INTRODUCTION TO ANTHROPOLOGY: A FOUR FIELD APPROACH



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Introduction

Welcome to your Anthropology textbook!

In it, we aim to communicate the strengths of the contemporary discipline – its focus on our shared humanity, its reliance on diverse voices, and its insistence on seeing other cultures from their own perspective rather than one imposed from outside – to a broad audience and to future specialists.

When we decided to create this textbook for use in our (and your!) classes, we had a few broad goals for the project. The first goal was to provide a text that is more inclusive to the students in our classes, and more representative of anthropology as a discipline. This textbook seeks to highlight the diverse voices of contemporary anthropology, emphasizing that anthropology works best amidst diversity. We hope that all students will feel more engaged when they see themselves reflected in the people, examples, and stories of contemporary anthropology, which has been profoundly improved by the inclusion of diverse, global perspectives over the past several decades. Ultimately we hope that more students from more backgrounds can see themselves as anthropologists.

We also wanted to better present anthropology as it is today, across all of its disciplines. We had found that textbooks rarely provided good coverage of all four of anthropology's subfields: biological anthropology, cultural anthropology, linguistic anthropology, and archaeology. This textbook aims to remedy that failing, providing substantial sections for each subfield. Additionally, the creation of this textbook has enabled us to highlight up-to-date research and relevant cross-cultural examples of topics, replacing dated sections from other available texts.

Finally, we wanted to reduce costs for everyone. Relatively expensive textbooks for introductory classes create a barrier to entry and inclusion for many students. We want to remove that barrier and make anthropology, the study of humans, accessible to all (you are humans after all!).

We hope you enjoy the text and come to engage with our discipline!

CHAPTER OVERVIEW

1: Introduction to Anthropology

1.1: Introduction to Anthropology
1.2: Culture
1.3: Applied Anthropology, and Anthropology and Your Job

Thumbnail: Museo Nacional de Antropología, Avenida Paseo de la Reforma, Polanco, Bosque de Chapultepec I Sección, Mexico City, CDMX, Mexico
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1.1: Introduction to Anthropology

Learning Objectives

By the end of this chapter, you will be able to:

- Define anthropology and concepts central to the field
- Describe the origins and early development of anthropology.
- Identify the four subdisciplines of anthropology and specify the focus of each one.

What is Anthropology?

The word **anthropology** is derived from Greek, with “anthropos” meaning “human” and “logy” referring to the “study of.” Therefore anthropology by definition, is the study of humans. It is about our history, our prehistory before written records, our biology, our language, the distribution of peoples all over the planet, and the cultural and social aspects of our existence. The methods we use on this journey of self-discovery are varied and eclectic—it’s an unusual discipline. What is perhaps unique about anthropology is its global quality, its comparative potential, and its integrative possibilities, which result from its examination of histories, biologies, languages, and socio-cultural variations. As a discipline, it is unusual because it is both soft and hard, including science as well as the humanities, between nature and culture, the past and the present, searching for new ways to understand the human condition. We are an academic discipline with porous boundaries that has refused to specialize and as a result can claim to have made enormous contributions to understanding what it means to be human. But this is a journey that has not always been perfect. At its beginning as an academic discipline anthropology focused on “the study of others,” meaning foreign cultures, but using the term “others” imposed false thoughts of “civilized versus savagery.” These dualistic views have often caused discrimination, wars, or even genocide. Now, anthropologists strive to uncover and better understand the mysteries of all cultures and eliminate the prejudice that it first created.

A Brief History of Anthropological Thinking

Imagine you are living several thousand years ago. Maybe you are a wife and mother of three children. Maybe you are a young man eager to start your own family. Maybe you are a prominent religious leader, or maybe you are a respected healer. Your family has, for as long as people can remember, lived the way you do. You learned to act, eat, hunt, talk, pray, and live the way you do from your parents, your extended family, and your small community. Suddenly, you encounter a new group of people who have a different way of living, speak strangely, and eat in an unusual manner. They have a different way of addressing the supernatural and caring for their sick. What do you make of these differences? These are the questions that have faced people for tens of thousands of years as human groups have moved around and settled in different parts of the world.

One of the first examples of someone who attempted to systematically study and document cultural differences is Zhang Qian (164 BC – 113 BC). Born in the second century BCE in Hanzhong, China, Zhang was a military officer who was assigned by Emperor Wu of Han to travel through Central Asia, going as far as what is today Uzbekistan. He spent more than twenty-five years traveling and recording his observations of the peoples and cultures of Central Asia. The Emperor used this information to establish new relationships and cultural connections with China’s neighbors to the West. Zhang discovered many of the trade routes used in the Silk Road and introduced several new cultural ideas, including Buddhism, into Chinese culture.



Figure 1. Book illustration by Léon Benett published in 1878 showing Ibn Baṭṭūṭah (right) and his guide in Egypt

Another early traveler and documenter of culture of note was Abu Abdullah Muhammad Ibn Battuta, known most widely as Ibn Battuta, (1304-1369). Ibn Battuta was an Amazigh (Berber) Moroccan Muslim scholar. During the fourteenth century, he traveled for a period of nearly thirty years, covering almost the whole of the Islamic world, including parts of Europe, Africa, India, and China. Upon his return to the Kingdom of Morocco, he documented the customs and traditions of the people he encountered in a book called *Tuhfat al-anzar fi gharaaib al-amsar wa ajaaib al-asfar* (*A Gift to those who Contemplate the Wonders of Cities and the Marvels of Traveling*), a book commonly known as *Al Rihla*, which means "travels" in Arabic. This book became part of a genre of Arabic literature that included descriptions of the people and places visited along with commentary about the cultures encountered. Some scholars consider *Al Rihla* to be among the first examples of early pre-anthropological writing.

Later, from the 1400s through the 1700s, during the so-called "Age of Discovery," Europeans began to explore the world, and then colonize it. Europeans exploited natural resources and human labor in other parts of the world, exerting social and political control over the people they encountered. New trade routes along with the trade of enslaved Africans fueled a growing European empire while forever disrupting previously independent cultures. European **ethnocentrism—**the belief that one's own culture is better than others—was used to justify the subjugation of non-European societies on the alleged basis that these groups were socially and even biologically inferior. Indeed, the emerging anthropological practices of this time were ethnocentric and often supported colonial projects.

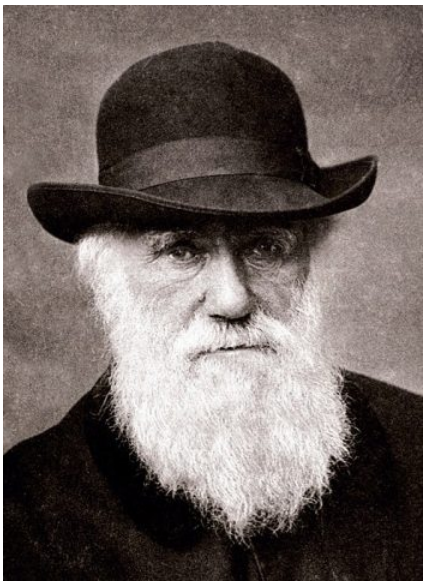


Figure 2. Charles Darwin in 1881.

As European empires expanded, new ways of understanding the world and its people arose. Beginning in the eighteenth century in Europe, the Age of the Enlightenment was a social and philosophical movement that privileged science, rationality, and experience, while critiquing religious authority. This crucial period of intellectual development planted the seeds for many academic disciplines, including anthropology. It gave ordinary people the capacity to learn the "truth" through observation and experience: *anyone* could ask questions and use rational thought to discover things about the natural and social world. For example, geologist Sir Charles Lyell (1797-1875) observed layers of rock and argued that the earth's surface must have changed gradually over long periods of time. He disputed the Young Earth theory, which was popular at the time and used Biblical information to date the earth as only 6,000 years old, Charles Darwin (1809-1882), a naturalist and biologist, observed similarities between fossils and living specimens, leading him to argue that all life is descended from a common ancestor. Philosopher John Locke (1632-1704) contemplated the origins of society itself, proposing that people historically had lived in relative isolation until they agreed to form a society in which the government would protect their personal property.

These radical ideas about the earth, evolution, and society influenced early social scientists into the nineteenth century. Philosopher and anthropologist Herbert Spencer (1820-1903), inspired by scientific principles, used biological evolution as a model to understand social evolution. Just as biological life evolved from simple to complex multicellular organisms, he postulated that societies "evolve" to become larger and more complex. Anthropologist Lewis Henry Morgan (1818-1881) argued that all societies "progress" through the same stages of development: savagery—barbarism—civilization. Societies were classified into these stages based on their family structure, technologies, and methods for acquiring food. So-called "savage" societies, ones that used stone tools and foraged for food, were said to be stalled in their social, mental, and even moral development.

Ethnocentric ideas like Morgan's were challenged by anthropologists in the early twentieth century in both Europe and the United States. During World War I, Bronislaw Malinowski (1884-1942), a Polish anthropologist, became stranded on the Trobriand Islands located north of Australia and Papua New Guinea. While there, he started to develop **participant-observation** fieldwork: the method of immersive, long-term research that cultural anthropologists use today. By living with and observing the Trobriand Islanders, he realized that their culture was not "savage," but was well-suited to fulfill the needs of the people. He developed a theory to explain human cultural diversity: each culture functions to satisfy the specific biological and psychological needs of its people. While this theory has been critiqued as biological reductionism, it was an early attempt to view other cultures in more open-minded ways.



Figure 3. Portrait of Franz Boas circa 1915

Around the same time in the United States, Franz Boas (1858-1942), widely regarded as the founder of American anthropology, developed **cultural relativism,** the view that while cultures differ, they are not better or worse than one another. This idea has become a cornerstone principle of contemporary anthropology. In his critique of ethnocentric views, Boas insisted that physical and behavioral differences among racial and ethnic groups in the United States were shaped by environmental and social conditions, not biology. In fact, he argued that culture and biology are distinct realms of experience: human behaviors are socially learned, contextual, and flexible, not innate. Further, Boas worked to transform anthropology into a professional and empirical academic discipline that integrated the four subdisciplines of cultural anthropology, linguistic anthropology, archaeology, and biological anthropology.

What Sets Anthropology Apart?

Anthropology is a vast field of study—so vast, in fact, that anthropology is interested in everything. Anthropology is unique in its enormous breadth and its distinctive focus. Consider other disciplines. In the arts and sciences, each discipline focuses on a discrete field of social life or physical phenomena. Economists study economics. Religious scholars study religion. Environmental scientists study the environment. Biologists study living organisms. And so on. Anthropologists study all of these things, every possible realm of human experience, thought, activity, and organization. Human as we are, we can only engage in social and natural worlds through our human minds and human bodies. Even engagement with non-human realms such as astronomy and botany is conditioned by our human senses and human cognition and thus varies across different societies and different time periods.

A Cultural Focus

A key theme throughout all of the diverse aspects of anthropological research is a focus on the concept of **culture**. Culture is a concept that often invokes thoughts of a Monet, a Mozart symphony, or ballerinas in tutus dancing Swan Lake. In the popular vernacular culture often refers to the arts. A person that is cultured has knowledge of and is a patron of the arts. Then there is pop culture; what trends are current and hip. Within anthropology these things are simply aspects of culture. To understand the anthropological culture concept, we need to think broader and holistically.

Anthropologists have long debated an appropriate definition of culture. Even today some anthropologists criticize the culture concept as oversimplifying and stereotyping cultures. The first anthropological definition of culture comes from 19th-century British anthropologist Edward Tylor, “Culture…is that complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of society.” (Tylor 1920 [1871]: 1). This is probably the most enduring definition of culture even though it relates more to the specifics, or particulars, of culture groups. As Bohannan and Glazer comment in *High Points in Anthropology* (1988: 62), “…[it is the definition] most anthropologists can quote correctly, and the one they fall back on when others prove too cumbersome.” Over time, anthropologists learned that including specifics into the

definition of culture limited that definition. In other words, the definition would not apply to all cultures. A general definition of **culture** that can be applied to all cultures is patterns of behavior that are common within a particular population of people.

Holism

Anthropologists are interested in **holism**, in the whole of humanity, in how various aspects of biological or cultural life intersect. One cannot fully understand what it means to be human by studying a single aspect of our complex bodies or societies. By using a holistic approach, anthropologists ask how different aspects interact with and influence one another. For example, a biological anthropologist studying monkeys in South America might consider the species' physical adaptations, foraging patterns, ecological conditions, and interactions with humans in order to answer questions about their social behaviors. By understanding how non-human primates behave, we discover more about ourselves: after all, as you will learn in this book, humans are primates! A cultural anthropologist studying marriage in a small village in India might consider local gender norms, existing family networks, laws regarding marriage, religious rules, and economic requisites in order to understand the particular meanings of marriage in that context. By using a holistic approach, anthropologists appreciate the complexity of any biological, social, or cultural phenomenon.

An easier understanding of holism is to say that the whole is greater than the sum of its parts. Individual human organisms are not just x percent genes and y percent culture added together. Rather, human beings are what they are because of mutual shaping of genes and culture and experiences living in the world produces something new, something that cannot be reduced to the materials used to construct it.

Fieldwork

Throughout this book, you will read examples of anthropological **fieldwork** that will take you around the world. Anthropologists do not only work in laboratories, libraries, or offices. To collect data, they go to where their data lives, whether it is a city, village, cave, tropical forest, or desert. At their field sites, anthropologists collect data which, depending on subdiscipline, may be interviews with local peoples, examples of language in use, skeletal remains, or material culture remains like potsherds or stone tools. While anthropologists ask an array of questions and use diverse methods to answer their research questions, they share this commitment to conducting their research in the field.

Anthropologists as Scientists

Many anthropologists use the scientific method as a way of learning about the world around them. Often people think of science as taking place in a sterile laboratory, and sometimes it does, but it also occurs many other places, such as at a research station in Romania, a field site in Tanzania, or a town in El Salvador. To understand how information is established, it is important to recognize what science is (and is not) as well as understand how the scientific method actually works.

Science combines our natural curiosity with our ability to experiment so we can understand the world around us and address needs in our communities. Thanks to science, meteorologists can predict the weather, it takes only a relatively small number of farmers to grow enough food to feed our large population, our medicine continues to improve, and over 90% of Americans have a cell phone.

The goal of scientists is to identify a research question and then identify the best answer(s) to that question. For example, an excavation of a prehistoric cemetery may reveal that many of the people buried there had unhealed fractures when they died, and the lead anthropologist may ask, "Why did this population experience more broken bones than their neighbors?" There might be multiple explanations to address this question, such as a lack of calcium in their diets, participation in dangerous work, or violent conflict with neighbors; these explanations are considered hypotheses. In the past, you might have learned that a hypothesis is an "educated guess," but in science, hypotheses are much more than that. A **scientific hypothesis** reflects a scientist's knowledge-based experiences and background research. A hypothesis is better defined as an explanation of observed facts; hypotheses explain how and why observed phenomena are the way they are.

What are the Four Subfields?

Because human experiences are varied and complex, we need a diversified tool kit to study them. Anthropology therefore comprises four subdisciplines: Some are more scientific (like biological anthropology), while others are more humanistic (like cultural anthropology). The scientific subdisciplines tend to use the scientific method to develop theories that explain human origins, evolution, material remains, or behaviors. The humanistic subdisciplines tend to use observational methods and interpretive approaches to understand human beliefs, languages, behaviors, cultures, and social organization. But in truth all of the subfields combine both scientific and humanistic approaches in studying humans. Findings from all four subdisciplines contribute to a multifaceted appreciation of human bio-cultural experiences, past and present.

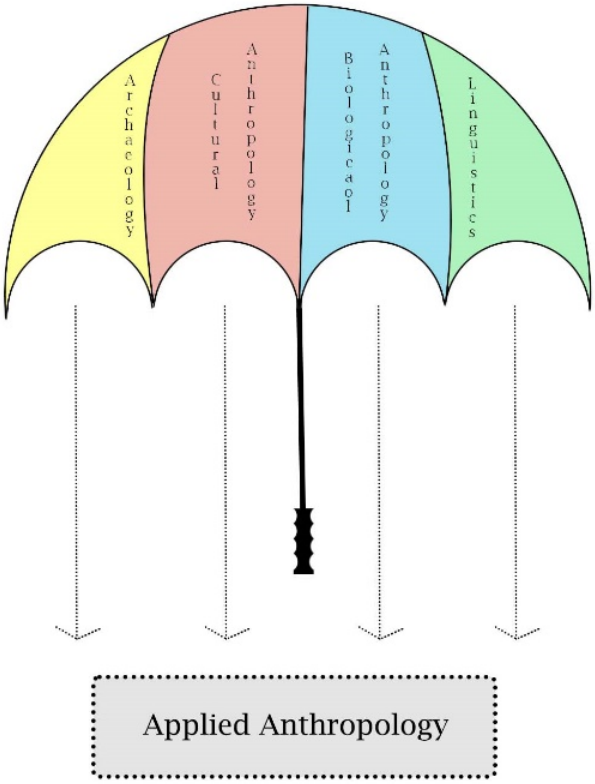


Figure 4. The Four Sub-Fields of Anthropology, making up the umbrella. Research in each of the subfields is also applied to real-world issues, as we'll see in Chapter 3. Image by Nancy Phaup

Archaeology

Archaeology focuses on the material past: the tools, food, pottery, art, shelters, seeds, and other objects left behind by people. Archaeologists recover and analyze these materials to reconstruct the lifeways of past societies. They ask specific questions like: How did people in a particular area live? What did they eat? What happened to them? They ask general questions about humankind: When and why did humans first develop agriculture? How did cities first develop? What type of interactions did prehistoric people have with their neighbors?

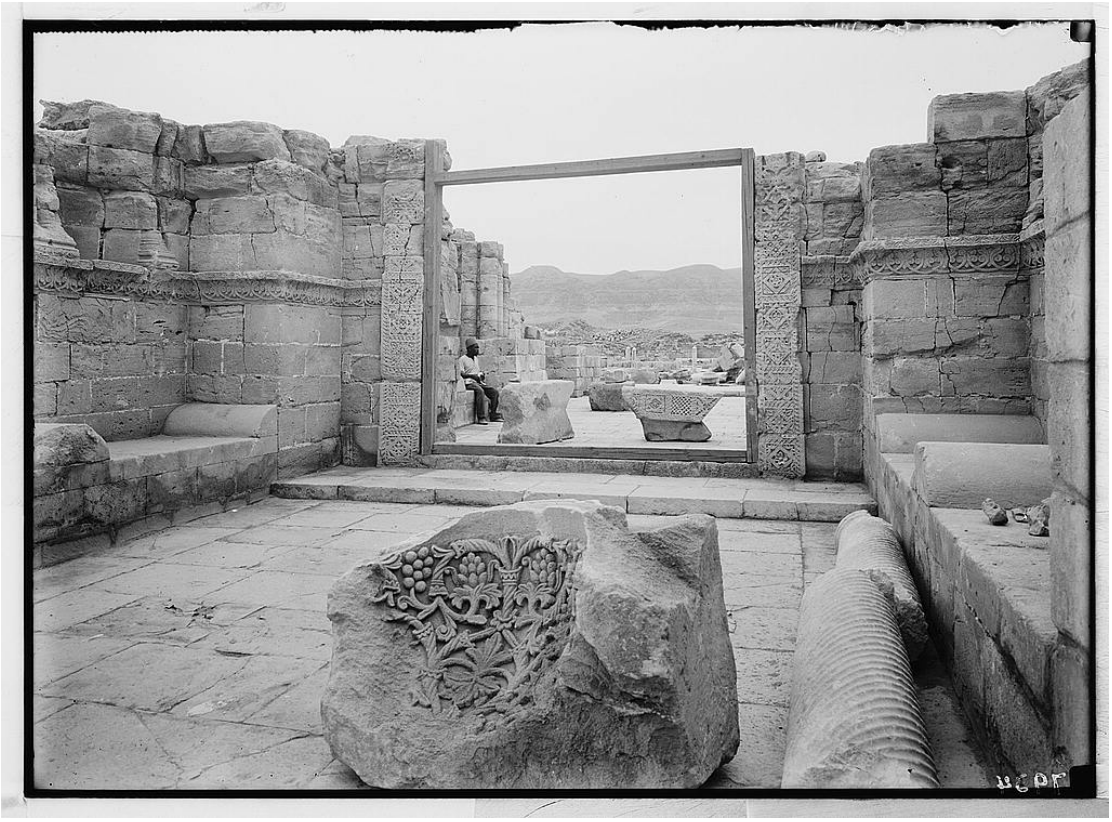


Figure 5. Jericho in the 1930's: Excavations at Khirbet Mefjer near Ain el-Sultan, Jericho. East gate of palace, closer. Abstract/medium: G. Eric and Edith Matson Photograph Collection. Original url: http://hdl.loc.gov/loc.pnp/matpc.03719

One key method that archaeologists use to answer their questions is **excavation**—a method of careful digging and removing of dirt and stones to uncover material remains while recording their context. Archaeological research spans millions of years from human origins to the present. For example, Kathleen Kenyon (1906–1978), a British archaeologist, was one of few women working in this field in the 1940s. While excavating at Jericho (which dates back to 10,000 BCE), she discovered city structures and cemeteries built during the Early Bronze Age (3,200 yBP in Europe). Based on her findings, she argued that Jericho is the oldest city continuously occupied by different groups of people (Kenyon 1979).

Cultural Anthropology

Cultural anthropology focuses on similarities and differences among living societies. The cultural anthropologist suspends their own sense of what is "normal" in order to understand the perspectives of the people they study (cultural relativism). They learn these perspectives through participant-observation fieldwork: a method that involves living with, observing, and learning from the people one studies. Beyond describing another way of life, cultural anthropologists ask broader questions about humankind: Are human emotions universal or culturally specific? Does globalization make us all the same or do we maintain cultural differences? For cultural anthropologists, no aspect of human life is outside their purview: They study art, religion, healing, natural disasters, video gaming, even pet cemeteries. While many cultural anthropologists are intrigued by human diversity, they realize that people around the world share much in common.



Figure 6. Dr. Margaret Mead, half-length portrait, facing right, reading book / World-Telegram photo by Edward Lynch. [Between 1930 and 1950] Photograph. https://www.loc.gov/item/98503240/.

One famous American cultural anthropologist, **Margaret Mead** (1901–1978), conducted several cross-cultural studies of gender and socialization practices. In the early twentieth century in the United States, people wondered if the emotional turbulence of American adolescence was caused by the biology of puberty (and was thus natural and universal) or something else. To find out, Mead famously set off for the Samoan Islands, where she lived for several months getting to know Samoan teenagers. According To Mead, she learned that Samoan adolescence was not angst-ridden (like it was in the United States), but rather a relatively tranquil and happy life stage. Upon returning to the United States, Mead wrote *Coming of Age in Samoa*, a best-selling book that was both sensational and scandalous (Mead 1928). In it, she critiqued U.S. parenting as overly restrictive, and contrasted it to Samoan parenting, which allowed teenagers to freely explore their community and even their sexuality. Ultimately, she argued that nurture (i.e., socialization) more than nature played a key role in the experience of child development.

Cultural anthropologists do not always travel far to provide insight into human experience. In the 1980s, American anthropologist Philippe Bourgois (1956–) wanted to understand how pockets of extreme poverty persist amid the wealth and overall high quality of life in the United States. To answer this question, he lived with Puerto Rican crack dealers in East Harlem, contextualizing their experiences both historically (in terms of socioeconomic dynamics in Puerto Rico and in the United States) and presently (in terms of social marginalization and institutional racism). Rather than blame crack dealers for their poor choices or blame our society for perpetuating inequality, he argued that both individual choices and social inequality can trap people in the overlapping worlds of drugs and poverty (Bourgois 2003).

Biological Anthropology

Biological anthropology is the study of human origins, evolution, and physical variation. Some biological anthropologists focus on our closest living relatives: monkeys and apes. They examine the biological and behavioral similarities and differences between non-human primates and human primates (us!). For example, Jane Goodall has devoted her life to studying wild chimpanzees (Goodall 1996). Not all biological anthropologists study primates. Other biological anthropologists study fossilized remains in order to chart the evolution of early hominins, the evolutionary ancestors of modern humans, asking questions like: What did our ancestors look like? What did they eat? When did they start to speak? And, how did they adapt to new environments? In this field

of study, anthropologists consider the emergence and migration of the various species in the hominin family tree as well as the conditions that promoted certain biological and cultural traits.

Some biological anthropologists examine the genetic makeup of contemporary humans in order to learn how certain genes and traits are distributed in human populations across different environments. For instance, Nina Jablonski (2012) asks why darker skin pigmentation is more prevalent in high ultraviolet (UV) contexts (like Central Africa), while lighter skin pigmentation is more prevalent in low UV contexts (like Nordic countries). Others examine human genetics looking for clues about the relationships between early modern humans and other hominins, such as Neanderthals.

Linguistic Anthropology

Linguistic anthropology focuses on language. Linguistic anthropologists view language as a primary means by which humans create and interact with their diverse cultures. Language combines biological and social elements. Some linguistic anthropologists study the origins of language, asking how language emerged in our biological evolution and sociocultural development and what aspects of language might have given early hominins an evolutionary advantage. Other linguistic anthropologists are interested in how language shapes our thinking processes and our views of the world. In addition to its cognitive aspects, language is a powerful tool for getting things done. Linguistic anthropologists also study how people use language to form communities and identities, assert power, and resist authority.

Linguistic anthropologists frequently conduct the same kinds of long-term, immersive research that cultural anthropologists do. Christopher Ball spent a year living and traveling with the Wauja, an indigenous group in Brazil (2018). He describes the many routine and ritualized ways of speaking in this community and how each kind of talk generates specific types of social action. “Chief speech” is used by leaders, while “bringing the spirits” is used for healing the sick. Ceremonial language is used for giving people names and for conducting exchanges between different indigenous groups. Ball, like many linguistic anthropologists, also examined public speeches, such as the ones delivered by Wauja leaders to protest a dam on a nearby river. Ball also analyzed the forms of language used by state officials and development workers to marginalize and subordinate indigenous groups such as the Wauja.

