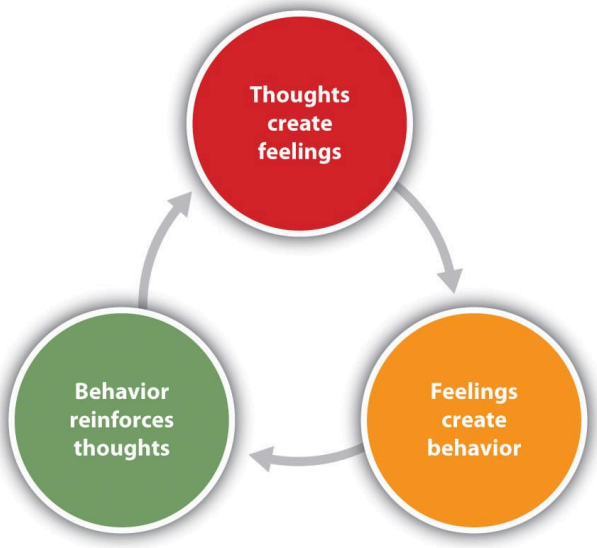


Figure 23.2.4: Cognitive-Behavior Therapy. Cognitive-behavior therapy (CBT) is based on the idea that our thoughts, feelings, and behavior reinforce each other and that changing our thoughts or behavior can make us feel better.

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 behaviors 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 behavior. 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 behavioral 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 behavioral and cognitive approaches.

Behavioral Aspects of CBT

In some cases the primary changes that need to be made are behavioral. Behavioral 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, for instance, 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 behaviors 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 more appropriately respond in public, for instance, by maintaining eye contact, smiling when appropriate, and modulating tone of voice.

As the patient practices the different techniques, the appropriate behaviors 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 behavior of others who are more socially skilled to acquire appropriate behaviors. 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 behavioral 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 posttraumatic 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 behavioral 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 23.2.1). The patient then confronts her fears in a systematic manner, sometimes using her imagination but usually, when possible, in real life.

Table 23.2.1 Hierarchy of Fears Used in Systematic Desensitization

Behavior	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.

Behavioral 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 soldiers 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 behavior therapy in which positive punishment is used to reduce the frequency of an undesirable behavior*. An unpleasant stimulus is intentionally paired with a harmful or socially unacceptable behavior until the behavior 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 behavior (Houts, Berman, & Abramson, 1994). Aversion therapy is also used to stop other specific behaviors 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 behavioral 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 behavior (Figure 23.2.4).

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 behavior 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 behaviors.

Beck's (Beck, 1995; Beck, Freeman, & Davis, 2004)) 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. 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 beliefs against concrete evidence. If a client claims that "everybody at work is out to get me," the therapist might ask him 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.

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; as you saw in Figure 23.2.2, the most commonly practiced 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 12 "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 behavior 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 behavior 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-centered 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 behavior. 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 behavior 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 behavior 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 behavioral 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 behavioral 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 treament 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 behaviors 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.
- Behavior therapy applies the principles of classical and operant conditioning, as well as observational learning, to the elimination of maladaptive behaviors 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?

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23.3: Reducing Disorder Biologically- Drug and Brain Therapy

Learning Objectives

1. Classify the different types of drugs used in the treatment of mental disorders and explain how they each work to reduce disorder.
2. 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 behaviors or thought processes, and they don't really solve psychological disorders. However, although they cannot "cure" disorder, 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 23.3.2.

Table 23.3.2 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 (MAOIs)	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

Class	Type	Brand names	Disorder	Notes
Mood stabilizers		Eskalith, Lithobid, Depakene	Bipolar disorder	Effective in reducing the mood swings associated with bipolar disorder
Antianxiety drugs	Tranquilizers (benzodiazepines)	Valium, Xanax	Anxiety, panic, and mood disorders	Work by increasing the action of the neurotransmitter GABA (gamma-aminobutyric acid)
Antipsychotics (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-behavior 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 4 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.

Recently, 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. This concern has led the FDA to put a warning label on SSRI medications

and 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"), was approved by the FDA in the 1970s for treating both manic and depressive episodes, and it has proven very effective. 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. 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 behavior. 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 both 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 centers, 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)[1]. 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 23.3.7). 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).

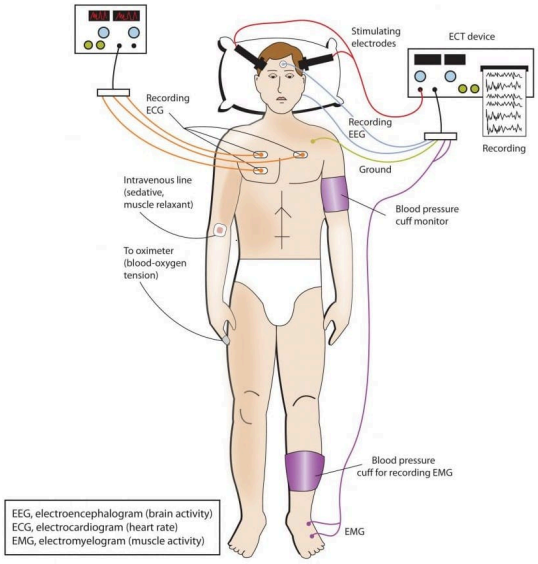


Figure 23.3.7: Electroconvulsive Therapy (ECT). Today's ECT uses precisely calculated electrical currents to achieve the most benefit with the fewest possible risks.

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 23.3.8). 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.

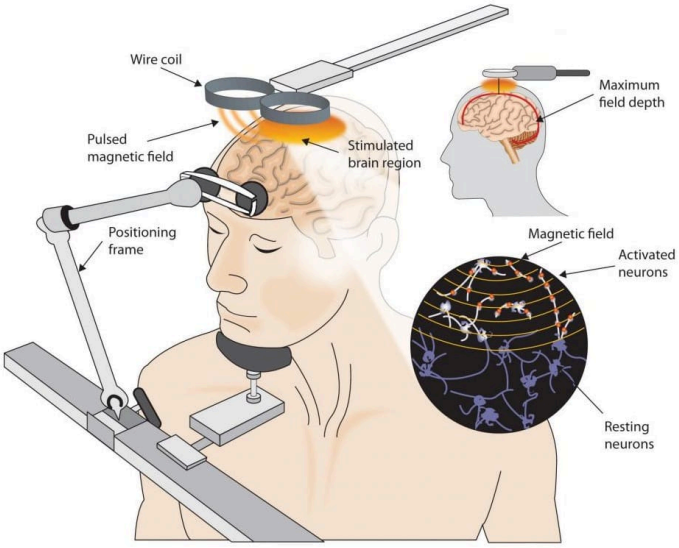


Figure 23.3.8: Transcranial Magnetic Stimulation (TMS). TMS is a noninvasive procedure that uses a pulsing magnetic coil to electrically stimulate the brain. Recently, TMS has been used in the treatment of Parkinson's disease.

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 President John F. Kennedy, which left her severely incapacitated.

There are very few centers 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), posttraumatic 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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23.4: Practice skills

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