Language is central to the way we conceptualize ourselves and our lives. Anthropologist Summerson Carr examined an addiction treatment program for homeless women in the midwestern United States, looking at the role of language in the therapeutic process (2011). After observing therapy sessions and self-help meetings, she describes how addiction counselors promote a certain kind of “healthy talk” that conveys deep cultural notions about personhood and responsibility. As patients master this “healthy talk,” they learn to demonstrate progress by performing very scripted ways of speaking about themselves and their addiction.

Applied Anthropology

Sometimes considered a fifth subdiscipline, **applied anthropology** involves the practical application of anthropological theories, methods, and findings to solve real-world problems. Applied anthropologists are employed outside of academic settings, in both the public and private sectors, including business or consulting firms, advertising companies, city government, law enforcement, the medical field, nongovernmental organizations, and even the military. Applied anthropology draws upon each of the four subfields.

Working across Cultures toward Common Goals

Stepping back for a moment, consider the problems facing us as humans on our shared planet. Climate change threatens the survival of humanity and the biodiversity of plants and animals. Forms of deeply entrenched inequality fuel racial, ethnic, and class conflicts within and between nations. These are global problems, transnational problems, cross-cultural problems. Human beings need to find a way to communicate and cooperate across the sociocultural boundaries that divide us, always recognizing the power dynamics involved in that process.

How can we do this? Anthropology teaches us that we may never understand exactly how it feels to be a member of a different culture or group within our own culture. But if we want to work together with people of different sociocultural backgrounds to solve these pressing global issues, we have to try. Long-term fieldwork and cross-cultural collaboration are not perfect solutions to the challenges of cross-cultural understanding, but these methods give us a place to begin. And anthropological methods and insights can be transformative, making possible the kinds of empathy and dialogue necessary to solve our global problems.

The goal of this anthropology textbook is to guide you in this process of transformation as you learn about the cultural lives of the various peoples with whom you share this planet.

Terms You Should Know

Anthropology

Ethnocentrism

Culture

Cultural Relativism

Participant Observation

Fieldwork

Holism

Scientific Hypothesis

Archaeology

Excavation

Cultural Anthropology

Biological Anthropology

Linguistic anthropology

Applied Anthropology

Margaret Mead

Study Questions

1. This chapter emphasizes how broad the discipline of anthropology is and how many different kinds of research questions anthropologists in the four subdisciplines pursue. What do you think are the strengths or unique opportunities of being such a broad discipline? What are some challenges or difficulties that could develop in a discipline that studies so many different things?
2. Cultural anthropologists focus on the way beliefs, practices, and symbols bind groups of people together and shape their worldview and lifeways. Thinking about your own culture, what is an example of a belief, practice, or symbol that would be interesting to study anthropologically? What do you think could be learned by studying the example you have selected?

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1.2: Culture

Learning Objectives

By the end of this chapter, you should be able to:

- Discuss what culture is and how it works, by referring to its characteristics
- Identify the variety of cultures that you belong to
- Understand the importance of cultural relativism for the study of culture

Anthropologists study all aspects of culture, but what exactly is "culture"? When we (the authors) first ask students in our introductory anthropology courses what culture means to them, our students typically say that culture is food, clothing, religion, language, traditions, art, music, and so forth. Indeed, culture includes many of these observable characteristics, but culture is also something deeper. Culture is a powerful defining characteristic of human groups that shapes our perceptions, behaviors, and relationships. **Culture** is a set of beliefs, practices, and symbols that are learned and shared. Together, they form an all-encompassing, integrated whole that binds people together and shapes their worldview and lifeways.

One reason that culture is difficult to define is that it encompasses all the intangible qualities that make people who they are. Culture is the "air we breathe": it sustains and comprises us, yet we largely take it for granted. We are not always consciously aware of our own culture. Nineteenth-century British anthropologist Edward Burnett Tylor defined culture as "that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society" (1873, 1:1). That's a lot to include in one concept! If all of that is culture, then what about human experience and activity is not culture?

Consider this scenario. A student comes to class one day, and the instructor says, "I've decided that you're all a bunch of failures and I'm flunking the entire class." Imagine then that the instructor simply stands there after that announcement, blinking calmly as the class erupts in protest. Now imagine that same scenario with one very slight difference. The instructor announces, "I've decided that you're all a bunch of failures and I'm flunking the entire class." Then, as the class erupts in protest, the instructor calmly blinks *one* eye, leaving the other eye open.

What just happened there? Blinking is a biological compulsion common to humans everywhere. Humans blink to keep eyes hydrated and clear of debris. Humans are born knowing how to blink; nobody has to teach us. But if someone deliberately blinks one eye, leaving the other one open, that's a completely different matter. In fact, leaving one eye open makes a blink a wink. Winking is not a biological necessity. Humans are not born knowing to how to wink, and it takes some practice to learn how to do it. Because it requires deliberate effort and people are not constantly doing it, winking can acquire special meaning in social interactions. In American culture (and many others), a wink often indicates that someone is joking around and that whatever they've just said or done should not be taken seriously. Of course, a wink can mean different things in different societies. Moreover, a wink can mean different things in the same society. If someone on a date takes their companion's hand and gives a cute little wink, the person may have reason to hope the winker is *not* just joking around.



Figure 1. Would you take this (winking) woman seriously? Winking can take on special meaning within certain cultures (credit: Motion Picture News/Wikimedia Commons, Public Domain)

Characteristics of Culture

American cultural anthropologist Clifford Geertz (1973) used the example of winking to illustrate two important aspects of culture. First, culture is **learned**. Innate human behaviors—that is, behaviors that people are born with—are biological, not cultural. Blinking is biological. Acquired human behaviors—that is, behaviors that people are taught—are cultural. Winking is cultural. This means that cultural behaviors are not genetically inherited from generation to generation but must be passed down from older members of a society to younger members. This process is called **enculturation**.

Some aspects of enculturation are deliberate and systematic, such as learning the rules of written punctuation in a language. At some point in an English speaker's childhood, someone explicitly told them the difference between a question mark and an exclamation point. Most likely, they learned this distinction in school, a fundamental institution of enculturation in many societies. Religious institutions are another common force of enculturation, providing explicit instruction in cultural rules of morality and social interaction. Extracurricular activities such as sports, dance, and music lessons also teach children cultural rules and norms.

While a great deal of very important cultural content is deliberately conveyed in these systematic contexts, the greater part of culture is acquired unconsciously by happenstance—that is, nobody planned to teach it, and no one made an effort to consciously try to learn it. By virtue of growing up in a culture, children learn what certain actions and objects mean, how their society operates, and what the rules are for appropriate behavior.

Many forms of culture are passed down through a combination of deliberate and unconscious processes. Perhaps when you were a child, someone told you what a wink was and showed you how to accomplish one; or perhaps you just witnessed a few winks, figured out what they meant from their contexts, and then learned how to accomplish one through trial and error. Geertz pointed out that there are two important aspects to winking: the meaning and the action. As both are learned, both are cultural. But perhaps more importantly, and Geertz' second important aspect of culture, both the standardized action of winking and the assumed meaning of this action are commonly known among members of a group. That is, culture is **shared**.

To say that a group of people shares a culture does not mean all individuals think or act in identical ways. One's beliefs and practices can vary within a culture depending on age, gender, social status, and other characteristics. Further, an individual is **not bound** by culture; they can conform to it or not, and work to change the culture if they choose. Still, members of a culture share many things in common.

Much like art and language, culture is also **symbolic**. A symbol is something that stands for something else, often without a natural connection. Individuals create, interpret, and share the meanings of symbols within their group or the larger society. For example, in U.S. society everyone recognizes a red octagonal sign as signifying "stop." In other cases, groups within American society interpret the same symbol in different ways. Take the Confederate flag: Some people see it as a symbol of pride in a southern heritage. Many others see it as a symbol of the long legacy of African enslavement, segregation, and racial oppression. Thus, displaying the Confederate flag could have positive or, more often, negative connotations. Cultural symbols powerfully convey either shared or conflicting meanings across space and time. Culture being symbolic captures these beliefs, but belief within culture refers not just to what we "believe" to be right or wrong, true or false. It also refers to all the mental aspects of culture including values, norms, philosophies, worldview, knowledge, the categories we have and use, and so forth.

Anthropologists studying culture are interested in the whole of humanity, in how various aspects of life interact. One cannot fully appreciate what it means to be human by studying a single aspect of our complex histories and societies. Instead, culture is **all-encompassing**, and must be studied holistically. By using a holistic approach, anthropologists ask how different aspects of human life influence one another. For example, a cultural anthropologist studying gender roles in the southern United States would need to consider economic factors, family structures, laws regarding gender, religious trends, and media representations, among other things. These different aspects of culture influence one another, because they, and culture is **integrated**.

Culture constantly changes in response to both internal and external factors, it is **dynamic**. Some parts of culture change more quickly than others. For instance, in dominant American culture, technology changes rapidly while deep seated values such as individualism, freedom, and self-determination change very little over time. Yet, inevitably, when one part of culture changes, so do other parts. This is because nearly all parts of a culture are **integrated** and interrelated. As powerful as culture is, humans are **not necessarily bound** by culture; they have the capacity to conform to it or not and even transform it.

While culture is central to making us human, we are still biological beings with natural needs and urges that we share with other animals: hunger, thirst, sex, elimination, etc. Human culture uniquely channels these urges in particular ways and cultural practices can then impact our biology, growth, and development. Culture is **interrelated with biology**.

Humans are one of the most dynamic species on Earth. Our ability to change both culturally and biologically has enabled us to persist for millions of years and to thrive in diverse environments. In this way, we can say that culture is **evolutionary,** as it has shaped our evolution

Characteristics of Culture

Culture is a set of beliefs, practices, and symbols that are **learned** and **shared**. Together, they form an **all-encompassing, integrated** whole that binds groups of people together and shapes their worldview and lifeways.

Additionally: 1. Humans are born with the capacity to learn the culture of any social group. We **learn** culture both directly and indirectly. 2. Culture changes in response to both internal and external factors, it is **dynamic**. 3. Humans are **not bound** by culture; they have the capacity to conform to it or not, and sometimes change it. 4. Culture is **symbolic**; individuals create and share the meanings of symbols within their group or society. 5. The degree to which humans rely on culture distinguishes us from other animals and **shaped our evolution**. 6. **Human culture and biology are interrelated**: Our biology, growth, and development are impacted by culture

Cultures and "subcultures"

Individuals may belong to various cultures simultaneously. Traditionally, according to many social scientists, the "dominant culture" of a society is the one exemplified by the most powerful group in the society. Taking the United States as an example, Andersen, Taylor and Logio (2015: 36-37) suggest that while it is hard to isolate a dominant culture, there seems to be a "widely acknowledged 'American' culture," epitomized by "middle class values, habits, and economic resources, strongly influenced by . . . television, the fashion industry, and Anglo-European traditions," and readily thought of as "including diverse elements such as fast food, Christmas shopping, and professional sports." Philosopher and cultural theorist Kwame Appiah (1994: 116) is more pointed, emphasizing America's historically Christian beginnings, its Englishness in terms both of language and traditions, and the mark left on it by the dominant classes, including government, business, and cultural elites.

In contrast to the dominant culture of a society, are the various "subcultures," conceived as groups that are part of the dominant culture but that differ from it in important ways. Race and ethnicity can be important bases for the formation of such cultures. Other commonly mentioned bases include geographic region, occupation, social or economic class, and religion. While these cultures are

often smaller in terms of numbers or less dominant in the society, they are equally important subjects for anthropological study. Indeed, many anthropologists have stopped using the term ‘subculture’ because these cultures are in no way inferior to any other, or indeed to the dominant culture.

> Many anthropologists have stopped using the term ‘subculture’ because these cultures are in no way inferior to any other, or indeed to the dominant culture

There is also an alternative way of looking at group membership, grounded in the concept of identity rather than of culture, that aims to capture the diverse and dynamic ways that individuals experience belonging to various cultures, though it often critiques a more static view of culture than most anthropologists have today.

Globalization, Lifestyle, and Global Culture

Globalization is a word commonly used in public discourse, but it is often loosely defined in today’s society (much like the word “culture” itself). First appearing in the English language in the 1940s, the term “globalization” is now commonplace and is used to discuss the circulation of goods, the fast and furious exchange of ideas, and the movement of people (Steger 2013). Despite its common use, many people do not define and treat globalization the same way. Some consider it as simply an economic issue while others focus more on the social and political aspects. But the fact that globalization impacts so many aspects of contemporary life make it an ideal topic of study for anthropologists, who pride themselves on taking a holistic, all-encompassing approach to culture.



Figure 2. You know globalization has arrived when you see Matryoshkas with Putin, Bush, Bin Laden, Elvis and Mickey Mouse side by side. “Globalization” by liber is licensed under CC BY-SA 2.0.

Globalization most certainly changes the landscape of contemporary social life and has had a profound impact on contemporary cultures. Yet it would be a mistake to think of globalization as a state that emerges without human agency. In most cases, people make decisions regarding whether or not they want to adopt a new product or idea that has been made available to them via globalization. They also have the ability to determine the ways in which that product or idea will be used, including many far different from what was originally intended.

While some aspects of globalization are best studied at the societal level, others are best examined at smaller scales such as the trends visible within specific social classes or even individual choices. The concept of **lifestyle** refers to the creative, reflexive, and sometimes even ironic ways in which individuals perform various social identities. Within this framework, the rise of a consumerist economy enables individuals to exhibit their identities through the purchase and conspicuous use of various goods and services.

Globalization has increased the variety of goods available for individuals to purchase, media for them to consume, and ideas for them to espouse—as well as people's awareness of all of these—thus expanding the range of identities that can be performed. In some situations, identity is an individual project, with conspicuous consumption used to display one's sense of self. People have opportunities to choose between global styles of clothing, music, cuisine and more to express themselves and contrast themselves with others (this can raise issues of cultural appreciation vs. cultural appropriation though!).

Cultural Relativism (versus Ethnocentrism)

The guiding philosophy of modern anthropology is **cultural relativism**—the idea that we should seek to understand another person's beliefs and behaviors from the perspective of their culture rather than our own. Anthropologists do not judge other cultures based on their values nor do they view other ways of doing things as inferior. Instead, anthropologists seek to understand people's beliefs within the system they have for explaining things.

The opposite of cultural relativism is **ethnocentrism**, the tendency to view one's own culture as the most important and correct and as a measuring stick by which to evaluate all other cultures that are largely seen as inferior and morally suspect. As it turns out, many people are ethnocentric to some degree; ethnocentrism is a common human experience. Why do we respond the way we do? Why do we behave the way we do? Why do we believe what we believe? Most people find these kinds of questions difficult to answer. Often the answer is simply "because that is how it is done." People typically believe that their ways of thinking and acting are "normal"; but, at a more extreme level, some believe their ways are better than others.



Figure 3. Anthropologist Katie Nelson conducting ethnographic fieldwork among undocumented Mexican immigrant college students. Photo by Luke Berhow.

Ethnocentrism is not a useful perspective in contexts in which people from different cultural backgrounds come into close contact with one another, as is the case in many cities and communities throughout the world. People increasingly find that they must adopt culturally relativistic perspectives in governing communities and as a guide for their interactions with members of the community. For anthropologists, cultural relativism is especially important. We must set aside our innate ethnocentric views in order to allow cultural relativism to guide our inquiries and interactions such that we can learn from others.

Terms You Should Know

Culture

Enculturation

The Characteristics of Culture: Learned, Shared, Symbolic, All-encompassing, Integrated, Dynamic, Interrelated with Biology, Not bound, Evolutionary

Globalization

Lifestyle

Cultural Relativism

Ethnocentrism

Study Questions

1. What are the characteristics of culture? How do they fit together to describe how culture works?
2. How many cultures can you belong to? How do you demonstrate that belonging?
3. What is the relevance of cultural relativism outside of anthropology in contemporary life?

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1.3: Applied Anthropology, and Anthropology and Your Job

Learning Objectives

By the end of this chapter, you should be able to:

- Define applied anthropology and the anthropological perspective
- Provide examples of applied anthropology projects from medical anthropology, international development, and environmental anthropology, and explain how the anthropological perspective was useful in those projects

Applied Anthropology

Sometimes considered a fifth subdiscipline, **applied anthropology** involves the application of anthropological theories, methods, and findings to solve practical problems. Applied anthropologists are employed outside of academic settings, in both the public and private sectors, including nongovernmental organizations, business or consulting firms, advertising companies, city government, law enforcement, the medical field, education, and public health. Applied anthropologists span the subfields. An applied archaeologist might work in cultural resource management to assess a potentially significant archaeological site unearthed during a construction project. An applied cultural anthropologist could work at a technology company that seeks to understand the human-technology interface in order to design better tools and programs.

Why is Anthropology Important?

As we hope you have learned thus far, anthropology is an exciting and multifaceted field of study. Because of its breadth, students who study anthropology go on to work in a wide variety of careers. These include medicine and public health, museums, field archaeology, historical preservation, education, international business, filmmaking, management, foreign service, law, non-profit work, and many more. Beyond preparing students for a particular career, anthropology helps people develop essential skills that are transferable to many career choices and life paths. Studying anthropology fosters broad knowledge of other cultures, skills in observation and analysis, critical thinking, clear communication, and applied problem-solving. Anthropology encourages us to extend our perspectives beyond familiar social contexts to view things from the perspectives of others. As one former cultural anthropology student observed, “I believe an anthropology course has one basic goal: to eliminate **ethnocentrism**. A lot of issues we have today (racism, xenophobia, etc.) stem from the toxic idea that people are ‘other.’ We must put that idea aside and learn to value different cultures.” This **anthropological perspective** is an essential skill for nearly any career in today’s globalized world. Indeed, whatever you go on to do, we encourage you to cultivate an anthropological perspective as you do it!

Anthropology, Health, and Medicine

What does it mean to be “healthy”? It may seem odd to ask the question, but health is not a universal concept and each culture values different aspects of well-being. At the most basic level, health may be perceived as surviving each day with enough food and water, while other definitions of health may be based on being free of diseases or emotional troubles. Complicating things further is the fact that that each culture has a different causal explanation for disease. For instance, in ancient Greece health was considered to be the product of unbalanced humors or bodily fluids. The four humors included black bile, phlegm, yellow bile, and blood. The ancient Greeks believed that interactions among these humors explained differences not only in health, but in age, gender, and general disposition. Various things could influence the balance of the humors in a person’s body including substances believed to be present in the air, changes in diet, or even temperature and weather. An imbalance in the humors was believed to cause diseases, mood problems, and mental illness.

The World Health Organization (WHO) recognizes that the health of individuals and communities is affected by many factors: “where we live, the state of our environment, genetics, our income and education level, and our relationships with friends and family.” Research conducted by the WHO suggests that these characteristics play a more significant role in affecting our health than any others, including having access to health care. For this reason, anthropologists who are interested in issues related to health and illness must use a broad holistic perspective that considers the influence of both biology and culture. **Medical anthropology**, a distinct sub-specialty within the discipline of anthropology, investigates human health and health care systems in comparative perspective, considering a wide range of bio-cultural dynamics that affect the well-being of human populations. Medical anthropologists study the perceived causes of illness as well as the techniques and treatments developed in a society to address health concerns. Using cultural relativism and a comparative approach, medical anthropologists seek to understand how ideas about health, illness, and the body are products of particular social and cultural contexts.

For example, in some cultures, people believe illness is caused by an imbalance within the community. Therefore, a communal response, such as a healing ceremony, is necessary to restore both the health of the person and the group. This approach differs from the one used in mainstream U.S. healthcare, whereby people go to a doctor to find the biological cause of an illness and then take medicine to restore the individual body.

Trained as both a physician and medical anthropologist, Paul Farmer demonstrates the applied potential of anthropology. During his college years in North Carolina, Farmer's interest in the Haitian migrants working on nearby farms inspired him to visit Haiti. There, he was struck by the poor living conditions and lack of health care facilities for many Haitians. Later, as a physician, he would return to Haiti to treat individuals suffering from diseases like tuberculosis and cholera that were rarely seen in the United States. As an anthropologist, he would contextualize the experiences of his Haitian patients in relation to the historical, social, and political forces that impact Haiti, the poorest country in the Western Hemisphere (Farmer 2006). Today, he not only writes academic books about human suffering, he also takes action. Through the work of Partners in Health, a nonprofit organization that he co-founded, he has helped open health clinics in many resource-poor countries and trained local staff to administer care. In this way, he applies his medical and anthropological training to improve people's lives.

Paul Farmer

In 1983, a young anthropology graduate from Duke University named Paul Farmer set off for Haiti. He had done research on Haitian migrant workers at Duke and become deeply interested in their home country. He wanted to become a doctor and an anthropologist and thought he might sample a bit of both by going to Haiti and volunteering in health clinics. While there, he boarded a bus with a new friend, Ophelia Dahl. Ophelia, the daughter of movie star Patricia Neal and author Roald Dahl, was just 18 at the time, and looking for a calling in life. As they navigated the rough, unkempt roads of Haiti, Paul leaned out the window and waved happily to all who greeted them, which Ophelia found nerdy but beautifully innocent and charming. Then they came upon an overturned bus on the road. Mangos destined for the market were scattered everywhere as people meandered about making sense of what had just happened. A woman lay lifeless, with a strip of cardboard covering her body. Paul went stone silent. Ophelia tried to comfort him by saying, "It's just an accident."



Figure 1. Paul Farmer giving the MacLean Prize Lecture in 2017. Image by the MacLean Center is licensed under CC BY 3.0

But Farmer was "seeing big" like an anthropologist. He saw that the neglected road was no accident. The worn shocks of the bus were no accident. The overloading of the bus with peasants going to market with their mangoes was no accident. These were all a result of poverty, and Farmer could see through this poverty the past 400 years of history in Haiti. He saw the 17th century French African enslavement colony, the brutal and bloody fight for independence, the French demand that Haiti pay back $21 billion for their "lost property" (the enslaved who were now the citizens of Haiti being asked to pay for themselves), and the environmental collapse that came from trying to pay those debts. So when he saw the woman who was riding in a worn-out bus over a torn-up road to sell mangos in a Third World market, lying dead on the side of the road, he turned to Ophelia and responded, "It is never 'just an accident'." This peculiar view of the world, that there are no pure accidents, is also an empowering one. Paul Farmer and Ophelia Dahl would soon recruit the young anthropologist Jim Kim to their cause and set out to provide the best healthcare possible to the world's poor. Thirty years later, their efforts would be celebrated as "the friendship that changed the world." And it all started by applying the anthropological perspective of seeing your own seeing, seeing small, seeing big, and seeing it all to realize that there are no pure accidents. The message of this trio has been, "We can do better."

Farmer enrolled in a program at Harvard that allowed him to pursue a degree in anthropology while simultaneously earning his doctorate in medicine. He knew that if he was going to serve the world's poor, he would need the anthropological perspective to understand the broader cultural environment and issues impacting their health outcomes. Throughout his training, he continued to spend most of his time in Haiti. His professors were not against it, as he was providing important medical care to people who needed it, and it proved to be a fruitful place to apply what he was learning in graduate school. His work had a profound influence on anthropology. In one of his first essays, "The Anthropologist Within," he argued that the traditional manner of practicing anthropology as an impartial observer made him feel restricted in his ability to help solve the many problems surrounding him in Haiti. Since that article was written in the early 1980s, anthropologist have become much more active in their work, and are more likely to actively participate in providing solutions to local problems rather than standing idly by as impartial observers. But Farmer was struggling to make a big impact in Haiti. He needed money to complete his vision of building a free hospital providing outstanding medical care to the poor. His essay caught the eye of Tom White, the owner of a construction company in Boston who was interested in donating money to feed the poor in Haiti. In fact, he planned to give away every last dollar of his substantial fortune before he died. In Paul Farmer, he thought he had found someone who could make sure his money was well spent. With the first $1 million donated by White, Paul Farmer established Partners in Health/Zanmi Lasante. The plan was not to simply support Paul Farmer in Haiti, but instead to create "partners in health" by training community health workers throughout rural areas of Haiti.

Ethnomedicine

Ethnomedicine is the comparative study of cultural ideas about wellness, illness, and healing. For the majority of our existence, human beings have depended on the resources of the natural environment and on health and healing techniques closely associated with spiritual beliefs. Many such practices, including some herbal remedies and techniques like acupuncture, have been studied scientifically and found to be effective (Lewith 1998). Others have not necessarily been proven medically effective by external scientific evidence, but continue to be embraced by communities that perceive them to be useful. When considering cultural ideas about health, an important place to start is with ethno-etiology: cultural explanations about the underlying causes of health problems.

In the United States the dominant approach to thinking about health is **biomedical**. Illnesses are thought to be the result of specific, identifiable agents. This can include pathogens (viruses or bacteria), malfunction of the body's biochemical processes (conditions such as cancer), or physiological disorders (such as organ failure). In biomedicine as it is practiced in the United States (Western biomedicine), health is defined as the absence of disease or dysfunction, a perspective that notably excludes consideration of social or spiritual well-being. In non-Western contexts biomedical explanations are often viewed as unsatisfactory.

The biomedical approach to health strikes many people, particularly residents of the United States, as the best or at least the most "fact based" approach to medicine. This is largely because Western biomedicine is based on the application of insights from science, particularly biology and chemistry, to the diagnosis and treatment of medical conditions. The effectiveness of biomedical treatments is assessed through rigorous testing using the scientific method and indeed Western biomedicine has produced successful treatments for many dangerous and complex conditions: everything from antibiotics and cures for cancer to organ transplantation. However, it is important to remember that the biomedical approach is itself embedded in a distinct cultural tradition. Also, in matters of health, as in other aspects of life, ethnocentrism predisposes people to believe that their own culture's traditions are the most effective, while anthropology would encourage them to not blindly assume as much. Further, if you are looking to make a positive biomedical intervention in a community that does not rely upon biomedical explanations for health, you will need to understand what they think and where they are coming from in order to do so.

Mental Health

Unlike other kinds of illnesses, which present relatively consistent symptoms and clear biological evidence, mental health disorders are experienced and treated differently cross-culturally. While the discipline of psychiatry within Western biomedicine applies a disease-framework to explain mental illness, there is a consensus in medical anthropology that mental health conditions are much more complicated than the biological illness model suggests. These illnesses are not simply biological or chemical disorders, but complex responses to the environment, including the web of social and cultural relationships to which individuals are connected.

Medical anthropologists do not believe there are universal categories of mental illness. Instead, individuals may express psychological distress through a variety of physical and emotional symptoms. Arthur Kleinman, a medical anthropologist, has argued that every culture frames mental health concerns differently. The pattern of symptoms associated with mental health conditions vary greatly between cultures. In China, Kleinman (1988) discovered that patients suffering from depression did not

describe feelings of sadness, but instead complained of boredom, discomfort, feelings of inner pressure, and symptoms of pain, dizziness, and fatigue.

Mental health is closely connected with social and cultural expectations and mental illnesses can arise as a result of pressures and challenges individuals face in particular settings. Rates of depression are higher for refugees, immigrants, and others who have experienced dislocation and loss. A sense of powerlessness also seems to play a role in triggering anxiety and depression, a phenomenon that has been documented in groups ranging from stay-at-home mothers in England to Native Americans affected by poverty and social marginalization.

Anthropology and Development

What does it mean to see and hear what others do not see and hear and how can that unique information be practically applied? The lack of a simple answer is fitting to anthropology because the work of anthropologists often demonstrates that simplistic explanations are, at best, only part of the complex stories of human culture. In this section, we provide examples of how the ability to see and hear is applied in practice and how these skills add value in a sociocultural anthropology setting associated with **international development**.

Varying degrees of criticism of the nature, objectives, and embedded assumptions of international development continue. Some have called on international development practitioners to significantly reform their activities to make them more effective, while others have expressed more radical criticisms, including the view that provision of aid causes greater impoverishment and should end (Moyo 2009). It is essential when deconstructing development, as a concept and an activity, to ask why, when, how, and for whom the development is intended and who it excludes. It also requires identifying the power dynamics and motivations involved. Anthropological tools and ways of seeing are important means by which to answer these questions.

This key component of anthropological research involves long-term engagement, living with and learning from a cultural community different from one's own. In listening, learning about, and seeing the world from the perspectives of others, anthropologists draw on the idea of **cultural relativism**. This is in contrast to **ethnocentrism**, the belief that one's own culture, cultural values, and societal organization are true, right, and proper and that others' are erroneous to some degree. Cultural relativism posits that cultural practices and ideas must be understood within their contexts.

The ethical challenge for anthropologists working in international development is that often the donors, organizations and projects operate without detailed sociocultural information. As a result, many anthropologists end up advocating for significant shifts in how the sector operates. For example, in designing a project, the proposed activities are often outlined before the baseline assessments of community needs are conducted. When the project is approved, and budget is set, it is difficult to adjust the focus and plan based on new knowledge of community needs. Anthropologists working on these projects often find themselves in the challenging space of advocating for new approaches, such as funding structures based on needs, rather than donor priorities, and flexibility in programming as opposed to carrying out the set activities that are outlined in program plans.

In one particular cautionary tale described by the anthropologist Logan Cochrane, his work for a group looking to improve female nutrition began with spending time with the people in their communities and asking them about their food taboos—what they actually were and why they existed—and the community members provided detailed and insightful information. When he talked to the field staff, who were hoping to eradicate the taboos to increase protein in the diet, they reported that they had never asked the people in the communities those questions. That might sound like a case of neglect, but it is the logical outcome of one way of seeing. When a problematic practice (taboos against certain eggs and chickens) has been identified and the organization has experience with activities that have changed such behavior, why do the details matter? From that perspective, the tedious task of collecting such data would waste valuable resources, time, and effort. The systemic nature of seeing from technical perspectives of this sort, which are common in the organizational cultures of international development programs and their staff members, is not limited to international development workers—national and local organizations often present the same narratives about "bad" cultural taboos that can be eliminated by providing education about nutrition and empowering women. The food taboos were, in fact, a small part of a detailed belief system that influenced many components of everyday life.

A brief analogy demonstrates the gravity of this point. Imagine that the people in the project communities were followers of Judaism or Islam, religions that prohibit consumption of a number of foods, including pork. An international development organization and its external staff members might identify a protein deficiency that could be resolved by people consuming pork and view the taboo against it as a harmful traditional practice that should be eliminated through education about its nutritional value. Additionally, disadvantaged members of society could be encouraged to raise and sell pigs to generate income. Because Islam and Judaism are major recognized religions with millions of followers, it might seem absurd to try to convince them to eat

pork based on nutritional and economic grounds. But this instance of food taboos described by Cochrane was also part of a belief system and was as important to the communities in the project as Islam and Judaism are to their adherents. The project had failed to recognize that the food taboos were part of a comprehensive belief system and that the organization had made demands that directly contradicted culturally important beliefs and values. As a result, the project activities were viewed as an affront to their religious traditions and to the righteous, respected man from whom the laws had come and his living spirit.

The anthropological way of seeing allows broader issues to come into view—cultural, social, and political—which can then be incorporated into the project goals and activities. These are areas that relatively technical approaches and evaluations tend to miss. From the anthropologist's point of view, understanding why a practice occurs is not merely an act of inquiry; it is also a means of demonstrating respect for people and their knowledge and taking time to listen, learn, and see. Anthropologists' ability and willingness to see reality from perspectives other than their own are essential skills—the ability to see what some people do not see and hear what some people do not hear. Anthropology can connect the activities of international development efforts to cultural values so they work together instead of against each other. The identification of the comprehensive belief system in which the food taboos were embedded, for example, opened up new avenues for practical, culturally respectful solutions to the problem of poor nutrition for women and children.

Life on $2

Life on $2 per day is difficult to imagine. Some people immediately counter that life on $2 per day in a poor country is different than $2 per day in the United States, because you can buy so much more with $2 in a poor country. But this is to misunderstand the statistic. When the World Bank reports that over 700 million people are living on less than $2 per day, they are using an approach called "purchasing power parity" to adjust the numbers so that $2 per day in a poor country is exactly what you would imagine it to be like to live on $2 per day in the United States.



Figure 2. Three Consecutively Numbered Two-dollar Notes. Image by Anthony Inswasty is licensed under CC BY-SA 4.0.

Imagine what this would be like. You would not be able to afford rent, so you would be homeless. You would probably do your best to make yourself a little shack out of whatever scrap materials you could find. You would not have electricity, running water, or a toilet. You may find yourself walking several miles to find clean water and carrying it back to your small shack every day. You would spend some of your money on coal or wood to burn for heat and cooking. The bulk of your money would go toward food – mostly cheap staple foods like rice and potatoes. This is what life is like for about 1 billion people on the planet who live in the world's slums.

Over 700 million people do not have access to clean drinking water. Nearly a third of all humans do not have access to a toilet. As a result, nearly 80% of all illnesses in developing countries come from unclean water. As Dean Kamen has noted, we could clear half of the hospital beds in the world just by providing clean water to everybody on the planet.

The structure of power that binds us together in a world system makes us all complicit in these problems at some level. Each one of us might only be one person, but collectively we make the world what it is. The idea of structural power can make it feel like there is nothing to be done. We might just say, "if not me, then somebody else" and let the structure roll on. But there is also a hopeful message within the idea of structural power. It can be a constant reminder of four very important ideas:

1. We are the structure.
2. It is what we make of it.
3. Participation is not a choice. Even the choice to not participate is a form of participation.
4. How we participate is our most important choice.

As we face up to this very important challenge to decide how we will participate in the structure, and what sort of structure we will help to create, it can be useful to examine the damage – the structural violence – that our current structure is doing to the world and the disadvantaged.

Anthropology and the Environment

Environmental anthropologists have argued that anthropology provides a good place to start to understand and begin to address some of the most important questions facing our species. For example, how can we provide for basic human needs while not sacrificing the welfare of other species? Why do many people say that they care about protecting the environment but then do nothing about it? What political, economic, and cultural factors are prohibiting world leaders from agreeing on solutions to global environmental challenges? To answer such questions, we must understand how humans think and act as groups, our socially and culturally mediated ways of interacting with each other, other species, and the world around us.

In many ways, anthropology as a discipline is only now starting to address these questions. In December 2014, Bruno Latour, a French anthropologist, spoke to a standing-room-only audience at the American Anthropological Association annual meeting in Washington, D.C., to discuss the relationship between the **Anthropocene** and anthropology. Anthropocene is a term used to describe the period (or epoch) in geological time in which the effects of human activities have altered the fundamental geochemical cycles of the earth as a result of converting forests into fields and pastures and burning oil, gas, and coal on a large scale. Because human activities have changed the earth's atmosphere, anthropologists can make important contributions to studies of geology, chemistry, and meteorology by considering the effects of humans and their cultural systems. As Latour noted, the discipline of anthropology is uniquely qualified to provide insight into key components of current environmental crises by determining the reasons behind choices various groups of humans make, bridging the social and natural sciences, and studying contradictions between cultural universals (traits all humans have in common) and particularities (interesting cultural differences).

Anthropologists have become involved in environmental causes around the world. In Brazil, for example, they have worked with Indigenous groups to maintain land claims, prevent deforestation, and organize against construction of large hydropower projects that threaten the river ecosystems (Athayde 2014). Others have challenged development of parks throughout the world as a major conservation strategy for biodiversity and explored the impacts of those parks on local communities (West et al. 2006). Studies of these diverse topics benefit from incorporation of an anthropological perspective that emphasizes the importance of identity politics, connection to place, and cultural beliefs for understanding how groups of people interact with their environment. This work also reminds us that environmentalism and conservation are grounded in sets of beliefs, assumptions, and world views developed in Western Europe and North America and must be translated as environmentalists work in other cultures.

Environmental anthropology naturally lends itself to use of anthropological perspectives to inform and engage in public policy decisions, land-use management, and advocacy for Indigenous communities, urban minorities, and other groups that are often under-represented in places of power and in traditional environmental movements. In that sense, environmental anthropology is a way to inform and connect with a variety of other disciplines that address similar questions of sustainability. Regardless of whether you decide to study anthropology, understanding the value of anthropological insights for environmental questions will allow you to better appreciate and understand the complexity of environmental questions in modern society and potential solutions.

What The People of the Amazon Know That You Don't

This TED talk by ethnobotanist Mark Plotkin describes some important cases of knowledge of medicinal plants learned from indigenous people in the Amazon.



Analyses of the environment may seem overly theoretical and abstract, far removed from actual practices and the work of learning to live with and within our environment. Anthropologists may be seen as hidden in ivory towers of academia, disconnected from real world issues and problems. However, applied and activist anthropology offer avenues for anthropologists to tackle problems on the ground and make a direct difference. Applied anthropologists often work with conservation and development organizations to implement projects that depend on an accurate understanding of local cultures and practices to succeed

.Anthropologist Gerald Murray's doctoral dissertation examined land tenure among small-holders in Haiti. After finishing his dissertation work, Murray delivered a presentation to USAID on a Haitian reforestation project. He joked that if they gave him "a jeep and carte blanche access to a $50,000 checking account" he could prove his "anthropological assertions about peasant economic behavior and produce more trees on the ground than their multi-million-dollar Ministry of Agriculture charade." USAID program officers accepted his challenge, inviting him to head a $4 million project to reforest Haiti. Using his understanding of Haitian small-holders, he drastically changed the USAID's approach. Instead of trying to convince small-holders that trees were valuable for their environmental services, he emphasized fast-growing species that could be sold for firewood, charcoal, and lumber. By giving the trees to the small-holders and allowing them to harvest and sell them whenever they wanted, he motivated them to plant and care for the seedlings like any other valuable cash crop. In prior projects, tree-cutting was prohibited and the trees belonged to the government. Consequently, no one took care of the trees and they were eventually destroyed by livestock or neglect and rarely reached maturity. Treating the trees as a cash crop motivated farmers to plant trees on their own land, thus meeting USAID's goals of stabilizing the soil and reducing illegal tree cutting (since farmers had access to stands of their own) and providing a direct economic benefit from selling wood. The project was a stunning success—20 million trees were planted in the first four years. By understanding local farmers' perspectives, Murray was able to work with Haitian small-holders instead of seeing them as an impediment to reforestation efforts.

A number of anthropologists are working with conservation and development organizations to assist them in understanding local cultures and implementing conservation and develop projects. This work is often done in teams in which anthropologists join with foresters, conservation biologists, agronomists, and others to implement projects. Because they often speak the local language, understand the peoples' perspectives, and are interested in close, on-the-ground observations, anthropologists make valuable contributions in support of conservation and economic development.

Anthropology in Your Life

Most of us will not lead a movement like Martin Luther King. We will not lead a revolution like Gandhi, or end apartheid like Nelson Mandela. But we will all have to face millions of decisions, some mundane and others momentous, and each time we will do so out of fear or love.

To find out how these decisions play out in everyday life, and how the lessons from his version of Intro to Anthropology might help in those decisions, the anthropologist Mike Wesch from Kansas State University reached out to alumni of his class and asked them to share their own heroic journeys through life. He received letters back from all over the world. Former students from his Intro class were now engaged in every kind of career you could imagine, applying the mindset, methods, and goals of anthropology to a wide range of problems. One had been paid by Virgin Records to travel across the United States in an RV studying how young people listen to music. Another was working with Facebook on what to do with social media profiles after people die. Many were living abroad in places like Dubai, Cambodia, South Africa, Iraq, Afghanistan, and Vietnam. Some were working on global health care while others held military leadership positions in combat zones. Others had settled into jobs in the United States in a wide range of careers including game design, clinical psychology, advertising, and business. All of them had stories to tell about how the "art of seeing" or how communication, empathy, and thoughtfulness had been essential to their careers. But Wesch was especially struck by how many of them had found these anthropological ideas so essential in helping them in their everyday lives. Indeed, it was their letters that inspired him to write his own textbook, sections of which are adapted here.

We hope that you approach this class with an open mind to the various ways that an anthropological perspective might be useful in your own lives as you move forward from this class, and that it proves as helpful to you.

Key Terms

Applied Anthropology

Cultural Relativism

Ethnocentrism

Anthropological Perspective

Medical Anthropology

Ethnomedicine

Biomedical

International Development

Anthropocene

Environmental Anthropology

Study Questions

1. What defines applied anthropology and what are some examples of applied anthropology projects?
2. What is the anthropological perspective? How does it come into use in medical anthropology, international development, and environmental anthropology?

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CHAPTER OVERVIEW

2: Biological Anthropology

2.1: Evolution and Human Adaptation
2.2: Primates
2.3: Early Hominins and Homo
2.4: Modern Human Origins and Agriculture

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2.1: Evolution and Human Adaptation

Learning Objectives

By the end of this chapter, you should be able to:

- Discuss differing perspectives about how the human species descended from a primate ancestor.
- Explain the process of natural selection.
- Examine and correct several misconceptions about human evolution.
- Discuss Darwin's theory and contributions to our understanding of evolution.
- Explain and identify the purpose of both DNA replication and protein synthesis.
- Describe how specific patterns of human adaptations and adjustments are correlated to natural selection processes.

The Science of Who We Are

If you were to do an internet search for the word "science," you would come up with a variety of definitions that all center around a few main ideas: science is knowledge or a system of knowledge that reflects *truth* about the natural world. Because this *truth* is obtained and tested through the scientific method, science is described as unbiased. Observations based on the scientific method are assumed to be objective and *real*. At the same time, scientists themselves are also thought of as unbiased, objective, and in search of *truth* and *real* observations about the natural world.

The scientific method is based on a series of steps that include observing a pattern or occurrence, formulating a hypothesis about that pattern or occurrence, and collecting data to test the validity of that hypothesis. Each step is expected to be unbiased, so that data-driven conclusions based on tested hypotheses can be safely interpreted as valid, or *real*.



Figure 1. The steps of the scientific method.

But what if the scientists who are observing the natural world, looking for patterns or occurrences, and then formulating hypotheses to test are themselves biased? Anthropology teaches us that culture, beliefs, and worldviews are learned by humans as we grow up; who we are and what we believe are the products of *enculturation*, or living, observing, and learning in groups. Each one of us – and how we look at the world – is the synthesis of where, when, how, and with whom we grew up. Ultimately, this means that we are all biased by our backgrounds. Scientists who are attempting to identify and explain patterns in the natural world must be extremely vigilant about identifying and examining their own biases, or the validity of their hypotheses, data, and conclusions might be at risk.

Read this comic by The Oatmeal about core beliefs, and then think about your own core beliefs. How do your core beliefs influence how you see the world? How do they influence how you ask questions about the world?

When scientists don't recognize their own core beliefs and biases – and how they might influence their scientific inquiry and interpretations – the results and conclusions of scientific studies can be biased in pretty significant ways. In some cases, scientific studies are not only based on biased views of the world, they are used to validate biases because they confirm what is expected based on the core beliefs of the scientist. This is why it is critical for scientists to examine their own core beliefs and biases as they design studies and interpret data – especially if the scientific inquiry is about humans. Early scholars of human biology and evolution were deeply plagued by their own core beliefs and biases, usually related to the barriers created by religious beliefs and/or racist conceptions of the world. It is useful to explore how the scientific exploration of humans and our closest relatives has changed over time, and how these biases have shaped our understanding of our own humanity in different ways.

Early Evolutionary Scholars

Some of the earliest evolutionary scholars were Muslim scholars who are often not included in the western scientific canon because their works were not published in English. It is often speculated, however, that later scholars had access to these works and may have borrowed heavily from them. Al-Jahiz was born in 776 in what is now Iraq, and was the first scholar to propose a theory of evolutionary biology in his *Book of Animals* (Figure 2). This book also described a process by which evolution might occur that is very similar to what Charles Darwin would later describe as "natural selection."

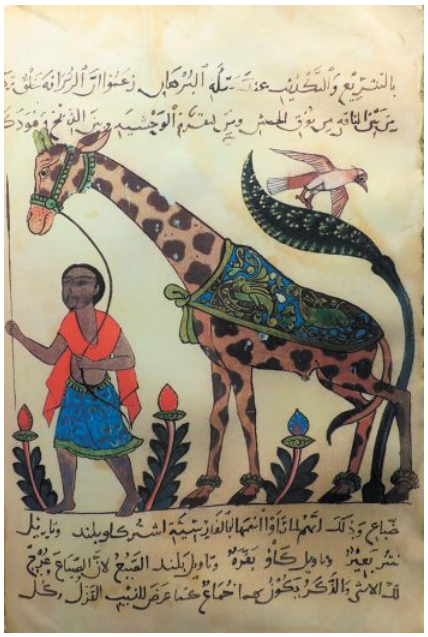


Figure 2. A giraffe from the ninth-century naturalist al-Jahiz's *Book of Animals*

Nasir ad-Din Tusi was a 13th century Persian Muslim scholar who wrote the book *Akhlaq Nasiri* (*Nasirean Ethics*). While this work is best known for its philosophy, math, and theology themes, Tusi also touches on evolutionary ideas around the origins of humans and the evolution and variation of species more than 600 years before Darwin did. Ibn Khaldun was born in 1332 in what is now known as Tunisia, and is broadly recognized for his efforts in social sciences, sociology, and history. In 1377, he wrote *Al-Muqaddimah (Prolegomena*), and specifically hypothesized that all species evolve, and that humans evolved from an ape or monkey ancestor. These Muslim scholars, like Christian scholars both before and after the Enlightenment, struggled with religious doctrines regarding evolution and the origins of humans and how their scientific observations did nor did not reflect these beliefs.

In the 17th and 18th centuries, European Enlightenment scientists focused on exploration and the pursuit of knowledge through reasoning and science, and were beginning to look at the world around them more systematically. Despite a general reluctance to consider humans as belonging to the same category as animals, around 1700 the English anatomist Edward Tyson published the first known anatomical study of the animal we now call a chimpanzee. HIs work demonstrated that it was physically more similar to us than to any other creature known. He even counted up its similarities: the chimpanzee resembled humans in 48 ways, but monkeys in only 34 ways (see Figure 3).



Figure 3. Tyson's "orang-outang"

Systema *Naturae* was a series of books by Swedish naturalist Carl Linneaus that attempted to illustrate and organize all the known species in the natural world. The tenth edition of *Systema Naturae* , published in 1758, is considered to be the first use of modern **taxonomy** – or how we organize and name groups of species based on how they look and how they are related to each other. We call this organization the **hierarchical classification scheme**, and it includes taxonomic groups like Kingdoms, Orders, and Species. Where animal species had traditionally been linearly conceptualized in terms of how similar to humans they are—forming a "Great Chain of Being"—Linnaeus identified a distinctly different pattern. In so doing, Linnaeus found that warm-blooded, hairy, lactating vertebrates formed a natural group that he named "Mammalia" in 1758 (in contrast to, say, fish or birds). Within that group was a cluster of species he called "Primates," and among them, according to our physical features, was our own species, which he named *Homo sapiens*. These physical correspondences among diverse kinds of creatures later came to be known as **homology**. But why did such a pattern of nested similarities exist, and what did it mean? Linneaus grew up in Sweden in the 18th century, which meant that his world view was deeply shaped by the idea that European populations and cultures were the most advanced in the world. This core belief influenced his scientific inquiry. Linnaeus was the first naturalist to include humans as part of the animal kingdom, but his core beliefs influenced hundreds of years of scientific thought about how humans and human variation fit into the natural world.

A question that scientists also grappled with was that of **adaptation** and biogeography, and what fossil discoveries meant. Why were different species located in different environments? What influenced where you might find some species, and not others? These were some of the questions that dominated the field of natural history by the beginning of the 1800s. But of course the big questions of the day weren't even about why some animals were extinct and others were only found in certain places at all but, rather, about the biopolitics of slavery. Were all people of one stock, the descendants of Christianity's Adam and Eve? That would seem to afford a moral argument against treating some people as property, if we are all share the same ancestors. This position, however, required the development of a biological theory to explain how Adam and Eve's descendants could have morphed into the diverse peoples of the world. In other words, if you imagined Adam and Eve to be White, then how did Black people arise? (Or vice versa.) This position, that all humans are descended from one origin, was known as **monogenism**, was biblical, socially progressive, and generated the earliest modern evolutionary theories—intended to explain the naturalistic production of variation in populations, or what we would now call evolution.

Others believed that Africans and Europeans shared no common ancestry at all, being the products of separate creations. Perhaps in Adam and Eve, the Bible was merely recounting one story of creation, but the peoples of the rest of the world were fundamentally and unalterably different and had always been so. This position, known as **polygenism,** was attractive to those looking to rationalize slavery as well as to radical intellectuals who did not feel constrained by biblical literalism.

Darwin's Mechanism of Evolution

The publication of *The Origin of Species* by Charles Darwin in 1859 became an intellectual flash point in European intellectual life. It was focused on a significantly narrow point: Where do new species, adapted to their surroundings, come from? Charles Darwin had come to think about the origin of species upon returning from a long voyage around the world in the early 1830s on the *H.M.S. Beagle*. In South America, Darwin had observed that the unusual species he saw alive there were very similar to the unusual extinct animals in the same area. This suggested some sort of historical continuity between them—**descent with modification**, he called it. The problem was how to make sense historically of the particular adaptations that differentiate species. The engine of adaptation, Darwin realized, was competition. This did not necessarily entail face-to-face competition but simply the fact that not all members of a species are equally likely to survive and breed. Which ones are more likely? The ones that randomly are a bit more in sync with their environment. Those creatures will disproportionately thrive and breed, and the next generation of the species will come to look just a bit more like them, on the average. The core of Darwin's thought is thus a two-step process: the random generation of variation, and the nonrandom process by which the environment subtly favors organisms with certain features to thrive and breed.

Darwin called this principle **natural selection** and planned to write a long book about it someday. But in 1858 he received a manuscript from a fellow naturalist, Alfred Russel Wallace, who had come up with quite similar ideas to his own while working in the Malay archipelago. Darwin's friend, the geologist Charles Lyell, had papers by Darwin and Wallace read into the record, *The Transactions of the Linnaean Society*, July 1, 1858, so they could share credit for the discovery, and Darwin set about to publish the work he had done on natural selection. The result was called *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, published on November 24, 1859.

Darwin's central thesis was that the differences among breeds or strains or varieties of animals and plants were the same kinds of differences that exist between species, only smaller and formed over shorter periods of time. The origin of new species lay in the long-term biases of survival and reproduction in older species. The result was a convincing naturalistic explanation for **adaptation**.

Moreover, it finally explained the nested pattern of similarities among species that Linnaeus had discovered a century earlier but couldn't explain. Those nested patterns were the legacy of common ancestries; they were literally family resemblances.

Darwin was especially careful to omit any discussion of people from his book. He wanted the discussion to be about the general process; consequently he wrote just a single line, near the end, about people: "Light will be thrown on the origin of man and his history" (Darwin 1859, 488). He was willing to acknowledge the possibility that life had "been originally breathed into a few forms or into one," but he was satisfied with having described the mechanism by which adaptive change has taken place in the organic world since then—in parallel with Isaac Newton, who famously refused to speculate on where gravity came from, focusing instead only on how it works.

Within the academy, there was not too much reaction against the proposition that humans had descended with modification from an ape stock, and had then differentiated from that stock over the eons as a result of the differential preservation of favorable variations. The heart of Darwinism as applied to humans is simply ape ancestry and adaptive divergence.

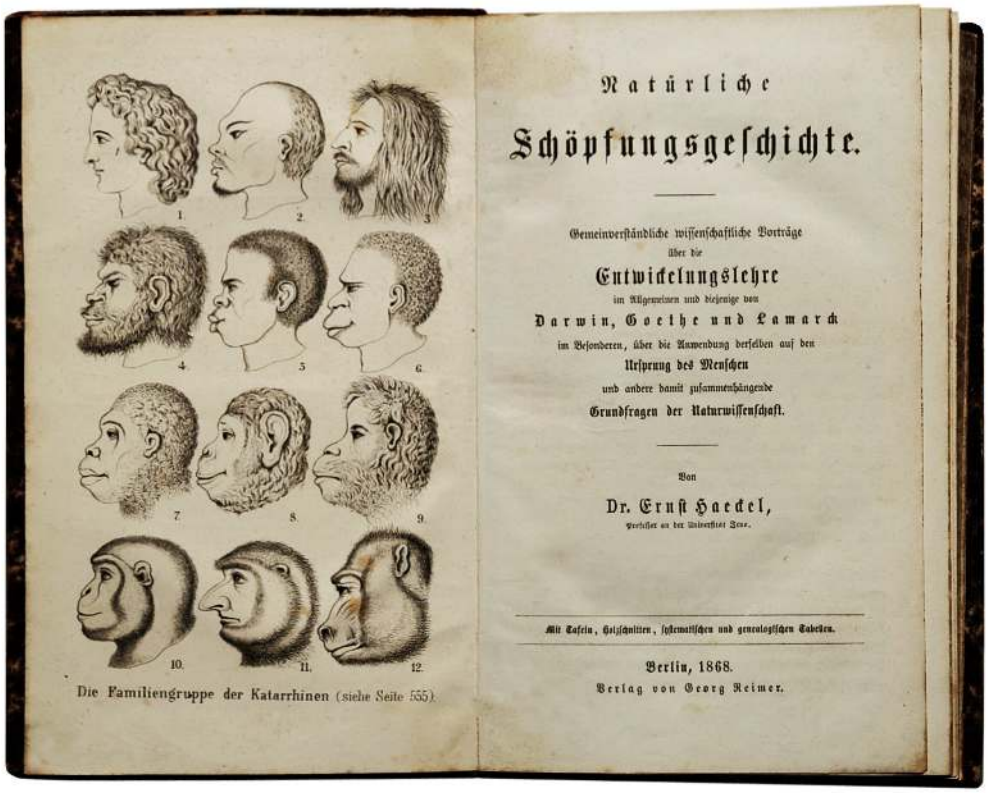


Figure 4. The frontispiece to Ernst Haeckel's (1868) popular German book on Darwinism. The English translation lacked this illustration.

But the early Darwinians were faced with a dilemma—in 1860, there was no fossil evidence linking humans to apes. The German biologist Ernst Haeckel solved this problem by fatefully arguing that we don't need a fossil record to link us to the apes, because Europeans are linked to the apes through the non-White peoples of the world. He envisioned 12 different species of living peoples, each at different distances from the apes, thus sacrificing the full humanity of most people on the altar of Darwinism (see Figure 4). Scientists of the 1860s thought the full humanity of Africans was less important than evolution. Today that position is morally repugnant. While Darwin and his English colleagues did not agree with these details, they nevertheless saw Haeckel as an ally in the broader struggle to get evolution accepted. With hindsight, we can judge this to be a morally questionable decision: Today we would hopefully universally consider the full humanity of Africans to be more important than whether humans are descended from apes, and thoroughly repudiate anyone who denied it.

Post-Darwinian Theories and Disputes

The immediate theoretical weakness of Darwinism lay in its reliance upon a pool of undirected variation for nature to select from. Darwin fell back on a principle developed by Lamarck known as the "**inheritance of acquired characteristics**" or "use and disuse of organs." Here, whatever attributes you develop over the course of your life—muscles, a tan, compassion, bad breath—can be

stably passed on to your children, somehow. That way, variation can be reintroduced every generation, by virtue of this new pool of acquired features.

The entire problem was rendered moot with the discovery in 1900 of Gregor Mendel's work on heredity in peas from 35 years earlier. Mendel showed that heredity didn't actually work like the blending of paints. When you isolated particular traits, you saw that offspring were not midway between their parents; rather, they were like one or the other parent. The offspring of a plant with green peas and one with yellow peas was green, not chartreuse. The offspring of a plant with wrinkled peas and one with round peas was round, not wrinkly-round. This suggested, rather, that heredity worked like interacting particles that came into new combinations but fundamentally retained their structural integrity every generation. Unlike paints, you could indeed recover the original variants under this model; variation wasn't lost every generation.

Mendelian genetics soon created new problems for Darwinism, however. The new geneticists were focused on discrete binary states of existence, like Mendel's peas: green/yellow, wrinkled/round, tall/short, in experimental populations. But the old Darwinian naturalists were working with quantitative variations in real populations—many of them intermediate, not extreme, in form. So, the Mendelians had a robust theory of heredity that had difficulty explaining natural patterns of variation, and the Darwinians had a robust theory of biological change that had difficulty accommodating discontinuous variation. One solution might be to reconceptualize all variation as fundamentally binary; the American geneticist Charles Davenport, for example, argued with considerable success that there were two kinds of people—smart and stupid—and that the stupid people simply had the **allele** for "feeblemindedness." This actually had a major and regrettable impact on American science and social policy in the 1920s.

A better solution came with the invention of population genetics, in works published around 1930 by the British geneticists Ronald Fisher and J. B. S. Haldane and the American geneticist Sewall Wright. In this model, a **gene** has small but cumulative effects. If we reduce a body to its genetic composition or **genotype**, and we reduce a species to its cumulative genetic composition, or **gene pool**, we can mathematically model the ways in which the gene pool can be transformed. There are rather few ways to accomplish it, and each has characteristic and predictable effects.

This became the first part of the **Synthetic Theory of Evolution**, the extension of Mendelian genetics to population genetics and the formal mathematical study of how gene pools may be transformed through time. The second part involved the study of how species diversify in addition to simply changing, and it entailed integrating speciation and geography in the story of how animal species have come to be.

By the 1960s, then, biologists had a robust theory to explain the history of life. Genetic or genotypic changes (known to be encoded in molecules of DNA) cause changes in the physical appearance or **phenotype**. The environment sorts out these changes, and their proportion within a species rises or falls with the nature and stringency of the environment. Selection could now be reduced to the favoring of certain genotypes over alternatives, which can make populations genetically adaptively different from one another. **Genetic drift**, or stochastic (random) changes to the gene pool, makes populations genetically different from one another non-adaptively—that is to say, in ways that don't track the environment. The genetic contact of populations, or **gene flow**, makes populations more similar to one another. Disrupting gene flow acts to divide gene pools, which is in turn stabilized by the development of reproductive barriers between the populations. These processes can be directly studied within living species and can be extrapolated and can adequately explain the differences we find among species.

Further work in population genetics revealed that most of a species' genome's DNA falls between genes and does not actually code for anything. Consequently, **mutations** that occur to most of the DNA do not have discernible effects on the body and are thus non-adaptive. Only a small bit of the DNA, it seems, actually builds the organism and encodes its adaptations; and even today, the processes by which it does so are vaguely understood.

Cell and Molecules

Molecules of Life

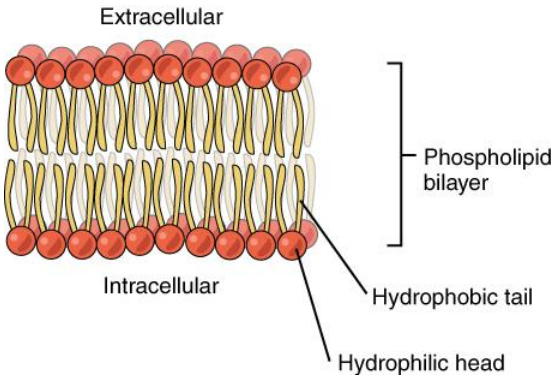


Figure 5. Phospholipid molecules forming a bilayer with their hydrophobic tails and hydrophilic heads.

Organisms are composed of four basic types of molecules that are essential for cell structure and function: proteins**,** lipids**,** carbohydrates, and nucleic acids**. Proteins** are strings of amino acids that are often folded into complex 3-D shapes. The structure of **lipids** can be described as having a hydrophilic (water-loving) head and a hydrophobic (water-repelling) tail (Figure 5). When lipids are chained together, they form more-complex molecules called fats and triglycerides. **Carbohydrates** are composed of carbon and hydrogen atoms that can be broken down to supply energy for an organism. Lastly, **nucleic acids** carry genetic information about a living organism.

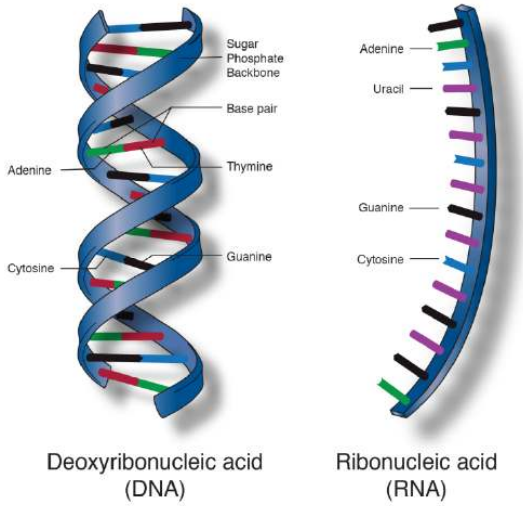


Figure 6. Structural components that form double-stranded nucleic acid (DNA) or single-stranded nucleic acid (RNA).

Probably the most familiar nucleic acid is **deoxyribonucleic acid (DNA)**. DNA comprises a sugar phosphate backbone and nucleotides (Figure 6). Anthropologists can analyze sequences of DNA nucleotides and determine how different organisms are related to each other, since they all have their own unique DNA genetic code. In the case of humans, forensic scientists can identify individuals by analyzing 20 different short **DNA sequences** known as “CODIS Core Loci.” Another nucleic acid is called **ribonucleic acid (RNA)**. One type of RNA molecule is responsible for chaining amino acids together in order to build proteins.

DNA Structure



Figure 7. Chemist and X-ray crystallographer Rosalind Franklin.

The 1953 discovery of the molecular structure of DNA was one of the greatest scientific achievements of all time. Using X-ray crystallography, Rosalind Franklin (Figure 7) provided the image that clearly showed the double helix shape of DNA. However, due to a great deal of controversy, Franklin's colleague and outside associates received greater publicity for the discovery. In 1962, James Watson, Francis Crick, and Maurice Wilkins received a Nobel Prize for developing a biochemical model of DNA. Unfortunately, Rosalind Franklin had passed away in 1958 from ovarian cancer. In current times, Franklin's important contribution and her reputation as a skilled scientist are widely acknowledged.

The double helix shape of DNA can be described as a twisted ladder (refer back to Figure 6). More specifically, DNA is a double-stranded molecule with its two strands oriented in opposite directions (i.e., antiparallel). Each strand is composed of nucleotides with a sugar phosphate backbone. There are four different types of DNA nucleotides: adenine (A), thymine (T), cytosine (C), and guanine (G). The two DNA strands are held together by nucleotide **base pairs**, which have chemical bonding rules. The complementary base-pairing rules are as follows: A and T bond with each other, while C and G form a bond. The chemical bonds between A—T and C—G are formed by "weak" hydrogen atom interactions, which means the two strands can be easily separated. A DNA sequence is the order of nucleotide bases (A, T, G, C) along only one DNA strand. If one DNA strand has the sequence CATGCT, then the other strand will have a complementary sequence GTACGA. This is an example of a short **DNA sequence**. In reality, there are approximately three billion DNA base pairs in human cells

DNA Is Highly Organized Within the Nucleus

If you removed the DNA from a single human cell and stretched it out completely, it would measure approximately two meters (about 6.5 feet). Therefore, DNA molecules must be compactly organized in the nucleus. To achieve this, the double helix configuration of DNA undergoes coiling. An analogy would be twisting a string until coils are formed and then continuing to twist so that secondary coils are formed, and so on. To assist with coiling, DNA is first wrapped around proteins called histones. This creates a complex called chromatin, which resembles "beads on a string" (Figure 8). Next, chromatin is further coiled into a **chromosome**. Another important feature of DNA is that chromosomes can be altered from tightly coiled (chromatin) to loosely coiled (euchromatin). Most of the time, chromosomes in the nucleus remain in a euchromatin state so that DNA sequences are accessible for regulatory processes to occur.

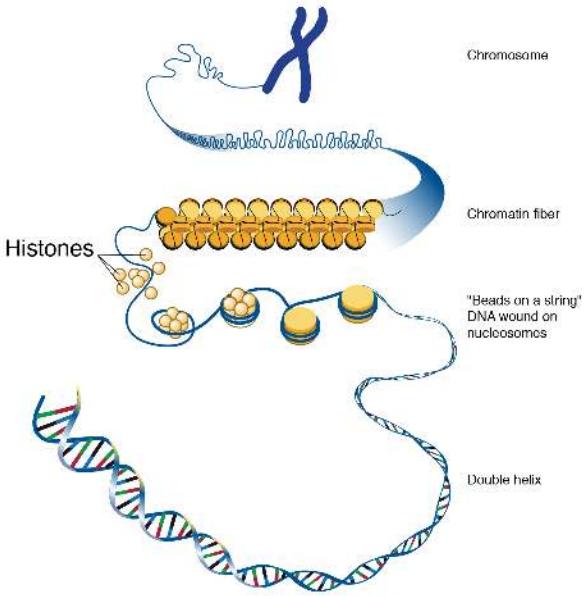


Figure 8. The hierarchical organization of chromosomes.

Human body cells typically have 23 pairs of chromosomes, for a total of 46 chromosomes in each cell's nucleus (Figure 9). An interesting fact is that the number of chromosomes an organism possesses varies, and this figure is not dependent upon the size or complexity of the organism. For instance, chimpanzees have a total of 48 chromosomes, while hermit crabs have 254. Chromosomes also have a distinct physical structure, including centromeres (the "centers") and telomeres (the ends) (Figure 10). Because of centromeres, chromosomes are described as having two different "arms," where one arm is long and the other is shorter. Centromeres play an important role during cell division, which will be discussed in the next section. Telomeres are located at the ends of chromosomes and they help protect the chromosomes from degradation after every round of cell division. However, our telomeres become shorter as we age, and if chromosome telomeres become too short, then the cell will stop dividing. Therefore, the link between the regulation of telomere length and cellular aging is of great interest to researchers.

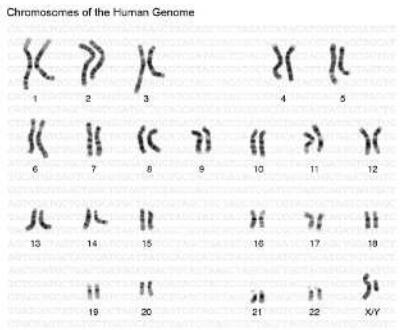


Figure 9. The 23 human chromosome pairs.

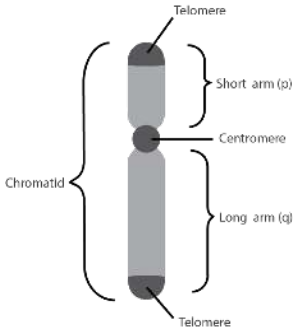


Figure 10. The regions of a chromosome.

For life to continue and flourish, cells must be able to divide. Tissue growth and cellular damage repair are also necessary to maintain an organism throughout its life. All these rely on the dynamic processes of **DNA replication** and the **cell cycle**. The mechanisms highlighted in this section are tightly regulated and represent only part of the life cycle of a cell.

DNA Replication

DNA replication is the process by which new DNA is copied from an original DNA template. It is one phase of the highly coordinated cell cycle and requires a variety of **enzymes** with special functions. Specifically, enzymes carry out the structural and high-energy reactions associated with replicating a double helical molecule. The creation of a complementary DNA strand from a template strand is described as semi-conservative replication. The result of semi-conservative replication is two separate double-stranded DNA molecules, each of which is composed of an original "parent" template strand and a newly synthesized "daughter" DNA strand.

DNA replication progresses in three steps: initiation, elongation, and termination. Initiation denotes the start of DNA replication by recruiting enzymes to specific sites along the DNA sequence. For example, the double helix of DNA presents structural challenges for replication, so an initiator enzyme, called **helicase**, "unwinds" DNA by breaking the hydrogen bonds between the two parent strands. The unraveling of the helix into two separated strands creates a fork, which is the active site of replication machinery (Figure 3.17). Once both strands are separated, the parent template strands are exposed, meaning they can be read and replicated.

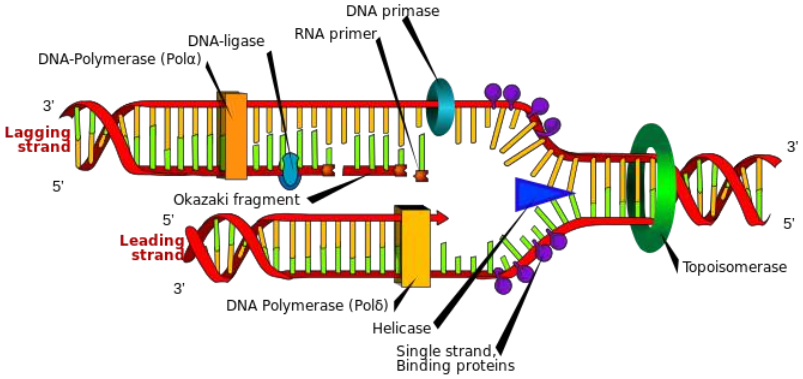


Figure 11. The different enzymes associated with DNA replication.

Elongation describes the assembly of new DNA daughter strands from parent strands. The two parent strands can further be classified as leading strand or lagging strand and are distinguished by the continuous or discontinuous direction of replication, respectively. A short fragment of RNA nucleotides acts as a primer, which binds to the parent DNA strand that will be copied. The leading strand receives one primer and the lagging strand receives several. Elongation proceeds with help from enzymes called **DNA polymerases**, which read parent template strands in a specific direction. Complementary nucleotides are added, and the newly formed daughter strand will grow. The direction in which replication proceeds depends on whether it is the leading or lagging strand. On the leading parent strand, a DNA polymerase will create one continuous strand. Because the lagging parent strand requires several primers, disjointed strands (called Okazaki fragments) will be generated. Other enzymes will fill in the missing nucleotide gaps between the disconnected lagging strand Okazaki fragments.

Finally, termination refers to the end of DNA replication activity. It is signaled by a stop sequence in the DNA, which is recognized by machinery at the replication fork. The end result of DNA replication is that the number of chromosomes are doubled so that the cell can divide into two.

DNA Mutations

DNA replication should result in the creation of two molecules with identical DNA nucleotide sequences. Although DNA polymerases are quite precise during DNA replication, copying mistakes are estimated to occur every 10^7 DNA nucleotides. Variation from the original DNA sequence is known as a **mutation**. Briefly, mutations can result in single nucleotide changes as well as the insertion or deletion of nucleotides and repeated sequences. Depending on where they occur, some mutations can be deleterious (harmful). For example, mutations may occur in regions that control cell cycle regulation, which can result in cancer. Many other mutations, however, are not harmful to an organism.

Regardless of their effect, the cell attempts to reduce the frequency of mutations that occur during DNA replication. To accomplish this, there are polymerases with proofreading capacities that can identify and correct mismatched nucleotides. These safeguards reduce the frequency of DNA mutations so that they only occur every 10^9 nucleotides.

Protein Synthesis

Proteins are strings of **amino acids** that fold into complex 3-D shapes. There are 20 standard amino acids that can be strung together in different orders in humans, and the result is that proteins can perform an impressive amount of different functions. For instance, muscle fibers are proteins that help facilitate movement. A special class of proteins (immunoglobulins) help protect the organism by detecting disease-causing pathogens in the body. Protein hormones, such as insulin, help regulate physiological activity. Blood hemoglobin is a protein that transports oxygen throughout the body. **Enzymes** are also proteins, and they are catalysts for biochemical reactions that occur in the cell (e.g., metabolism). Larger-scale protein structures can be visibly seen as physical features of an organism (e.g., hair and nails).

Transcription and Translation

Coding nucleotides in our DNA provide instructions on how to make proteins. Making proteins, also known as **protein synthesis**, can be broken down into two main steps referred to as transcription and translation. Protein synthesis relies on many molecules in the cell including different types of regulatory proteins and RNAs for each step in the process. Although there are many different types of RNA molecules that have a variety of functions within the cell, we will mainly focus on **messenger RNA (mRNA)**.

A **gene** is a segment of DNA that codes for RNA, and genes can vary in length from a few hundred to as many as two million base pairs in length. The purpose of transcription is to make an RNA copy of that genetic code (Figure 12). Unlike double-stranded DNA, RNA molecules are single-stranded nucleotide sequences (refer back to Figure 6). Additionally, while DNA contains the nucleotide thymine (T), RNA does not—instead, its fourth nucleotide is uracil (U). Uracil is complementary to (or can pair with) adenine (A), while cytosine (C) and guanine (G) continue to be complementary to each other. For transcription to proceed, a gene must first be turned "on" by the cell. The double-stranded DNA is then separated, and one side of the DNA strand is used as a template where complementary RNA nucleotides are strung together. For example, if a DNA template is TACGGATGC, then the newly constructed mRNA sequence will be AUGCCUACG. Sometimes the end product needed by the cell is that transcribed RNA, but for protein synthesis constructing the RNA (specifically pre-messenger RNA, or pre-mRNA) is just the first step.

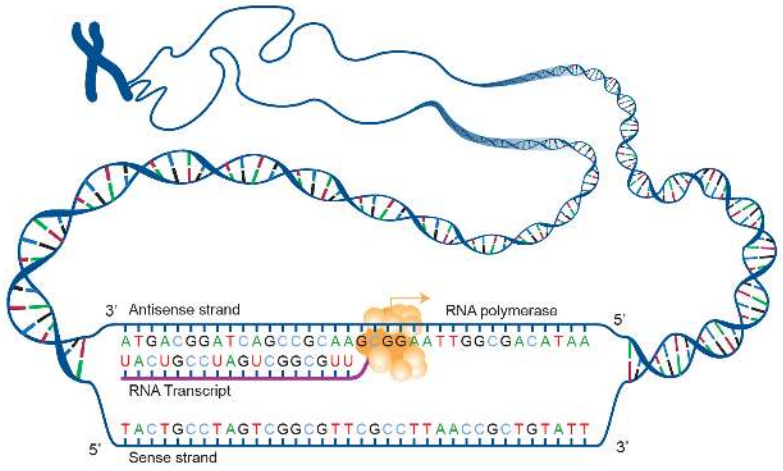


Figure 12. RNA polymerase catalyzing DNA transcription.

Genes contain segments called introns and exons. Exons are considered "coding" while introns are considered "noncoding"—meaning the information they contain will not be needed to construct proteins. When a gene is first transcribed into pre-mRNA, introns and exons are both included (Figure 13). However, once transcription is finished, introns are removed in a process called **splicing**. During splicing, a protein/RNA complex attaches itself to the pre-mRNA and removes introns and then connects the remaining exons, thus creating a shorter mature mRNA.

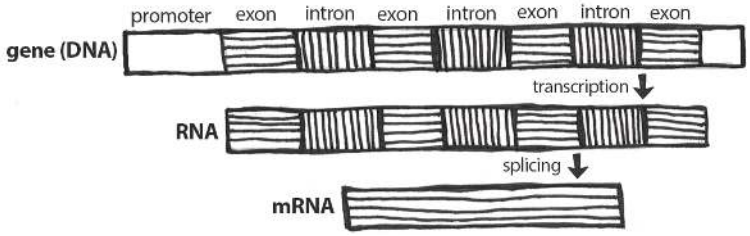


Figure 13. RNA processing is the modification of RNA, including the removal of introns, called splicing, between transcription and translation.

The process by which mRNA is “read” and amino acids chained together to form new proteins is called translation. During translation, mature mRNA is transported outside of the nucleus where it is bound to a **ribosome** (Figure 14). The nucleotides in the mRNA are read as triplets, which are called codons. Each codon corresponds to an amino acid, and this is the basis for building a protein. Continuing with our example from above, the mRNA sequence AUG-CCU-ACG codes for three amino acids. AUG is a codon for methionine (Met), CCU is proline (Pro), and ACG is threonine (Thr). Therefore, the protein sequence is Met-Pro-Thr. Methionine is the most common “start codon” (AUG) for the initiation of protein translation in eukaryotes. As the ribosome moves along the mRNA, the growing amino acid chain exits the ribosome and folds into a protein (Figure 15). When the ribosome reaches a “stop” codon (UAA, UAG, or UGA), the ribosome stops adding new amino acids, detaches from the mRNA, and the protein is released. Folded proteins can then be used to complete a structural or functional task.

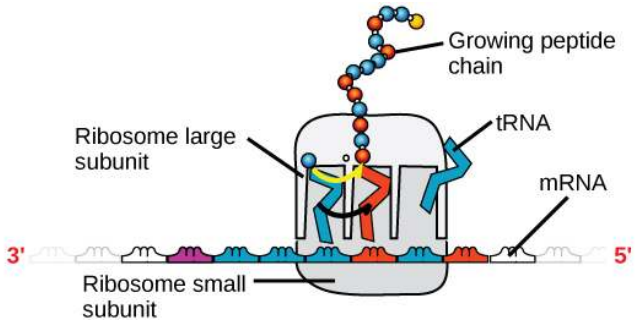


Figure 14. Translation of mRNA into an amino acid.

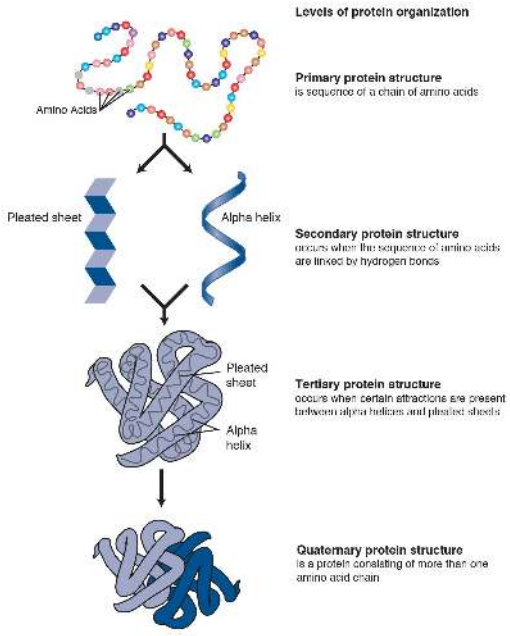


Figure 15. Indicates levels of protein organization from the simple amino acid chain that is then folded and organized into more complex protein structures.

Adaptations

Survival and reproduction at high altitudes (as well as other extreme environments!) present numerous physiological challenges for most humans, but what if there were some humans who were specially adapted to life at high altitudes? These behavioral, acclimatory, and developmental adjustments are all related to the phenotypic plasticity of the individual; however, most adjustments are temporary in nature and they affect a single individual rather than all individuals within a population. But, what if the physiological changes were permanent? What if they affected all members of a population rather than just a single individual? The long-term, micro-evolutionary (i.e., genetic) changes that occur within a population in response to an environmental stressor are referred to as an **adaptation**. From an evolutionary standpoint, the term "adaptation" refers to a phenotypic trait (i.e., physiological/morphological feature or behavior) that has been acted upon by natural selection processes to increase a species' ability to survive and reproduce within a specific environment. Within the field of physiology, the term "adaptation" refers to traits that serve to restore homeostasis. The physiology-based interpretation of adaptations presumes that all traits serve a purpose and that all adaptations are beneficial in nature; however, this may be a fallacy, since some traits may be present without clear evidence as to their purpose. As such, during the following discussion of various forms of adaptations in human populations, we will focus our attention to phenotypic traits with an evidence-based purpose.

Adaptation: Altitude

There is genomic research supporting the evolutionary selection of certain phenotypes and their corresponding genotypes within indigenous high-altitude populations across the globe. The following discussion focuses on three high-altitude indigenous populations from Tibet, the Andes, and Ethiopia (Figure 16). Although these populations share many common genetic traits based on relatively similar evolutionary histories influenced by similar environmental stressors, there is support for local genetically based adaptation as well, based on different genes being acted upon by environmental stressors that may be unique to Tibet, the Andes, and Ethiopia (Bigham 2016).



Figure 16. Highlighted regions feature (from left to right) the Andean, Ethiopian, and Tibetan Plateau high-altitude regions.

Tibetan populations have resided in the Tibetan Plateau and Himalayan Mountain regions at elevations exceeding 4,000 m.a.s.l. (13,100 f.a.s.l.) for at least the past 7,400 years (Meyer et al. 2017). A gene referred to as *EPAS1* is involved in the regulation of red blood cell (and hemoglobin) production as well as catecholamine homeostasis. Catecholamines are hormones (e.g., epinephrine) secreted as part of the sympathetic nervous system's acute stress ("fight-or-flight") response. An acute stress response typically includes an increase in: heart rate, blood pressure, and blood glucose levels. Long-term elevation of catecholamines in the body may lead to hypertension (elevated blood pressure), increased blood pH levels, the development of a form of cardiovascular disease leading to narrowing of the arteries (atherosclerosis), and blood clots. In the short term, an acclimatory adjustment leading to the increase of catecholamines and hemoglobin production by the hypoxia (low-oxygen level)-induced activation of the *EPAS1* gene may assist individuals from lower altitudes as they ascend to significantly higher altitudes; however, such increases may not be maintained for long before they cause damage to the body. For indigenous high-altitude populations of Tibet, a mutation in the *EPAS1* gene inhibits increased red blood cell production and assists with catecholamine regulation. The red blood cell count of high-altitude Tibetans with the *EPAS1* point mutation is about the same as for individuals residing at sea level.

Interestingly, individuals in populations from the high-altitude Andean Altiplano of Peru and Bolivia, such as the Quechua and Aymara, lack the *EPAS1* point mutation, so their red blood cell counts are relatively elevated compared with the Tibetan populations. In addition, populations from the Andean Altiplano also have an increased arterial oxygen saturation and low,

hypoxia-induced breathing pattern (minor hyperventilation) as compared to their Tibetan counterparts (Bigham 2016). Populations indigenous to the Semien Plateau of Ethiopia, such as the Oromo and Amhara, share a similar but not identical *EPAS1* point mutation with the Tibetan population (Bigham 2016). This suggests that the *EPAS1* mutations occurred independently from each other; however, their effects are still similar in that they permit the Tibetan and Ethiopian populations to survive at high altitudes. Not all adaptations are related to life in high-altitude environments, however. In the following sections, we will address more general examples of adaptation in human populations: variations in skin color and differences in body build.

Adaptation: Skin Tone

When you think about your own skin tone and compare it to members of your family, do you all possess exactly the same shade? Are some members of your family darker than others? What about your friends? Your classmates? Skin tone occurs along a continuum, which is a reflection of the complex evolutionary history of our species. The expression of skin tone is regulated primarily by both melanin and hemoglobin. Melanin is a dark brown-black pigment that is produced by the oxidation of certain amino acids (e.g., tyrosine, cysteine, phenylalanine) in the melanocytes, which are specialized cells located in the base layer (stratum basale) of the skin's epidermis as well as several other areas within the body (Figure 17). Within the melanocytes, melanin is produced in the special organelle called a melanosome. Melanosomes serve as sites for the synthesis, storage, and transportation of melanin. Melanosomes transport the melanin particles through cellular projections to epidermal skin cells (keratinocytes) as well as to the base of the growing hair root (root sheath portion). In the eye, however, melanin particles produced by the melanosomes remain present within the iris (iridial melanocytes) and are not transported beyond their origin location. The two main forms of melanin related to skin, hair, and eye color are eumelanin and pheomelanin. All humans contain both eumelanin and pheomelanin within their bodies; however, the relative expression of these two forms of melanin determines an individual's overall coloring. Eumelanin is a brown-to-black colored melanin particle and pheomelanin is more pink-to-red. Individuals with darker skin or hair color have a greater expression of eumelanin than those with lighter-colored skin and blonde or red hair.

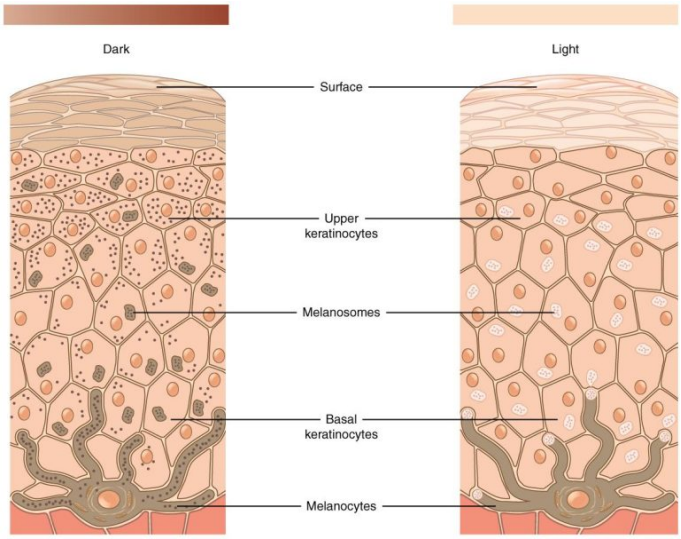


Figure 17. Diagram featuring the relative numbers of melanocytes and melanosomes in light and dark shades of skin tone.

Skin Tone Genetic Regulation

The melanocortin 1 receptor (*MC1R*) gene acts to control which types of melanin (eumelanin or pheomelanin) are produced by melanocytes. The *MC1R* receptor is located on the surface of the melanocyte cells (Quillen et al. 2018). Activation of the *MC1R* receptors may occur through exposure to specific environmental stimuli or due to underlying genetic processes. Inactive or blocked *MC1R* receptors results in melanocytes producing pheomelanin. If the *MC1R* gene receptors are activated, then the melanocytes will produce eumelanin. Thus, individuals with activated *MC1R* receptors tend to have darker pigmented skin and hair than individuals with inactive or blocked receptors.

The alleles of another gene, the major facilitator, superfamily domain-containing protein 12 (*MFSD12*) gene, affect the expression of melanocytes in a different way than the *MC1R* gene. Instead of affecting the activation of melanocyte receptors, the *MFSD12* alleles indirectly affect the membranes of melanocyte lysosomes (Quillen et al. 2018). The melanocyte's lysosomes are organelles containing digestive enzymes, which ultimately correlate to varying degrees of pigmentation in

humans. Variations in the membranes of the melanocyte lysosomes ultimately correlate to differing degrees of pigmentation in humans.

Ancestral *MFSD12* allele variants are present in European and East Asian populations and are associated with lighter pigmentation of the skin (Crawford et al. 2017; Quillen et al. 2018). In addition, this ancestral variant is also associated with Tanzanian, San, and Ethiopian populations of Afro-Asiatic ancestry (Crawford et al. 2017; Quillen et al. 2018). In contrast, the more-derived (i.e. more recent) allele variants that are linked to darker skin tones are more commonly present in East African populations, particularly those of Nilo-Saharan descent (Crawford et al. 2017; Quillen et al. 2018). The notion that ancestral alleles of *MFSD12* are associated with lighter skin pigmentation is in opposition to the commonly accepted idea that our pigmentation was likely darker throughout early human evolution (Crawford et al. 2017; Quillen et al. 2018). Due to the complexity of the human genome, *MFSD12* and *MC1R* are but two examples of alleles affecting human skin tone. Furthermore, there is genetic evidence suggesting that certain genomic variants associated with both darker and lighter skin color have been subject to directional selection processes for as long as 600,000 years, which far exceeds the evolutionary span of *Homo sapiens sapiens* (Crawford et al. 2017; Quillen et al. 2018). So, evolutionary processes may lead to skin becoming more darkly pigmented as well as more lightly pigmented.

Although all humans have approximately the same number of melanocytes within the epidermis, the production of melanin by these melanocytes varies. There are two forms of melanogenesis (the process through which melanocytes generate melanin): basal and activated. As discussed previously, the expression of eumelanin and pheomelanin by the melanocytes is genetically regulated through the expression of specific receptors (e.g., *MC1R*) or other melanocyte components (e.g., *MFSD12*). **Basal melanogenesis** is dependent upon an individual's inherent genetic composition and is not influenced by external factors. **Activated melanogenesis** occurs in response to ultraviolet radiation (UV) exposure, specifically UV-B (short UV wave) exposure. Increased melanogenesis in response to UV-B exposure serves to provide protection to the skin's innermost layer called the hypodermis, which lies below the epidermis and dermis (Figure 14.11). Melanin in the skin, specifically eumelanin, effectively absorbs UV-B radiation from light meaning that it will not reach the hypodermal layer. This effect is often more apparent during periods of the year when individuals tend to be outside more and the weather is warmer, which leads to those individuals donning fewer protective garments. The exposure of skin to sunlight is, of course, culturally mediated with some cultures encouraging the covering of skin at all times.

As previously noted, hemoglobin is an iron-rich protein that binds with oxygen in the bloodstream. For individuals with lighter-colored skin, blood vessels near the surface of the skin and the hemoglobin contained within those vessels is more apparent than in individuals with darker skin. The visible presence of hemoglobin coupled with the pink-to-red tone of the pheomelanin leads to lighter-skinned individuals having a pale pink skin tone. Individuals with lighter skin more readily absorb UV radiation as their basal melanin expression is directed more toward the production of pheomelanin than eumelanin. But, why are there so many variations in skin tone in humans? To answer this question, we now turn toward an exploration of an evolutionary-based adaptation of skin tone as a function of the environment.

Evolutionary Basis for Skin Tone Variation

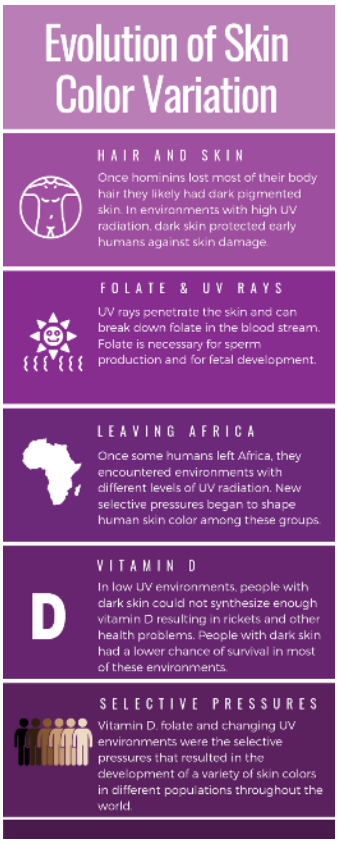


Figure 18. Evolutionary basis for human skin color variation.

Skin cancer is a significant concern for many individuals with light skin tone as the cumulative exposure of the epidermis and underlying skin tissues to UV radiation may lead to the development of abnormal cells within those tissues leading to malignancies. Although darker-skinned individuals are at risk for skin cancer as well, they are less likely to develop it due to increased levels of melanin, specifically eumelanin, in their skin. Even though skin cancer is a serious health concern for some individuals, most skin cancers occur in the post-reproductive years; therefore, it is improbable that evolutionary forces favoring varying melanin expression levels are related to a selective pressure to avoid such cancers. Furthermore, if avoiding skin cancer were the primary factor driving the evolution of various skin tones, then it reasons that everyone would have the most significant expression of eumelanin possible. So, why do we have different skin tones (Figure 18)? The term **cline** refers to the continuum or spectrum of gradations (i.e., levels or degrees) from one extreme to another. With respect to skin tone, the various tonal shades occur clinally, with darker skin being more prevalent near the equator and gradually decreasing in tone (i.e., decreased melanin production) in more distant latitudes. For individuals who are indigenous to equatorial regions, the increased levels of melanin within their skin provides them with a measure of protection against both sunburn and sunstroke as the melanin is more reflective of UV radiation than hemoglobin. In cases of severe sunburn, eccrine glands are affected, resulting in an individual's ability to sweat being compromised. As sweat is the body's most effective means of reducing its core temperature to maintain homeostasis, damage to the eccrine glands may lead to numerous physiological issues related to heat that may ultimately result in death.

Even though avoiding severe sunburn and sunstroke is of great importance to individuals within equatorial regions, this is likely not the primary factor driving the evolutionary selection of darker skin within these regions. It has been proposed that the destruction of **folic acid**, which is a form of B-complex vitamin, by UV radiation may have led to the selection of darker skin in equatorial regions. For pregnant women, low levels of folic acid within the body during gestation may lead to defects in the formation of the brain and spinal cord of the fetus. This condition, which is referred to as spina bifida, often significantly reduces the infant's chances of survival without medical intervention. In men, low levels of folic acid within the body lead to an inhibition in the production of sperm. Thus, in geographic regions with high UV radiation levels (i.e., equatorial regions), there appears to be an evolutionarily driven correlation between darker skin and the maintenance of fertility.

If darker skin tone is potentially correlated to more successful reproduction, then why do lighter shades of skin exist? One hypothesis is that there is a relationship between lighter skin tone and vitamin D synthesis within the body. When skin is exposed to the UV-B radiation waves in sunlight, a series of chemical reactions occur within the epidermis leading to the production of vitamin

D3. Before the body can use vitamin D3, it must travel to the liver and then to the kidneys where it is converted into different forms of bioactive molecules. Ultimately, it is converted into the bioactive molecule calcitriol. Within the human body there are numerous cell types with binding receptors for calcitriol, so it is capable of adhering to the DNA of those cells. Calcitriol serves as a regulator in cellular-replication processes within the body, including those for pancreatic, breast, colon, and kidney cells. Insufficient calcitriol is associated with an increased risk of: some forms of cancer (colon, prostate, etc.), autoimmune diseases (multiple sclerosis, lupus, type I diabetes, etc.), cardiovascular diseases, and infections (e.g., tuberculosis, influenza). Deficiencies in calcitriol production and absorption within the human body may be linked to underlying genetic factors, such as a mutation in the vitamin D receptors present in some of the body's cells. Alternatively, it may be linked to inadequate exposure to the UV-B rays necessary to stimulate calcitriol production or to a nutritional deficiency in vitamin D-rich foods. Regardless of the cause of the deficiency, individuals with a calcitriol (vitamin D3) deficiency may also be at risk for the development of certain skeletal abnormalities in addition to the previously mentioned health issues.

Vitamin D is required for the absorption of certain nutrients, such as calcium and phosphorus, in the small intestine. These nutrients are among those that are critical for the proper growth and maintenance of bone tissue within the body. In the absence of adequate minerals, particularly calcium, bone structure and strength will be compromised leading to the development of rickets during the growth phase. Rickets is a disease affecting children during their growth phase and is characterized by inadequately calcified bones that are softer and more flexible than normal. Individuals with rickets will develop a true bowing of their femora, which may affect their mobility. In addition, deformation of pelvic bones in women may occur as a result of rickets leading to complications with reproduction. In adults, a deficiency in vitamin D will often result in osteomalacia, which is a general softening of the bones due to inadequate mineralization. This softening is the result of impaired bone metabolism that is primarily linked to insufficient levels of bioavailable vitamin D, calcium, and phosphate. In addition, it may be linked to inadequate absorption of calcium in the bloodstream. As noted, a variety of maladies may occur due to the inadequate production or absorption of vitamin D, as well as due to the destruction of folate within the human body; so, from an evolutionary perspective, natural selection should favor a skin tone that is best suited to a given environment.

In general, the trend related to lighter skin pigmentation further from the equator follows a principle called **Gloger's Rule** This rule states that within the same species of mammals the more heavily pigmented individuals tend to originate near the equator while lighter-pigmented members of the species will be found in regions further from the equator. Gloger's Rule applies latitudinally; however, it does not appear to hold for certain human populations near the poles. Specifically, the Inuit people (Figure 14.14), who are indigenous to regions near the North Pole and currently reside in portions of Canada, Greenland, and Alaska. The Inuit have a darker skin tone that would not be anticipated under the provisions of Gloger's Rule. The high reflectivity of light off of snow and ice, which is common in polar regions, necessitates the darker skin tone of these individuals to prevent folic acid degradation just as it does for individuals within equatorial regions. The consumption of vitamin D–rich foods, such as raw fish, permits the Inuit to reside at high latitudes with darker skin tone while preventing rickets.



Figure 19. Inuit family, 1917.

Genome studies have identified a number of genes (*TYR, OCA2/HERC2, TYRP1, SLC45A2, HPS6i*, etc.) related to the expression of melanin and pigmentation presentation in humans. Compared to the exceptionally large number of genes within the human genome, those regulating the expression of melanin are relatively few and appear on distinct loci. The genes at these loci are generally pleiotropic in nature, so there is a relatively predictable patterning in skin, hair, and eye color combinations. For example, some populations that are indigenous to higher latitude regions tend to have lighter skin, hair, and eye color than their counterparts from equatorial regions. Still, since the genes affecting skin, hair, and eye color are actually independent, it is possible that variations may produce many phenotypic combinations. Turning again to our example of individuals indigenous to higher latitudes, it is theoretically possible to encounter an individual with dark hair, light-toned skin, and blue eyes within this region due to the variability of phenotypic combinations.

Adaptation: Shape and Size Variations

In addition to natural selection playing a role in the determination of melanin expression related to skin tone, it plays a significant role in the determination of the shape and size of the human body. The most significant thermodynamic mechanism of heat loss from the body is radiation. At temperatures below 20 ℃ (68 ℉), the human body loses around 65% of its heat to radiative processes; however, the efficiency of radiation as a means of heat reduction is correlated to the overall body shape and size of the individual. There is a direct correlation between the ratio of an object's surface area to mass and the amount of heat that may be lost through radiation. For example, two metal objects of identical composition and mass are heated to the same temperature. One object is a cube and the other is a sphere. Which object will cool the fastest? Geometrically, a sphere has the smallest surface area per unit mass of any three-dimensional object, so the sphere will cool more slowly than the cube. In other words, the smaller the ratio of the surface area to mass an object has, the more it will retain heat. This, in general, holds true for humans, as well.

In regions where temperatures are consistently cold, the body shape and size of the individuals who are indigenous to the area tend to be more compact. These individuals have a relatively higher body mass to surface area (i.e., skin) than their counterparts from equatorial regions where the average temperatures are considerably warmer. Individuals from hot climates, such as the Fulani (Figure 14.15a) of West Africa, have limbs that are considerably longer than those of individuals from cold climates, such as the Inuit of Greenland (Figure 19). Evolutionarily, the longer limbs of individuals from equatorial regions (e.g., the Fulani) provide a greater surface area (i.e., lower body mass to surface area ratio) for the dissipation of heat through radiative processes. In contrast, the relatively short limbs of Arctic-dwelling people, such as the Inuit, allows for the retention of heat as there is a decreased surface area through which heat may radiate away from the body.

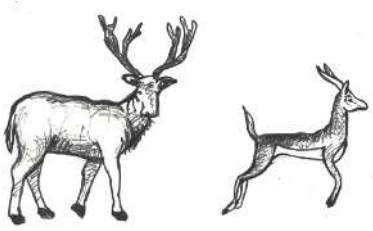


Figure 20. These organisms are representative of Bergmann's rule. The animal on the left depicts an ungulate from a cooler environment with increased body weight and decreased surface area, compared to the slender ungulate on the right.

As described above, there are certain trends related to the general shape and size of human bodies in relation to the thermal conditions. To better describe these trends, we turn to a couple of general principles that are applicable to a variety of species beyond humans. **Bergmann's Rule** predicts that as average environmental temperature decreases, populations are expected to exhibit an increase in weight and a decrease in surface area (Figure 20). Also, within the same species of homeothermic animals, the relative length of projecting body parts (e.g., nose, ears, and limbs) increases in relation to the average environmental temperature (Figure 21). This principle, referred to as **Allen's Rule**, notes that longer, thinner limbs are advantageous for the radiation of excess heat in hot environments and shorter, stockier limbs assist with the preservation of body heat in cold climates. A measure of the crural index (crural index=tibia length [divided by] femur length) of individuals from various human populations provides support for Allen's Rule since this value is lower in individuals from colder climates than it is for those from hot climates. The crural indices for human populations varies directly with temperature.

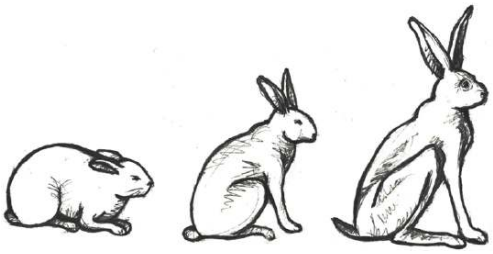


Figure 21. These animals are representative of Allen's rule. Note the shorter limbs and ears of the rabbit on the left that you might find in cold temperatures. Note the length of the ears on the rabbit on the right that you might find in a warm climate. Rabbits do not sweat like humans, heat is dissipated primarily through their ears.

Adaptation: Infectious Disease

Throughout our evolutionary journey, humans have been exposed to numerous infectious diseases. In the following section, we will explore some of the evolutionary-based adaptations that have occurred in certain populations in response to the stressors presented

by select infectious diseases. One of the primary examples of natural selection processes acting on the human genome in response to the presence of an infectious disease is the case of the relationship between the sickle-cell anemia trait and malaria.

Malaria is a **zoonotic disease,** a type of infectious disease naturally transmitted between animals and humans, caused by the spread of the parasitic protozoa from the genus *Plasmodium*. These unicellular, eukaryotic protozoa are transmitted through the bite of a female *Anopheles* mosquito. During the bite process, the protozoan parasites that are present within an infected mosquito's saliva will enter the bloodstream of the individual where they will be transported to the liver. Within the liver, the parasites multiply and will eventually be released into the bloodstream where they will infect erythrocytes (red blood cells). Once inside the erythrocytes, the parasites will reproduce until they exceed the cell's storage capacity, causing it to burst and release the parasites into the bloodstream once again. This replication cycle will continue as long as there are viable erythrocytes within the host to infect.

General complications from malaria infections include: enlargement of the spleen (due to destruction of infected erythrocytes), lower number of thrombocytes (also called platelets, required for coagulation/clotting of blood), high levels of bilirubin (a byproduct of hemoglobin breakdown in the liver) in the blood, jaundice (yellowing of the skin and eyes due to increased blood bilirubin levels), fever, vomiting, retinal (eye) damage, and convulsions (seizures). According to the World Health Organization, in 2022 there were 608,000 deaths from malaria globally, with the highest percentage of those deaths occurring in Africa (95%) (World Health Organization 2023). In sub-Saharan Africa, where incidence of malaria is the highest in the world, millions of pregnancies are affected by malaria, resulting in thousands infant deaths. Pregnant women who become infected during the gestational process are more likely to have low-birthweight infants due to prematurity or growth restriction inside the uterus (Hartman et al. 2013). After birth, infants born to malaria-infected mothers are more likely to develop infantile anemia (low red blood cell counts), a malaria infection that is not related to the maternal malarial infection, and they are more likely to die than infants born to non-malaria-infected mothers.

For children and adolescents whose brains are still developing, there is a risk of cognitive (intellectual) impairment associated with some forms of malaria infections (Fernando et al. 2010). Given the relatively high rates of morbidity (disease) and mortality (number of deaths) associated with malaria, it leads to reason that this disease may have served as a selective pressure during human evolution. Support for natural selection related to malaria resistance is related to genetic mutations associated with sickle cell, thalassemia, glucose-6-phosphate dehydrogenase (G6PD) deficiency, and the absence of certain antigens (molecules capable of inducing an immune response from the host) on erythrocytes. For the purposes of this text, we will focus our discussion on the relationship between sickle cell disease and malaria.

Sickle cell disease is a group of genetically inherited blood disorders characterized by an abnormality in the shape of the hemoglobin within erythrocytes. It is important to note that there are multiple variants of hemoglobin. Each of these variants of hemoglobin may result in various conditions within the body; however, for the following explanation we will focus solely on variants A and S.

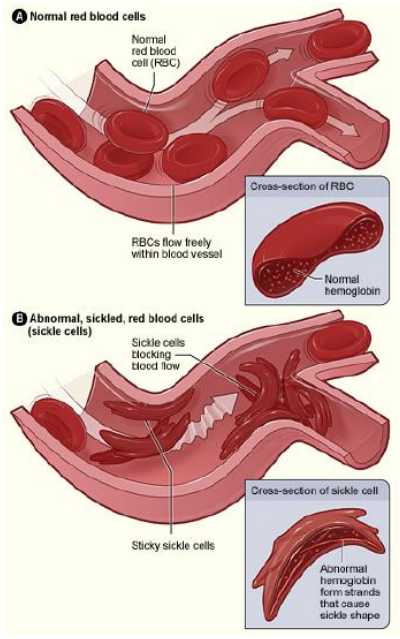


Figure 22. Normal and sickled erythrocytes.

Individuals who inherit a mutated gene (hemoglobin with a sickled erythrocyte variety, HbS) on chromosome 11 from both parents will develop sickle cell anemia, which is the most severe form of the sickle cell disease family (Figure 22). The genotype of an individual with sickle cell anemia is HbSS; whereas, an individual without sickle cell alleles has a genotype of HbAA representing two normal adult hemoglobin type A variants. Manifestations of sickle cell anemia (HbSS) range from mild to severe with some of the more common symptoms being: anemia, blood clots, organ failure, chest pain, fever, and low blood oxygen levels. In high-income countries with advanced medical care, the median life expectancy of an HbSS individual is around 60 years; however, in low-income countries where advanced medical care is scarce, as many as 90% of children with sickle cell disease perish before the age of five (Longo et al. 2017).

Considering that advanced medical care was not available during much of human evolutionary history, it stands to reason that the majority of individuals with the HbSS genotype died before the age of reproduction. If that is the case though, why do we still have the HbS variant present in modern populations? As covered earlier in this textbook, the genotype of an individual is composed of genes from both biological parents. In the case of an individual with an HbSS genotype, the sickle cell allele (HbS) was inherited from each of the parents. For individuals with the heterozygous genotype of HbSA, they have inherited both a sickle cell allele (HbS) and a normal hemoglobin allele (HbA). Heterozygous (HbSA) individuals who reside in regions where malaria is endemic may have a selective advantage. They will experience a sickling of some, but not all, of their erythrocytes. Unlike an individual with the HbSS genotype, someone with HbSA may experience some of the symptoms listed above; however, they are generally less severe.

As noted earlier, the mechanism through which *Plasmodium* protozoan parasites replicate involves human erythrocyte cells. Due to their sickled shape, as well as the presence of an abnormally shaped protein within the cell, the parasites are unable to replicate effectively in the erythrocyte cells coded for by the HbS allele (Cyrklaff et al. 2011). An individual who has an HbSA genotype and an active malaria infection will become ill with the disease to a lesser extent than someone with an HbAA genotype. Although normal erythrocytes (regulated by the HbA allele) allow for the replication of the parasite, the parasites will not be able to replicate in HbS erythrocytes of the heterozygote. So, individuals with the HbSA genotype are more likely to survive a malaria infection than an individual who is HbAA. Although individuals with the HbSA genotype may endure some physiological complications related to the sickling of some of their erythrocytes, their morbidity and mortality rates are lower than they are for HbSS members of the population. The majority of individuals who are heterozygous or homozygous for the HbS trait have ancestors who originated in places where malaria was endemic, such as sub-Saharan Africa, India, Saudi Arabia, regions in South and Central America, the Caribbean, and the Mediterranean (Turkey, Greece, and Italy)

With respect to the history of these regions, during the early phases of settlement horticulture was the primary method of crop cultivation. Typically performed on a small scale, horticulture is based on manual labor and relatively simple hand tools rather than the use of draft animals or irrigation technologies. Common in horticulture is *swidden*, or the cutting and burning of plants in woodland and grassland regions. The swidden is the prepared field that results following a slash-and-burn episode. This practice fundamentally alters the soil chemistry, removes plants that provide shade, and increases the areas where water may pool. This anthropogenically altered landscape provides the perfect breeding ground for the *Anopheles* mosquito, as it prefers warm, stagnant pools of water (Figure 23).

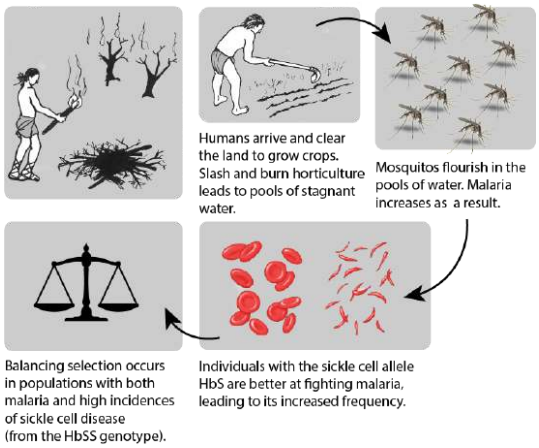


Figure 23. The effects of human horticultural activities on the balancing selection of populations in relation to sickle cell disease genotype variants.

Although swidden agriculture was historically practiced across the globe, it became most problematic in the regions where the *Anopheles* mosquito is endemic. These areas have the highest incidence rates of malaria infection. Over time, the presence of the *Anopheles* mosquito and the *Plasmodium* parasite that it transmitted acted as a selective pressure, particularly in regions where swidden agricultural practices were common, toward the selection of individuals with some modicum of resistance against the infection. In these regions, HbSS and HbSA individuals would have been more likely to survive and reproduce successfully. Although individuals and populations are far more mobile now than they have been throughout much of history, there are still regions where we can see higher rates of malaria infection as well as greater numbers of individuals with the HbS erythrocyte variant. The relationship between malaria and the selective pressure for the HbS variant is one of the most prominent examples of natural selection in the human species within recent evolutionary history.

Adaptation: Lactase Persistence

With the case of sickled erythrocytes and their resistance to infection by malaria parasites, there is strong support for a cause-and-effect-style relationship linked to natural selection. Although somewhat less apparent, there is a correlation between lactase persistence and environmental challenges. Lactase-phlorizin hydrolase (LPH) is an enzyme that is primarily produced in the small intestine and permits the proper digestion of lactose, a disaccharide (composed of two simple sugars: glucose and galactose) found in the milk of mammals. Most humans will experience a decrease in the expression of LPH following weaning, leading to an inability to properly digest lactose. Generally, LPH production decreases between the ages of two and five and is completely absent by the age of nine (Dzialanski et al. 2016). For these individuals, the ingestion of lactose may lead to a wide variety of gastrointestinal ailments including abdominal bloating, increased gas, and diarrhea. Although the bloating and gas are unpleasant, the diarrhea caused by a failure to properly digest lactose can be life-threatening if severe enough due to the dehydration it can cause. Some humans, however, are able to produce LPH far beyond the weaning period.

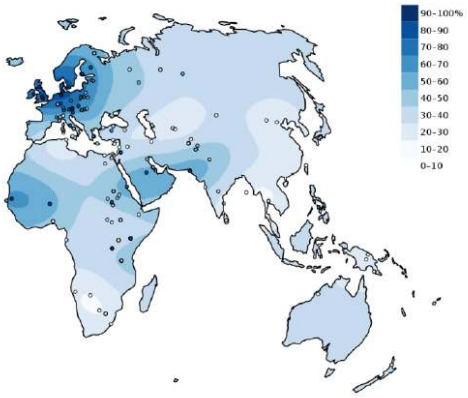


Figure 24. Interpolated map depicting the percentage of adults with the lactase persistence genotype in indigenous populations of the Old World. Circles denote sample locations.

Individuals who continue to produce LPH have what is referred to as the **lactase persistence** trait. The lactase persistence trait is encoded for a gene called *LCT*, which is located on human chromosome 2. From an evolutionary and historical perspective, this trait is most commonly linked to cultures that have practiced cattle domestication (Figure 24). For individuals in those cultures, the continued expression of LPH may have provided a selective advantage. During periods of environmental stress, such as a drought, if an individual is capable of successfully digesting cow's milk, they have a higher chance of survival than someone who suffers from diarrhea-linked dehydration due to a lack of LPH. Per Tishkoff et al. , the "frequency of lactase persistence is high in northern European populations (more than 90% in Swedes and Danes), decreases in frequency across southern Europe and the Middle East (less than 50% in Spanish, French, and pastoralist Arab populations), and is low in non-pastoralist Asian and African populations (less than 1% in Chinese, less than 5% to 20% in West African agriculturalists)" (2007: 248). Although the frequency of the lactase persistence trait is relatively low among African agriculturalists, it is high among pastoralist populations that are traditionally associated with cattle domestication, such as the Tutsi and Fulani, who have frequencies of 90% and 50%, respectively (Tishkoff et al. 2007).

It appears that the emergence of the lactase persistence mutation in European vs. non-European populations, specifically those in East Africa (e.g., Tutsi and Fulani), is a case of **convergent evolution**. With convergent evolution events, a similar mutation may occur in species of different lineages through independent evolutionary processes. Based on our current understanding of the genetic mutation pathways for the lactase persistence trait in European and African populations, these mutations are not

representative of a shared lineage. In other words, just because a person of European origin and a person of African origin can each digest milk due to the presence of the lactase-persistence trait in their genotypes, it does not mean that these two individuals inherited it due to shared common ancestry.

Human Variation: Our Story Continues

From the time that the first of our species left Africa, we have had to adjust and adapt to numerous environmental challenges. The remarkable ability of human beings to maintain homeostasis through a combination of both nongenetic (adjustments) and genetic (adaptations) means has allowed us to occupy a remarkable variety of environments from high-altitude mountainous regions to the tropics near the equator. From adding piquant, pungent spices to our foods as a means of inhibiting food-borne illnesses due to bacterial growth to donning garments specially suited to local climates, behavioral adjustments have provided us with a nongenetic means of coping with obstacles to our health and well-being. Acclimatory adjustments, such as sweating when we are warm in an attempt to regulate our body temperature or experiencing increased breathing rates as a means of increasing blood oxygen levels in regions where the partial pressure of oxygen is low, have been instrumental in our survival with respect to thermal and altitudinal environmental challenges. For some individuals, developmental adjustments that were acquired during their development and growth phases (e.g., increased heart and lung capacities for individuals from high-altitude regions) provide them with a form of physiological advantage not possible for someone who ventures to such an environmentally challenging region as an adult. Genetically-mediated adaptations, such as variations in the pigmentation of our skin, have ensured our evolutionary fitness across all latitudes.

Will the human species continue to adjust and adapt to new environmental challenges in the future? If past performance is any measure of future expectations, then the human story will continue as long as we do not alter our environment to the point that the plasticity of our behavior, physiological, and morphological boundaries is exceeded.

Misconceptions About Human Evolution

- There is no separation of culture from science, or facts from values, in human evolution.

As we have seen, the scientific study of who we are and where we come from is not biology. It is a branch of anthropology that overlaps in crucial ways with biology, and yet it also traffics in the world of politics, cultures, moral codes, and histories. This is not to say that other sciences can necessarily be free of culture but simply that it is easier to be objective about boron than about your ancestors. Narratives about ancestors are invariably sacred stories, and biological anthropologists incur an unusual responsibility in being the scientific custodians of our ancestors' stories-writing and validating their stories, shepherding them through history.

- Equality is not identity.

The great geneticist Theodosius Dobzhansky emphasized the distinction between equality (a political state) and identity (a biological state). Sameness/difference is unrelated to equal/unequal, under our system of government. No matter what kind of person you are, you are entitled to equality. Consequently all discussions of race or sex are irrelevant to questions of rights: All citizens are entitled to equal rights. The difficulty is how to guarantee that all receive them, which is a political issue, because obviously there is a great deal of inequality in America. Patterns of social inequality are not grounded in human biological variation. It has become a moral challenge for the nation and for science to better understand this fact, particularly as critiques of equality are too often accompanied by pseudo-biological arguments.

- All humans are equally close to apes, despite the attempt of some people to question the essential humanity of certain populations by suggesting that some people are more apelike than others.

The suggestion that some groups of humans are more naturally apelike than others is a recurrent slander of the modern age. Apelike is obviously a synonym for subhuman; and the symbolic association of apes with African peoples is actually a pre-Darwinian slur, from centuries before evolutionary theory was developed. All humans are equally distantly related from the chimpanzee, but some humans, especially people of color, have been symbolically dehumanized throughout modern history by associating them with apes. Consequently, such a comparison is no longer considered funny.

Terms You Should Know

Activated Melanogenesis

Adaptation

Allele

Amino Acids

Basal Melanogenesis

Base Pairs

Bergmann’s Rule

Carbohydrates

Cell Cycle

Chromosome

Cline

Descent with Modification

DNA

DNA Polymerases

DNA Replication

DNA Sequence

Enzymes

Folic Acid

Gene

Gene Flow

Gene Pool

Genotype

Gloger’s Rule

Hierarchical Classification

Helicase

Homology

Inheritance of Acquired Characteristics

Lactase Persistence

Lipids

Messenger RNA

Monogenism

Mutation

Natural Selection

Nucleic Acids

Phenotype

Polygenism

Proteins

Protein Synthesis

RNA

Ribosome

Sickle Cell Disease

Splicing

Synthetic Theory of Evolution

Taxonomy

Zoonotic Disease

Study Questions

1. Detail at least two examples of how natural selection has influenced human variation. Specifically, what was the selective pressure that may have led to a preference for a specific trait and how is that trait related to an increased level of fitness?
2. What was gained by reducing organisms to genotypes and species to gene pools? What is gained by reintroducing bodies and species into evolutionary studies?
3. How are you reducible to your ancestry? If you could meet your ancestors from the year 1700 (and you would have well over a thousand of them!), would their lives be meaningfully similar to yours? Would you even be able to communicate with them?
4. Detail at least two examples of how natural selection has influenced human variation. Specifically, what was the selective pressure that may have led to a preference for a specific trait and how is that trait related to an increased level of fitness?

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2.2: Primates

Learning Objectives

By the end of this chapter, you should be able to:

- Discuss how primates are different from other mammals.
- Understand how studying non-human primates is important in anthropology.
- Identify different types of traits that we use to evaluate primate taxa.
- Describe the major primate taxa using their key characteristics.
- Understand your place in nature by learning your taxonomic classification.

What is a Primate?

Because humans are primates, we share a wide range of behavioral and morphological traits with the other species who also fall into this group. In a previous chapter, you learned about the nature of Linnaean classification, the system we use for organizing life-forms. Here, we focus on the organization and diversity within the Order Primates. The term *Order Primates* dates back to 1758 when, in his tenth edition of *Systema Naturae*, Carolus Linnaeus put humans, “simia” (monkeys and apes), “lemurs” (lemurs and colugos), and some bats into one of eight groups of mammals. Linnaeus was wrong in including colugos (now in Order Dermoptera) and bats (now in Order Chiroptera), but the grouping of humans with the then-known non-human primates was significant in that by doing so Linnaeus formally recognized the affinities between humans and these non-human **taxa**. In fact, acknowledgment of similarities between humans and non-humans dates back far earlier than Linnaeus, yet it was only more recently that we attained the genetic data to back up our intuition.

Primates are one of at least twenty Orders belonging to the Class Mammalia. All members of this class share certain characteristics, including, among other things, having fur or hair, producing milk from mammary glands, and being warm-blooded. There are three types of mammals: monotremes, marsupials, and placental mammals. Monotremes are the most primitive of the mammals, meaning they have retained more ancient traits than marsupials or placental mammals, and so, monotremes are characterized by some unusual traits. Monotremes, which include echidnas and duck-billed platypuses, lay eggs rather than give birth to live young. Once the young hatch, they lap up milk produced from glands on the mother’s abdomen rather than latch onto nipples. Marsupial mammals are those, like kangaroos and koalas, who internally gestate for a very short period of time and give birth to relatively undeveloped young. Joeys, as these newborns are called, complete their growth externally in their mother’s pouch where they suckle. Lastly, there are placental mammals. Placental mammals internally gestate for a longer period of time and give birth to fairly well-developed young who are then nursed. Primates, including ourselves, belong to this last group. Among the diversity of mammalian orders alive today, primates are very likely one of the oldest. Today, the Order Primates is a diverse group of animals that includes lemurs and lorises, tarsiers, monkeys of the Americas and Africa, Europe, and Asia, apes, and humans, all of which are united in sharing a suite of anatomical, behavioral, and life history characteristics. Before delving into the specific traits that distinguish primates from other animals, it is important to first discuss the different types of traits that we will encounter.

Types of Traits

When evaluating relationships between different groups of primates, we use key traits that allow us to determine which species are most closely related to one another. Traits can be either primitive or derived. **Primitive traits** are those that a taxon has because it has inherited the trait from a distant ancestor. For example, all primates have body hair because we are mammals and all mammals share an ancestor hundreds of millions of years ago that had body hair. This trait has been passed down to all mammals from this shared ancestor, so all mammals alive today have body hair. **Derived traits** are those that have more recently evolved. This type of trait is most useful when we are trying to distinguish one group from another because derived traits tell us which taxa are more closely related to each other. For example, humans walk on two legs. The many adaptations that humans possess which allow us to move in this way evolved after humans split from the Genus *Pan* (chimpanzees and bonobos). This means that when we find fossil taxa that share derived traits for walking on two legs, we can conclude that they are likely more closely related to humans than to chimpanzees and bonobos.

There are a couple of other important points about primitive and derived traits. First, the terms *primitive* and *derived* are relative terms. This means that depending on what taxa are being compared, a trait can be either one. For example, in the previous section, body hair was used as an example for a primitive trait among primates. All mammals have body hair because we share a distant ancestor who had this trait. The presence of body hair therefore doesn’t allow you to distinguish whether monkeys are more closely

related to apes or lemurs because they all share this trait. However, if we are comparing mammals to birds and fish, then body hair becomes a derived trait of mammals. It evolved after mammals diverged from birds and fish, and it tells us that all mammals are more closely related to each other than they are to birds or fish. The second important point is that very often when one lineage splits into two, one taxon will stay more similar to the last common ancestor in retaining more primitive traits, whereas the other lineage will usually become more different from the last common ancestor by developing more derived traits. This will become very apparent when we discuss the two suborders of primates, Strepsirrhini and Haplorrhini. When these two lineages diverged, strepsirrhines retained more primitive traits (those present in the ancestor of primates) and haplorrhines developed more derived traits (became more different from the ancestor of primates).

There are two other types of traits that will be relevant to our discussions here: generalized and specialized traits. **Generalized traits** are those characteristics that are useful for a wide range of things. Having **opposable thumbs** that go in a different direction than the rest of your fingers is a very useful, generalized trait. You can hold a pen, grab a branch, peel a banana, or text your friends all thanks to your opposable thumbs. **Specialized traits** are those that have evolved in response to for a specific need. These traits may not have a wide range of uses, but they will be very efficient at their job. Hooves in horses are a good example of a specialized trait. Horses cannot grasp objects with their hooves, but hooves allow horses to run very quickly on the ground on all fours. You can think of generalized traits as a Swiss Army knife, useful for a wide range of tasks but not particularly good at any of one them. That is, if you're in a bind, then a Swiss Army knife can be very useful to cut a rope or fix a loose screw, but if you were going to build furniture or fix a kitchen sink, then you'd want specialized tools for the job. As we will see, most primate traits tend to be generalized.

Primate Suite of Traits

The Order Primates is distinguished from other groups of mammals in having a suite of characteristics. This means that there is no individual trait that you can use to instantly identify an animal as a primate; instead, you have to look for animals that possess a collection of traits. What this also means is that each individual trait we discuss may be found in non-primates, but if you see an animal that has most or all of these traits, there is a good chance it is a primate.

One area in which the Order Primates is most distinguished from other organisms regards traits related to our senses, especially our vision. Compared to other animals, primates rely on vision as a primary sense. Our heavy reliance on vision is reflected in many areas of our anatomy and behavior. All primates have eyes that face forward with convergent (overlapping) visual fields. This means that if you cover one eye with your hand, you can still see most of the room with your other one. This also means that we cannot see on the sides or behind us as well as some other animals can. In order to protect the sides of the eyes from the muscles we use for chewing, all primates have at least a **postorbital bar,** a bony ring around the outside of the eye (Figure 1). Some primate taxa have more convergent eyes than others, so those primates need extra protection for their eyes. As a result, animals with greater orbital convergence will have a postorbital plate or postorbital closure in addition to the bar. The postorbital bar is a derived trait of primates, appearing in our earliest ancestors; all primates, including you, have a postorbital bar.

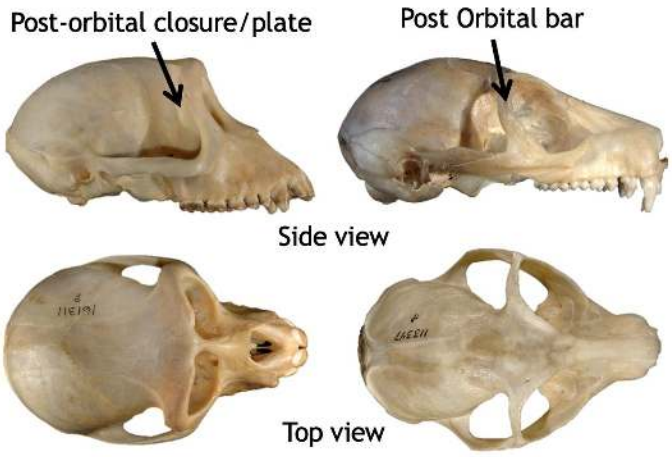


Figure 1. All primates have some form of bony protection around their eyes. Some have a postorbital bar only (right), but many have full postorbital closure, also called a postorbital plate, that completely protects the back of the eye socket (left).

Another important and distinctive trait of our Order is that many primates have **trichromatic color vision**, or the ability to distinguish reds and yellows in addition to blues and greens. Interestingly, birds, fish, and reptiles are tetrachromatic (they can see

reds, yellows, blues, greens, and even ultraviolet), but most mammals, including some primates, are only dichromatic (they see only in blues and greens). It is thought that the nocturnal ancestors of mammals benefited from seeing better at night rather than in color, and so dichromacy is thought to be the primitive condition for mammals. There is a lot of interest in why some primates would re-evolve trichromacy. Some theories revolve around food, arguing that the ability to see reds/yellows may allow primates who can see these colors to better detect young leaves (Dominy and Lucas 2001) or ripe fruits (Regan et al. 2001) against an otherwise green, leafy background. Color vision has also been suggested to be useful for detecting predators, especially big cats. Another theory emphasizes the usefulness of trichromacy in social and mate-choice contexts (Changizi et al. 2006). Thus far there is no consensus, as trichromatic color vision can be useful in many circumstances. There is also the added complication that sometimes dichromacy is more advantageous, as animals who are dichromatic are usually better at seeing through camouflage to find hidden items like foods or predators (Morgan et al. 1992). Therefore, investigating the evolution of color vision continues to be an interesting and ongoing area of research.

The primate visual system uses a lot of energy, so primates have compensated by cutting back on other sensory systems, particularly our sense of smell. Compared to other mammals, primates have relatively reduced snouts. This is another derived trait of primates that appears even in our earliest ancestors. As we will discuss, there is variation across primate taxa in how much snouts are reduced. Those with a better sense of smell usually have poorer vision than those with a relatively dull sense of smell. The reason for this is that all organisms have a limited amount of energy to spend on running our bodies, so we make **evolutionary trade-offs**, because energy spent on one trait must mean cutting back on energy spent on another. With regards to primate senses, primates with better vision (more convergent eyes, better visual acuity, etc.) are spending more energy on vision and thus will have poorer smell (and a shorter snout). Primates who spend less energy on vision (less convergent eyes, poorer visual acuity, etc.) will have a better sense of smell (and a longer snout).

Primates also differ from other mammals in the size and complexity of our brains. All primates have brains that are larger than you would expect when compared to other mammals of the same size. On average, primates have brains that are twice as big for their body size as you would expect when compared to other mammals. Not unexpectedly, the visual centers of the brain are larger in primates and the wiring is different from that in other animals, reflecting our reliance on this sense. The neocortex, which is used for higher functions like consciousness and language in humans, as well as sensory perception and spatial awareness, is also larger in all primates relative to other animals. In non-primates this part of the brain is often smooth, but in primates it is made up of many folds which increase the surface area. It has been proposed that the more complex neocortex of primates is related to diet, with fruit-eating primates having larger relative brain sizes than leaf-eating primates, due to the more challenging cognitive demands required to find and process fruits (Clutton-Brock and Harvey 1980). An alternative hypothesis argues that larger brain size is necessary for navigating the complexities of primate social life, with larger brains occurring in species who live in larger, more complex groups relative to those living in pairs or solitarily (Dunbar 1998). There seems to be support for both hypotheses, as large brains are a benefit under both sets of selective pressures.

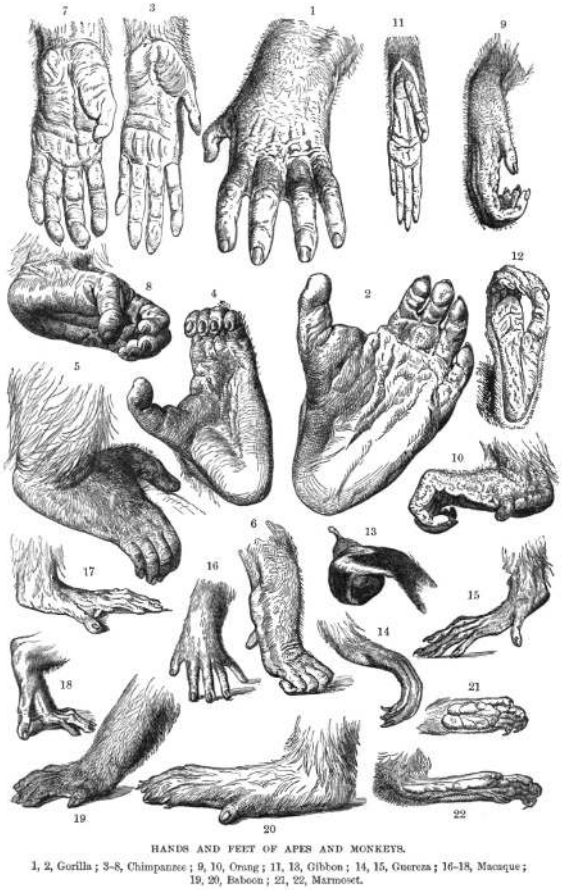


Figure 2. These drawings of the hands and feet of different primates clearly show the opposable thumbs and big toes, pentadactyly, flattened nails, and tactile pads that are characteristic of our Order.

Primates also differ from other animals in our hands and feet. The Order Primates is a largely **arboreal** taxonomic group, which means that most primates spend a significant amount of their time in trees. As a result, the hands and feet of primates have evolved to move around in a three-dimensional environment. Primates have the generalized trait of **pentadactyly**— possessing five digits (fingers and toes) on each limb. Many non-primates, like dogs and horses, have fewer digits because they are specialized for high-speed, **terrestrial** (on the ground) running. Pentadactyly is also a primitive trait, one that dates back to the earliest four-footed animals. Primates today have opposable thumbs and, except humans, opposable big toes (Figure 2). **Opposable digits** are a derived trait that appeared in the earliest primates about 55 million years ago. Having thumbs and big toes that go in a different direction from the rest of the fingers and toes allow primates to be excellent climbers in trees but also allow us to manipulate objects. Our ability to manipulate objects is further enhanced by the flattened nails on the backs of our fingers and toes that we possess in the place of the claws and hooves that many other mammals have. On the other side of our digits, we have sensitive **tactile pads** that allow us to have a fine sense of touch. Primates use this fine sense of touch for handling food and, in many species, grooming themselves and others. In primates, grooming is an important social currency, through which individuals forge and maintain social bonds.

Animals with large brains usually have extended life history patterns, and primates are no exception. Life history refers to the pace at which an organism grows, reproduces, ages, and so forth. Some animals grow very quickly and reproduce many offspring in a short time frame, but do not live very long. Other animals grow slowly, reproduce few offspring, reproduce infrequently, and live a long time. Primates are all in the “slow lane” of life history patterns. Compared to animals of similar body size, primates grow and develop more slowly, have fewer offspring per pregnancy, reproduce less often, and live longer. Primates also invest heavily in each offspring. With a few exceptions, most primates only have one offspring at a time. There is a group of small-bodied monkeys in the Americas who regularly give birth to twins, and some lemurs are able to give birth to multiple offspring at a time, but these primates are the exception rather than the rule. Primates also reproduce relatively infrequently. The fastest-reproducing primates will produce offspring about every six months, while the slowest, the orangutan, reproduces only once every seven to nine years. This very slow reproductive rate makes the orangutan the slowest-reproducing animal on the planet! Primates are also

characterized by having long lifespans. The group that includes humans and large-bodied apes has the most extended life history patterns among all primates, with some large-bodied apes estimated to live up to 58 years in the wild.

Lastly, primates share some behavioral and ecological traits. Primates are very social animals, and all primates, even those that search for food alone, have strong social networks with others of their species. Indeed, social networks in primates have been shown to be crucial in times of stress and to enhance reproductive success (Silk et al. 2009). Unlike many animals, primates do not migrate. This means that primates stay in a relatively stable area for their whole life, often interacting with the same individuals for their long lives. The long-term relationships that primates form with others of their species lead to complex and fascinating social behaviors. Finally, non-human primates show a clear preference for tropical regions of the world. Most primates are found between the Tropic of Cancer and the Tropic of Capricorn, with only a few taxa living outside of these regions. You can see a summary of the primate suite of traits below.

Primate suite of traits
Convergent eyes
Post-orbital bar
Many have trichromatic color vision
Short snouts
Opposable thumbs and big toes
Pentadactyly
Flattened nails
Tactile pads
Highly arboreal
Large brains
Extended life histories
Live in the tropics

Key Traits Used to Distinguish between Primate Taxa

When trying to place primate species into specific taxonomic groups, we use a variety of dental characteristics, locomotor adaptations, and behavioral adaptations. Differences in these characteristics across groups reflect constraints of evolutionary history as well as variation in adaptations.

Dental Characteristics

We can learn a tremendous amount of information about an organism from its teeth. First, teeth are vital to survival. Wild animals do not have the benefit of knives and forks, and so rely primarily on their teeth to process their food. Because of this, teeth of any species have evolved to reflect what that organism eats and so tell us directly about their diet. Second, variation in tooth size, shape, and number tells us a lot about an organism's evolutionary history. Some taxa have more teeth than others or different forms of teeth than others. Furthermore, differences in teeth between males and females can tell us about competition over mates. Lastly, teeth preserve really well in the fossil record. Enamel is hard, and there is little meat on jaws so carnivores and scavengers often leave them behind. Because of this, very often we find a lot of fossil jaws and teeth, and so we need to be able to learn as much as we can from those pieces.

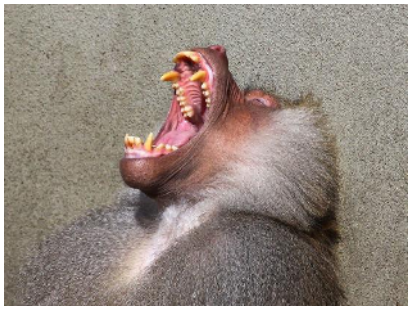


Figure 3. This open-mouthed Hamadryas baboon clearly demonstrates the diastema between his upper canine and front teeth. This space is taken up by his lower canine when he closes his mouth.

If you've ever seen the jaws of a shark, dinosaur, or crocodile, you were probably struck by how sharp their teeth were and by the sheer number of teeth they had. What you probably didn't think about was that they also only have one type of tooth, referred to as homodont**.** In fact, one of the ways that mammals differ from other organisms is that we have multiple types of teeth, known as **heterodont,** that we use in different ways. We have incisors, which we use for slicing; we have premolars and molars, which we use for grinding up our food; and we have canines, which most primates (not humans) use as weapons against predators and each other. The sizes of canines vary across species and can often be **sexually dimorphic**, with male canines usually being larger than those of females. Non-human primates often hone, or sharpen, their canines by gnashing the teeth together to sharpen the sides. The upper canine sharpens on the first lower premolar and the lower canine sharpens on the front of the upper canine. As canines get larger, they require a space to fit in order for the jaws to close. This space between the teeth is called a **diastema** (Figure 3).

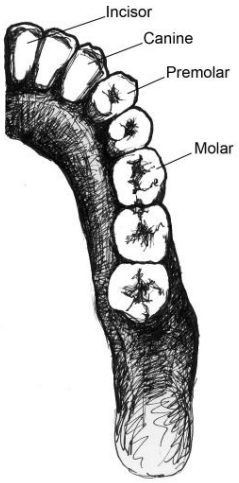


Figure 4. This drawing shows half of the human mandible.

Primate taxa vary in the numbers and forms of teeth they have. We determine the number of each type of tooth an organism has by its **dental formula**. The dental formula tells you how many incisors, canines, premolars, and molars are in each quadrant of the mouth (half of the top or bottom). For example, Figure 4 shows half of the lower teeth of a human.

Teeth also tell us directly about a primate's diet. Primates are known to eat a wide range of plant parts, insects, gums, and, rarely, meat. While all primates eat a variety of foods, what differs among primates are the proportions of each of these food items in the diet. That is, two primates living in the same forest may be eating the same foods but in vastly different proportions, and so we would categorize them as different dietary types. The most common dietary types among primates are those whose diets consist primarily of fruit (**frugivores**), those who eat mostly insects (**insectivores**), and those who eat primarily leaves (**folivores**). Fewer primates are **gummivores**, who specialize in eating gums and saps.

Plants want animals to eat their fruits because, in doing so, animals eat the seeds of the fruit and then disperse them far away from the parent plant. Because plants want animals to eat the fruit, plants often "advertise" fruits by making them colorful and easy to spot, full of easy-to-digest sugars that make them taste good—and, often, easy to chew and digest (not being too fibrous or tough). For these reasons, frugivores often do not need a lot of specialized traits to consume a diet rich in fruits. Primates that eat fruit tend to have stomachs, colons, and small intestines that are intermediate in terms of size and complexity between insectivores and folivores (Chivers and Hladik 1980). They are also usually of intermediate body size between the other two dietary types. Because fruit does not contain protein, frugivores must supplement their diet with protein from insects and/or leaves. Some frugivorous primates get protein by eating seeds.

Insects can be difficult to find and catch but are not typically difficult to chew. As a result, insectivorous primates usually have small, pointed molars that allow them to puncture the exoskeleton of the insects. Once the outer shells of the insects are punctured, insects are not difficult to digest, so insectivores have simple stomachs and colons and a long small intestine. Nutritionally, insects provide a lot of protein and fat but are not plentiful enough in the environment to support large-bodied animals, so insectivores are usually the smallest of the primates.

Unlike with fruits, plants do not want animals to eat their leaves. Leaves are the way plants get their energy from the sun, therefore, plants evolved to make their leaves difficult for animals to eat. Leaves often have toxins in them, taste bitter, are very fibrous and difficult to chew, and are made of large cellulose molecules that are difficult to break down into usable sugars. Because of these

defenses, animals who eat leaves need a lot of specialized traits. Folivorous primates have broad molars with high, pointed cusps and crests that are good at slicing leaves. These molar traits allow folivores to physically break down fibrous leaves when chewing. Folivores then have to chemically break down cellulose molecules into usable energy, so these animals need specialized digestive systems. Some folivores have complex stomachs with multiple compartments, but all leaf eaters have large, long intestines and special gut bacteria that can break up cellulose. Folivores are usually the largest bodied of all primates, and they spend a large portion of their day digesting their food, so they are often less active than frugivores or insectivores.

Behavioral Adaptations

Behavioral differences amongst living primates include variations in activity patterns, social grouping, and habitat use. Primate groups often differ in **activity patterns**—that is, whether they are active during the day (diurnal), at night (nocturnal), or through the 24-hour period (cathemeral). We also see variations among primate groups in social groupings: some taxa are primarily solitary, others live in pairs, and still others live in groups of varying sizes and compositions. Lastly, some taxa are primarily **arboreal** while others are more **terrestrial**.

Locomotor Adaptations

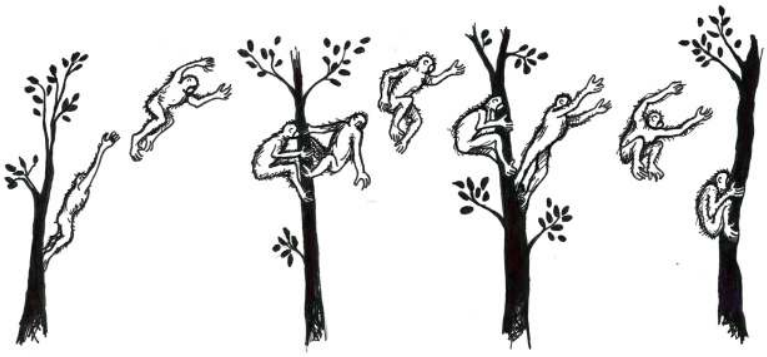


Figure 5. An example of a vertical clinger and leaper. Note the longer legs than arms, long lower back and long fingers and toes. This vertical clinger and leaper doesn't have a tail, but most have long tails as well.

Finally, primate groups vary in their adaptations for different forms of **locomotion**, or how they move around. Living primates are known to move by vertical clinging and leaping, quadrupedalism, brachiation, and bipedalism. **Vertical clinging and leaping** is when an animal grasps a vertical branch with its body upright, pushes off with long hind legs and then lands on another vertical support branch (Figure 5). Animals who move in this way usually have longer legs than arms, long fingers and toes, and smaller bodies. Vertical clinger leapers also tend to have elongated ankle bones, which serve as a lever to help them push off with their legs and leap to another branch.

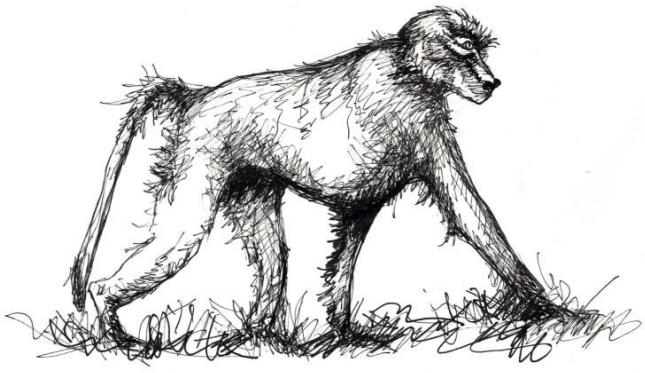
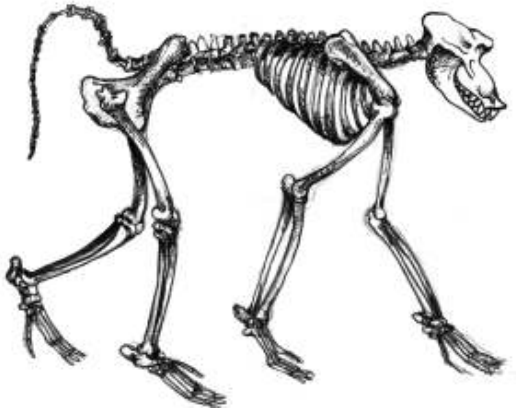


Figure 6. Here are examples of a typical quadrupedal primate. Note that the arms and legs are about the same length and the back is long and flexible. This is a terrestrial quadruped so the arms and legs are relatively long and the tail is shorter.



Quadrupedalism is the most common form of locomotion among primates (Figure 6). The term *quadrupedal* means to walk on all fours. Animals that move in this way usually have legs and arms that are about the same length and typically have a tail for balance. Arboreal quadrupeds usually have shorter arms and legs and longer tails, while terrestrial quadrupeds have longer arms and legs and, often, shorter tails. These differences relate to the lower center of gravity needed by arboreal quadrupeds for balance in trees and the longer tail required for better balance when moving along the tops of branches. Terrestrial quadrupeds have longer limbs to help them cover more distance more efficiently.

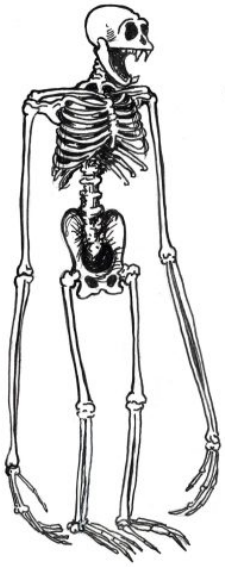


Figure 7. These are examples of a typical brachiator. Note the longer arms than legs, short back, and lack of a tail. You will read about more details of their anatomy later in the chapter.

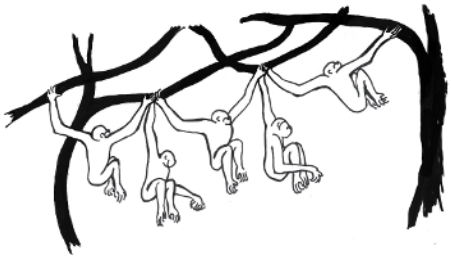




Figure 8. Spider monkeys, like the one shown here, are considered semi-brachiators who can swing below branches but use their tails as a third limb. On the ground they move via quadrupedal locomotion.

The third form of locomotion seen in primates is **brachiation**, the way of moving you used if you played on "monkey bars" as a child. Brachiation involves swinging below branches by the hands (Figure 7). To be an efficient brachiator, a primate needs to have longer arms than legs, flexible shoulders and wrists, a short lower back, and no tail. Some primates move via semi-brachiation. These taxa also swing below branches but do not have all of the same specializations as brachiators. They have flexible shoulders, but their arms and legs are about the same length, useful because they are quadrupedal when on the ground. Semi-brachiators also use long **prehensile tails** as a third limb when swinging (Figure 8). The underside of the tail has a tactile pad, resembling your fingerprints, for better grip.

Lastly, humans move around on two feet, called **bipedalism**. Some primates will occasionally travel on two feet but do so awkwardly and never for long distances. Among mammals, only humans have evolved to walk with a striding gait on two legs as a primary form of locomotion. To move bipedally, humans need many specialized adaptations that will be discussed in detail in later chapters.

Primate Diversity

As we begin exploring the different taxa of primates, it is important to keep in mind the hierarchical nature of taxonomic classification and how this relates to the key characteristics that will be covered. Figure 9 summarizes the major taxonomic groups of primates. If you locate humans on the chart, you can trace our classification and see all of the categories getting more and more inclusive as you work your way up to the Order Primates. What this means is that humans will have the key traits of each of those groups. It is a good idea to refer to the figure to orient yourself as we discuss each taxon.

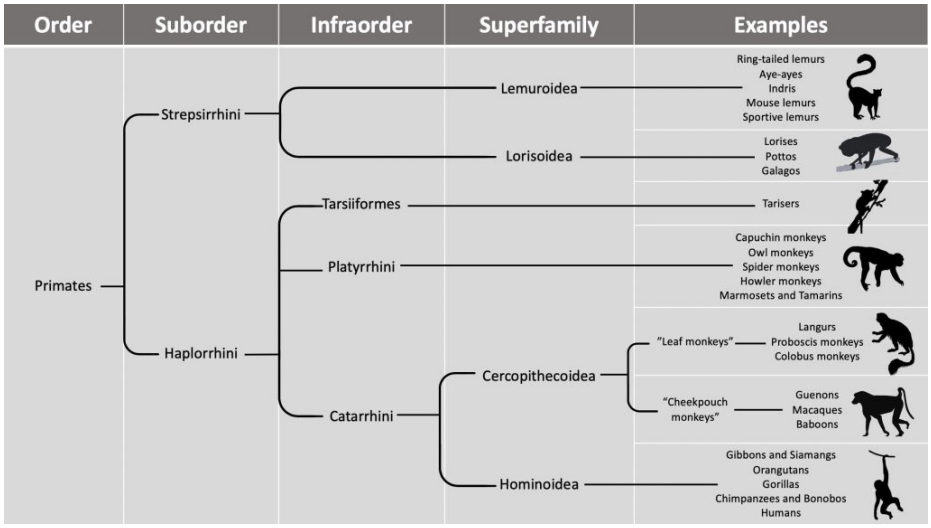


Figure 9. This taxonomy chart shows the major groups of primate taxa. Be sure to refer back to this chart as you read through the primate groups so that you can see how each group is related to one another.

Ways of Organizing Taxa

Our goal in taxonomic classification is to place taxa into categories that reflect their clade relationships. A **clade** is a grouping of organisms that reflect a branch of the evolutionary tree, a grouping based on relatedness. Clade relationships are determined using derived traits shared by groups of taxa as well as genetic similarities. We are mostly going to refer to the primate groups by their informal names, but you can refer to Figure 9 for the scientific names for their various nested clades.



Figure 10. The foot of a ring-tailed lemur showing its grooming claw on the second digit.

The first group of primates include the species commonly called lemurs, lorises, and galagos. These primates all share two key derived traits: the **grooming claw** (Figure 10), which is on the second digit of each foot, and the **tooth comb** (or dental comb), located on the lower, front teeth (Figure 11). They also all retain a long snout and wet nose (like the nose of your dog or cat) – reflecting their greater reliance on olfaction. Indeed, many of these species use scent marking, rubbing scent glands or urine on objects in the environment to communicate with others. Additionally, many primate species in this group have mobile ears that they use to locate insect prey and predators. All lemurs, lorises, and galagos have a **tapetum lucidum**, a reflective layer at the back of the eye that reflects light and thereby enhances the ability to see in low-light conditions. It is the same layer that causes your dog or cat to have "yellow eye" when you take photos of them with the flash on. It is thought to be primitive among mammals as a whole.

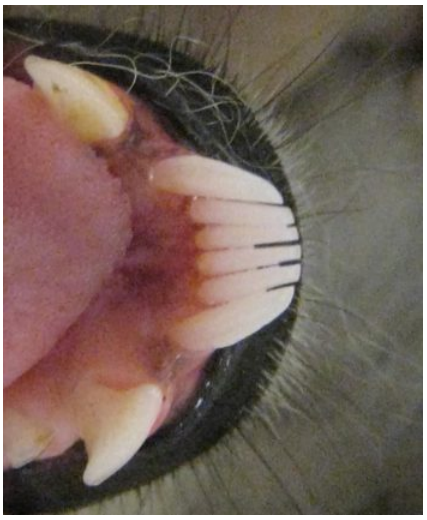


Figure 11. The lower front teeth of a ring-tailed lemur showing a tooth comb.

The majority of the species in this group are solitary, traveling alone to search for food, although some taxa are more social. Most are also nocturnal and arboreal, have smaller body sizes, and consume a diet consisting of insects and fruit, with few taxa eating primarily leaves. Lastly, most of these species are good at leaping, including vertical clinging and leaping.

Species in this group can be found all across the Asia, Africa, and on the island of Madagascar (Figure 12).



Figure 12. Geographic distribution of living lemurs, lorises, and galagos. Lemurs live only on the island of Madagascar, while their relatives the lorises and galagos live across Central Africa and South and Southeast Asia.

Lemurs of Madagascar

Madagascar is an island off the east coast of Africa, and it is roughly the size of California, Oregon, and Washington combined. It has been separated from Africa for about 130 million years and from India for about 85 million years, which means it was already an island when lemur ancestors got there approximately 60–70 million years ago. Only a few mammal species ever reached Madagascar, and so when lemurs arrived they were able to flourish into a variety of forms.



Figure 13. Indris, the largest of the lemurs. These folivorous lemurs are vertical clingers and leapers and live in pairs.

The lemurs of Madagascar are much more diverse compared to their mainland counterparts, the lorises and galagos. While many species are nocturnal, plenty of others are diurnal or cathemeral. They range in body size from the smallest of all primates, the mouse lemur, some species of which weigh a little over an ounce, up to the largest lemur, the indri, which weighs up to about 20 pounds (Figure 13). Lemurs include species that are insectivorous, frugivorous, and folivorous. A couple of members of this group have specialized in more unusual diets for primates. These include the gummivorous fork-marked lemurs as well as bamboo lemurs, who are able to metabolize the cyanide in bamboo. The most unusual lemur is the aye-aye. This nocturnal lemur exhibits traits not seen in any other primate, including having rodent-like front teeth that grow continuously and a long-bony middle finger that it uses to fish grubs out of wood. It has a very large brain compared to other lemurs, which it fuels with a diet that includes bird's eggs and other animal matter. Based on genetic estimates and morphological studies, it is believed that aye-ayes were the first lemurs to separate from all of the other strepsirrhines and so have been evolving on their own since around the time strepsirrhines got to Madagascar (Matsui et al. 2009).

Lemurs are also diverse in terms of behavior. Many are solitary foragers, but some live in pairs, others in small groups, some in larger groups, and some, like the red-ruffed lemur, are now known to live in complex social groups that are unlike what we see in any other primates. It is also among the lemurs that we see some of the best vertical clingers and leapers. Many lemurs are quadrupedal, but even the quadrupedal lemurs are quite adept at leaping. Malagasy strepsirrhines also exhibit a few unusual traits. They are highly seasonal breeders, often mating only during a short window, once a year. Female ring-tailed lemurs, for example, only come into estrus one day a year for a mere six hours. Lemurs are also unusual in that females are socially dominant. In most

primates, males dominate females because they are typically larger and exhibit greater aggression, but in lemur groups, males and females are usually the same size and females have priority access to resources over males.

Lorises, Pottos, and Galagos of Asia and Africa

Unlike the lemurs of Madagascar, lorises, pottos, and galagos live in areas where they share their environments with monkeys and apes, who often eat similar foods. Lorises live across South and Southeast Asia, while pottos and galagos live across Central Africa. Because of competition with larger-bodied monkeys and apes, mainland lorises, pottos, and galagos are more restricted in the niches they can fill in their environments and so are not as diverse as the lemurs of Madagascar.



Figure 14 This slow loris, like all others in this taxonomic group, is solitary and nocturnal, with a diet heavy in insects and fruit.

All species in Africa and Asia are nocturnal and solitary. Their body sizes don't range as greatly as the lemurs, and neither do their diets. For the most part, the diet of lorises, pottos, and galagos consist of fruits and insects. A couple of species eat more gum, but overall the diet of this group is fairly narrow when compared to the Malagasy lemurs. Lorises and pottos are known for being slow, quadrupedal climbers, moving quietly through the forests to avoid being detected by predators (Figure 14). Because they are not fast moving, they have developed alternative defenses against predators. Lorises, for example, eat a lot of caterpillars, which makes their saliva slightly toxic. Loris mothers will then bathe their young in this toxic saliva, thus making the babies unappealing to predators. In comparison to the slow-moving lorises and pottos, galagos are active quadrupedal runners and leapers that scurry about the forests at night. Galagos make distinctive calls that sound like a baby crying, which has led to their nickname "bushbabies." The chart below summarizes the key differences between the lemurs of Madagascar and the lorises, galagos, and pottos of Africa and Asia.

	 **Lemurs**	 **Lorises, Pottos and Galagos**
Geographic range	Madagascar	South and Southeast Asia and Central Asia
Activity patterns	Diurnal, nocturnal or cathemeral	Nocturnal
Dietary types	Insectivore, frugivore or folivore	Insectivore, frugivore
Social groupings	Solitary, pairs, or small to large groups	Solitary

	 **Lemurs**	 **Lorises, Pottos and Galagos**
Forms of locomotion	Vertical clinger leapers, quadrupedal	Slow quadrupedal climbers and active quadrupedal runners

Tarsiers, monkeys, and apes

The group in including tarsiers, monkeys, and apes shares many derived traits. Their visual systems are more developed, and many are trichromatic. With one exception, they all have full postorbital closure (Figure 1), and more convergent convergent eyes. The heavier reliance on vision over olfaction is also reflected in their shorter snouts ending with a **dry nose**. All but two genera in this group are active during the day, so they lack the tapetum lucidum which is so useful to nocturnal species. On average, they also have larger brains relative to their body size when compared with lemurs, lorises, and galagos.

This group of primates is generally larger than lemurs and lorises, and so we see many more species that are folivorous and frugivorous, and fewer that are insectivorous. The larger body size of this group also influences locomotion. Only one member is a vertical clinger and leaper; most are quadrupedal, with one subgroup specialized for brachiation. Many members of this group show moderate to high sexual dimorphism in body size and canine size. All but two species live in groups, which is very different from the primarily solitary lemurs and lorises. Differences between the two suborders are summarized in the chart below.

	 **Lemurs, lorises, and galagos**	 **Tarsiers, monkeys, and apes**
Sensory adaptations	Wet nose Longer snout Eyes less convergent Post-orbital bar Tapetum lucidum Mobile ears	Dry nose Short snout Eyes more convergent Post-orbital plate No tapetum lucidum Many are trichromatic
Dietary differences	Mostly insectivores and frugivores, few folivores	Few insectivores, mostly frugivores and folivores
Activity patterns and Ecology	Mostly nocturnal, few diurnal or cathemeral Almost entirely arboreal	Only two are nocturnal, rest are diurnal Many arboreal taxa, also many terrestrial taxa
Social groupings	Mostly solitary, some pairs, small to large groups	Only two are solitary, all others live in pairs, small to very large groups
Sexual dimorphism	Minimal to none	Few taxa have little/none, many taxa show moderate to high dimorphism

This larger group is divided into three smaller groups based on shared characteristics: Tarsiiformes, which includes the tarsiers of Asia; Platyrrhini, which includes the monkeys of Central and South America; and Catarrhini, a group that includes the monkeys and apes of Asia and Africa, as well as humans. According to molecular estimates, tarsiers split from the other groups close to 70 million years ago, and platyrrhini split from catarrhini close to 46 million years ago (Pozzi et al. 2014).

Tarsiers of Asia



Figure 15. Tarsiers are the only living representatives of their group

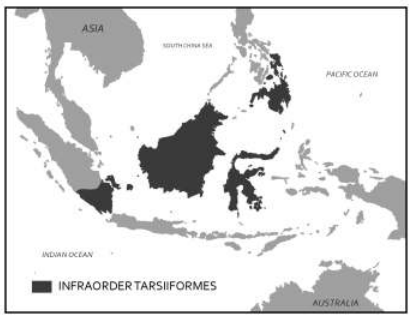


Figure 16. Tarsiers can be found in tropical forests of Southeast Asia.

Today, this group includes only one genus, Tarsius (Figure 15). Tarsiers are small-bodied primates that live in Southeast Asian forests (Figure 16) and possess an unusual collection of traits that have led to some debate about their position in the primate taxonomy. They share several key derived traits with monkeys, apes, and humans, including dry noses, not having a tapetum lucidum, and having eyes that are close together. Tarsiers also have some traits that are more like lemurs and lorises and some that are unique. Tarsiers are the only member of their group that are specialized vertical clinger leapers. Tarsiers actually get their name because their ankle (tarsal) bones are elongated to provide a lever for vertical clinging and leaping. Tarsiiformes are also small, with most species weighing between 100 and 150 grams. Like lemurs and lorises, tarsiers are nocturnal, but because they lack a tapetum lucidum, tarsiers compensate by having enormous eyes. In fact, each eye of a tarsier is larger than its brain. These large eyes allow enough light in for tarsiers to still be able to see well at night without the reflecting layer in their eyes. To protect their large eyes, tarsiers have a partially closed postorbital plate that is somewhat intermediate between the postorbital bar of lemurs and the full postorbital closure of monkeys and apes. Other unusual traits of tarsiers include having two grooming claws on each foot and the ability to rotate their heads around 180 degrees, a trait useful in locating insect prey. The tarsier diet consists entirely of animal matter, making them the only primate not to eat any vegetation. They are also only one of two living members of this group to be solitary, the other being the orangutan. Most tarsiers are not sexually dimorphic, although males of a few species are slightly larger than females.

Some scientists have argued about the best way to classify tarsiers because of the types of characteristics they share with lemurs, lorises, monkeys, and apes, but today most classification schemes group them with monkeys and apes. This is based on the interpretation that their shared derived characteristics suggest that they are most closely related to monkeys and apes.

Central and South American Monkeys



Figure 17. Geographic distribution of Central and South American monkeys. They are the only naturally occurring non-human primates in the Americas.

Central and South American monkeys are the only non-human primates in Central and South America (Figure 17) and so, like the lemurs of Madagascar, have diversified into a variety of forms in the absence of competition. Their noses that are flat and wide, with nostrils that are far apart, facing outward, and usually round in shape (Figure 18). This nose shape is very different from what we see in African and Asian monkeys, apes, and humans.



Figure 18. A capuchin monkey demonstrating a typical Central and South American monkey nose shape with round nostrils pointing outward on a flat nose.

On average, Central and South American monkeys are smaller and less sexually dimorphic than African and Asian monkeys and apes. Central and South American monkeys are also all highly **arboreal**, whereas many African and Asian monkeys and apes spend significant time on the ground. The Central and South American monkeys monkeys also differ in having less well-developed vision. This is reflected in the wiring in the visual system of the brain but also in their **polymorphic color vision**. The genes that enable individuals to distinguish reds and yellows from blues and greens are on the X chromosome. Different genes code for being able to see different wavelengths of light so to distinguish between them you need to be heterozygous for seeing color. In Central and South American monkeys, each X chromosome carries the genes for seeing one wavelength. This means that male monkeys (having only one X chromosome) are always dichromatic. Female monkeys in Central and South America can be dichromatic (if they are homozygous for the same version of the color vision gene) or trichromatic (if they are heterozygous). We currently know of only two exceptions to this pattern among Central and South American monkeys. Owl monkeys, which are nocturnal, cannot distinguish any colors. The other exception are Howler monkeys, which have evolved to have two color vision genes on each X chromosome. This means that both male and female howler monkeys are able to see reds and yellows. As we will discuss, all African and Asian monkeys, apes, and humans are trichromatic.

Central and South American monkeys include the smallest of the monkeys, the marmosets and tamarins (Figure 19). These small monkeys, all of which weigh less than 1 kilogram, live in cooperative family groups, wherein usually only one female reproduces and everyone else helps carry and raise the offspring. They are unusual primates in that they regularly produce twins. The diet of marmosets and tamarins largely consists of gums and saps, so these monkeys have evolved claw-like nails that enable them to cling to the sides of tree trunks like squirrels as well as special teeth that allow them to gnaw through bark.

The largest of the Central and South American monkeys are a family that include spider monkeys, woolly spider monkeys, woolly monkeys, and howler monkeys (Figure 20). This group of monkeys can weigh up to 9–15 kg and have evolved prehensile tails that can hold their entire body weight. It is among this group that we see semi-brachiators, like the spider monkey (Figure 8). To make them more efficient in this form of locomotion, spider monkeys evolved to not have thumbs so that their hands work more like hooks that can easily let go of branches while swinging. Howler monkeys are another well-known member of this group, earning their name due to their loud calls, which can be heard for miles away. To make these loud vocalizations, howler monkeys have a specialized vocal system that includes a large larynx and hyoid bone. Howler monkeys are the most folivorous of the Central and South American monkeys and are known for spending a large portion of their day digesting their food.

There are many other monkeys in the Central and South America, including the gregarious capuchins (Figure 18) and squirrel monkeys, the pair-living titi monkeys, and the nocturnal owl monkeys. There are also the seed-eating monkeys such as saki monkeys and uakaris. In many areas across Central and South America, multiple different species of monkey will share the forests, and some species will even travel together in associations. According to molecular evidence, the diversity of Central and South American monkeys that we see today seems to have originated about 25 million years ago (Schneider and Sampaio 2015).



Figure 19. (Clockwise from top-right) golden-headed lion tamarin, pygmy marmoset, Goeldi's monkey, bare-eared marmoset, emperor tamarin, and common marmoset.



Figure 20. (Clockwise from top right) howler monkey, woolly monkey, woolly spider monkey, and spider monkey.

Monkeys and apes of Asia and Africa

Non-human members of this group are found all over Africa and South and Southeast Asia, with some being found as far north as Japan. The most northerly and southerly distributed species are monkeys. In contrast, apes are less tolerant of drier, more seasonal environments and so have a relatively restricted geographic range.



Figure 21 A Wolf's guenon demonstrating a typical African and Asian monkey and apes nose.

African and Asian monkeys and apes have a distinctive nose shape, with teardrop-shaped nostrils that are close together and point downward (Figure 21). On average, African and Asian monkeys and apes are the largest and most sexually dimorphic group of primates. Gorillas are the largest of all living primates, with males weighing up to 220 kg. The most sexually dimorphic of all primates are mandrills. Mandrill males not only have much more vibrant coloration than mandrill females but also have larger canines and can weigh up to three times more. The larger body size of African and Asian monkeys and apes is related to the more terrestrial lifestyle of many members of this group. In fact, the most terrestrial of living primates can be found in this group. Among all primate taxa, vision is the most developed in African and Asian monkeys and apes. They independently evolved the same adaptation as howler monkeys in having each X chromosome with sufficient genes to distinguish both reds and yellows, so all African and Asian monkeys and apes are **trichromatic**. Trichromatic color vision is particularly useful to this group because they are all diurnal.

This group is divided into two superfamilies: monkeys and hominoids (apes including humans). Molecular estimates place the split between African and Asian monkeys and apes at about 32 million years ago (Pozzi et al. 2014).

Monkeys of Africa and Asia

Compared to hominoids, African and Asian monkeys have a more primitive quadrupedal body plan, but they do have a couple of derived traits shared by all members of this group. All African and Asian monkeys have **bilophodont molars** ("bi" meaning two, "loph" referring to ridge, and "dont" meaning tooth). It is thought that this molar enabled African and Asian monkeys to eat a wide range of foods, thus allowing them to live in habitats that apes cannot. The other key derived trait that all African and Asian monkeys share is having **ischial callosities** (Figure 22). The ischium is the part of your pelvis that you are sitting on right now. In African and Asian monkeys, this part of the pelvis has a flattened surface that, in living animals, will have callused skin over it. These function as seat pads for these monkeys, who often sit above branches or on hot or sharp rocks when feeding and resting.

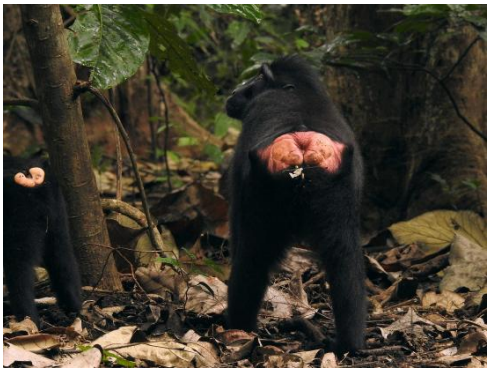


Figure 22. The second derived trait of cercopithecoids are their ischial callosities, shown here on a crested black macaque.

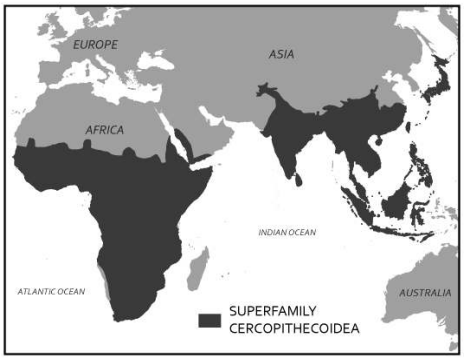


Figure 23. Geographic distribution of the African and Asian monkeys (here, “Cercopithecoidea”). They have the widest geographic distribution.



Figure 24. Silver leaf monkey infants are born with orange fur, dramatically contrasting the adult coat color of their mothers. After a few months, the infants gradually change color to that of their parents.

The African and Asian monkeys are the most geographically widespread group of non-human primates (Figure 23). Since their divergence from hominoids, this monkey group has increased in numbers and diversity. In part, their success over hominoids is due to the faster reproductive rates of monkeys relative to hominoids. On average, African and Asian monkeys will reproduce every one to two years, whereas hominoids will reproduce once every four to nine years, depending on the taxon.

There are two groups of African and Asian monkeys: the leaf monkeys and the cheek-pouch monkeys. Both groups coexist in Asia and Africa; however, the majority of leaf monkey species live in Asia with only a few taxa in Africa. In contrast, only one genus of cheek-pouch monkey lives in Asia, and all the rest of them in Africa. As you can probably guess based on their names, the two groups differ in terms of diet. Leaf monkeys are primarily folivores, with some species eating a significant amount of seeds. Cheek-pouch monkeys tend to be more frugivorous or omnivorous, with one taxon, geladas, eating primarily grasses. The two groups also differ in some other interesting ways. Leaf monkeys tend to produce infants with natal coats—infants whose fur is a completely different color from their parents (Figure 24). Leaf monkeys are also known for having odd noses, and so they are sometimes called “odd-nosed monkeys.” Cheek-pouch monkeys are able to pack food into their cheek pouches (Figure 25), thus allowing them to move to a location safe from predators or aggressive individuals of their own species where they can eat in peace.



Figure 25. This bonnet macaque has filled its cheek pouches with food. This adaptation is useful in transporting food to a safer location to eat

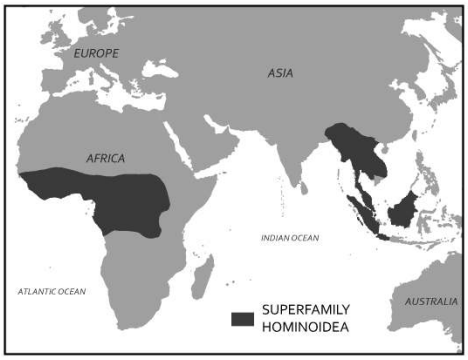


Figure 26. Geographic distribution of apes across Central and West Africa, and Southeast Asia. Hominoids overlap geographically with cercopithecoid monkeys but have a lower tolerance for seasonal environments and so are found only in tropical forests across these regions.

The Hominoidea of Africa and Asia (Figure 26) includes the largest of the living primates, apes and humans, but our superfamily differs from other primates in some other key ways as well. When compared to African and Asian monkeys, hominoids have more primitive teeth. Where hominoids differ the most from other primates, however, is in our body plans. This is due to the unusual form of locomotion that hominoids are adapted for, **brachiation**.

To successfully swing below branches, many changes to the body needed to occur. The arms of a hominoid are much longer than the legs in order to increase reach, and the lower back is shorter and less flexible to increase control when swinging. The torso, shoulders, and arms of hominoids have evolved to increase range of motion and flexibility. The clavicle, or collar bone, is longer in order to stabilize the shoulder joint out to the side, thus enabling us to rotate our arms 360 degrees. Our rib cages are wider side to side and shallower front to back than those of monkeys and we do not have tails, as tails are useful for balance when running on all fours but not useful when swinging.

Apes and humans also differ from other primates in behavior and life history characteristics (see chart below). Hominoids are characterized by the most extended life histories of all primates. All members of this group live a long time and take a long time to grow and start reproducing. Hominoids also reproduce much less frequently compared to African and Asian monkeys. The slow pace of this life history is likely related to why hominoids have decreased in diversity since they first evolved. In the past, hominoids were tremendously diverse in both geography and adaptations. Today, there are only five types of hominoids left: gibbons and siamangs, orangutans, gorillas, chimpanzees and bonobos, and humans.

African and Asian monkeys and apes
Downward facing, tear-drop shaped nostrils, close together
Arboreal and more terrestrial taxa
On average, largest primates
On average, most sexually dimorphic taxonomic group
All trichromatic

 **African and Asian monkeys**	 **Hominoids (apes)**
Wide geographic distribution	Tropical forests of Africa and Asia
Bilophodont molars	More primitive molars
Ischial callosities	Adaptations for brachiation
Reproduce every 1-2 years	Reproduce every 4-9 years

Gibbons and Siamangs of Southeast Asia



Figure 27. Siamangs are the largest of this group. They are all black and, as you can see inflated in this photo, have a throat sac that they use to give loud calls.

Both gibbons and siamangs are found across Southeast Asian tropical forests. These are the smallest of the hominoids and so are sometimes referred to as the "lesser apes." Gibbons weigh, on average, about 13 pounds and tend to be more frugivorous, whereas siamangs are about twice the size of gibbons and are more folivorous. Unlike the larger-bodied apes (orangutans, chimps, bonobos, and gorillas) who make nests to sleep in every night, gibbons and siamangs will develop callused patches on their ischium resembling ischial callosities. There are many different gibbon species that vary in their coloration and markings. Siamangs, however, are all black with big throat sacs that are used in their exuberant vocalizations (Figure 27). Both gibbons and siamangs live in pairs with very little sexual dimorphism, although males and females do differ in coloration in some species.

Pongo of Southeast Asia



Figure 28. A female orangutan and her infant.



Figure 29. A flanged adult male. Male orangutans are about twice the size of females, and in these photos you can also see the sexual dimorphism in coat length, cheek flanges and throat sac in the male.

The Genus *Pongo* refers to orangutans. These large red apes are found on the islands of Borneo and Sumatra in Southeast Asia. There are two well-known species of orangutan, one on each island. Recently, a third, very rare species was discovered in Southern Sumatra (Nater et al. 2017). Orangutans are highly frugivorous but will supplement their diet with leaves and even bark when fruit is less available. Orangutans are the only diurnal, solitary taxon among primates and are extremely slow to reproduce, producing only one offspring about every seven to nine years. They are highly sexually dimorphic (Figures 28 and 29), with fully developed, "flanged" males being approximately twice the size of females. These males have large throat sacs; long, shaggy coats; and cheek flanges.The skulls of male orangutans often feature a **sagittal crest**, which is believed to function as both additional attachment area for chewing muscles but also in sexual competition. An unusual feature of orangutan biology is male bimaturism. Male orangutans are known to delay maturation until one of the more dominant, flanged males disappears. The males that delay maturation are called "unflanged" males, and they can remain in this state for their entire life. Unflanged males resemble females in their size and appearance and will sneak copulations with females while avoiding the bigger, flanged males. Flanged and unflanged male orangutans represent alternative reproductive strategies, both of which successfully produce offspring.

Gorilla of Africa



Figure 30. A female gorilla and her offspring.



Figure 31. A silverback male. Male gorillas are about twice the size of females, but also differ from females in having a large sagittal crest, and silver back, which appears as they mature.

There are several species of gorillas that can be found across Central Africa. Gorilla males, like orangutan males, are about twice the size of female gorillas (Figures 30 and 31). When on the ground, gorillas use a form of quadrupedalism called **knuckle-walking**, where the fingers are curled under and the weight is carried on the knuckles. Male gorillas have a large **sagittal crest** and larger canines compared with females. Adult male gorillas are often called "silverbacks" because when they reach about twelve to thirteen years old, the hair on their backs turns silvery gray. Gorillas typically live in groups of one male and several females. Gorillas are considered folivorous, although they can be more frugivorous depending on fruit seasonality.

Pan of Africa



Figure 32. Bonobo, *Pan paniscus*. You can see the distinctive hair-part on this bonobo.

The Genus *Pan* includes two species: *Pan troglodytes* (the common chimpanzee) and *Pan paniscus* (the bonobo). These species are separated by the Congo River, with chimpanzees ranging across West and Central Africa and bonobos located in a restricted area south of the Congo River. Chimpanzees and bonobos both have broad, largely frugivorous diets and similar social groups. The two species differ morphologically in that bonobos are slightly smaller, have their hair parted down the middle of their foreheads, and are born with dark faces (Figure 32). In contrast, chimpanzees do not have the distinctive parted hair and are born with light faces which darken as they mature (Figure 33). Chimpanzees and bonobos live in a grouping called a fission-fusion community, which means they will gather in larger groups when there is enough food to support them, but otherwise forage in smaller groups. Both species are moderately sexually dimorphic, with males about 20% larger than females. When on the ground, chimpanzees and bonobos **knuckle-walk** like gorillas do.



Figure 33. A common chimpanzee, *Pan troglodytes*, female and her offspring. Note the pink face of the youngest individual. Bonobos are born with dark-skinned faces, but chimpanzees are born with pink faces that darken with age.

Homo

The last member of the Hominoidea to discuss is our own taxon, the genus *Homo*. Humans differ from apes in many aspects, but there are clear similarities between humans and the other apes in our morphology and life history. Like other hominoids, humans lack a tail and possess upper-body adaptations for brachiation. While our lower body has been modified for a bipedal gait, we are still able to swing from branches or "monkey bars," or throw a fastball, all thanks to our mobile shoulder joint. Humans, like other hominoids, also have primitive molars. As discussed earlier, all hominoids have an extended life history, taking a long time to grow and develop, and have a long life span. Humans, too, exhibit these same characteristics. Lastly, while humans show a great deal of variation across cultures, many human societies show patterns of female dispersal in which males stay in the group into which they were born while females leave.

Among the hominoids, humans show particular affinities with other members of the African apes, *Pan* and *Gorilla*. Humans share over 96% of our DNA with gorillas (Scally et al. 2012), and over 98% with *Pan* (Ebersberger et al. 2002). Our closest living relatives today are chimpanzees and bonobos. Because of our close relationship, humans share many additional traits in common with *Pan*. Humans, chimpanzees, and bonobos all live in similar social groups that are characterized by territoriality and male cooperation, among other things. Chimpanzee males are well-known to cooperate in hunting, a common trait across human societies as well. Chimpanzee populations have also been observed to make and use tools for different purposes, not unlike what humans do.

Learning from Primates

While primates are fascinating animals in their own right, we study non-human primates in anthropology with the ultimate goal of understanding more about our own biology and evolutionary history. The close relationship between humans and non-human primates makes them excellent for studying humans via **homology,** looking at traits that are shared between two taxa because they inherited the trait from a common ancestor. Consider, for example, the characteristics discussed in the previous section that are shared by humans and *Pan*. Since both taxa exhibit these traits, they are likely *homologous*, meaning these shared traits were probably present in the last common ancestor of humans and *Pan* approximately 6-8 million years ago .

Non-human primates also make excellent comparators for learning about humans via analogy (sometimes called **convergent evolution**, parallel evolution, or homoplasy). Many non-human primates live in environments or social groups similar to those in which our ancestors lived and therefore exhibit similar behavioral and morphological traits as what we see in humans. For example, baboons and humans share the trait of having long legs. In humans, this is because about 1.8 million years ago, our ancestors moved into open savanna habitats, like those baboons live in today, and longer legs enabled them to move over long distances more efficiently. Baboons independently evolved longer arms and legs for the same reason—to be able to cover more ground, more efficiently, in an open habitat. This means that having long legs is an *analogous* trait in baboons and humans—that is, this adaptation evolved independently in the two species but for the same purpose.

Primate evolution

As described in the sections above, primates have been evolving for about 66 million years – since the time period known as the Paleoecene. These earliest primates are identified by their teeth, and are found in a variety of places that are unexpected given today's primate distributions – but 66 million years ago, the environment around the globe was very different (Figure 34).

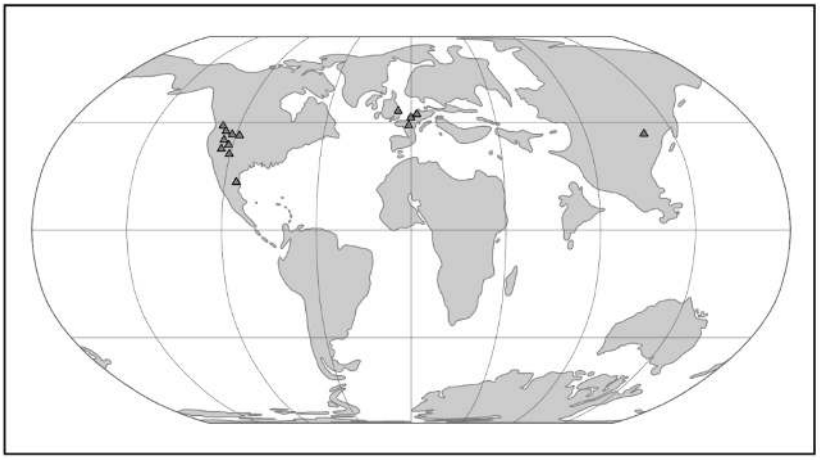


Figure 34. Map of the world in the Paleocene, highlighting early primate localities.

By the Eocene time period (about 55-33 million years ago), primate ancestors were clearly recognizable in the fossil record and were distributed in even more areas. As a group they were pretty diverse.

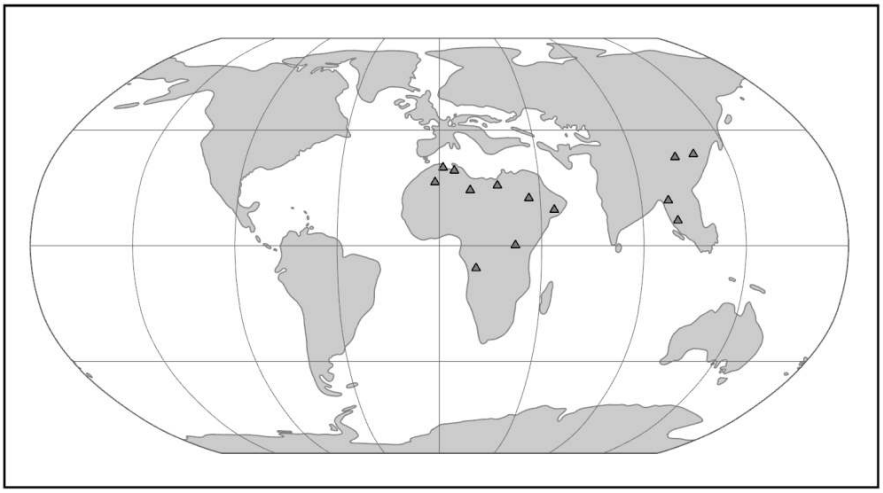


Figure 35. Map of key localities of early ancestors of monkeys and apes. Note that the landmasses are in their current configuration.

Changing global climate has had profound effects on primate dispersal patterns and ecological habits over evolutionary time. Primates today are strongly tied to patches of trees and particular plant parts such as fruits, seeds, and immature leaves. It is no surprise, then, that the distribution of primates mirrors the distribution of forests. Today, primates are most diverse in the tropics and especially in tropical rainforests. Global temperature trends across the Tertiary have affected primate ranges. Following the Cretaceous-Tertiary event when dinosaurs went extinct, cooler temperatures and greater seasonality characterized the Paleocene. In the Eocene, temperatures (and probably rainfall) increased globally and rainforests likely extended to very high latitudes. During this time, early primate ancestors became very diverse. With cooling and increased aridity at the end of the Eocene, many primate extinctions occurred in the northern continents and the surviving primates were confined to lower latitudes in South America, Afro-Arabia, Asia, and southern Europe. Among these survivors are the progenitors of the living groups of primates: lemurs and lorises, tarsiers, Central and South American monkeys, African and Asian monkeys, and apes (Figure 35).

By the Oligocene epoch (between about 65 and 23 million years ago), researchers see the first early monkeys in the fossil record. The classic localities yielding the greatest wealth of early ancestral monkey and ape fossils are those from the Fayum Basin in Egypt (Figure 36). The Fayum is a veritable oasis of fossil primates in an otherwise rather spotty African fossil record from this time period. The Fayum Jebel Qatrani Formation and Birket Qarun Formation between them have yielded a remarkable array of terrestrial, arboreal, and aquatic mammals. These include ungulates, bats, sea cows, elephants, hyraces, rodents, whales, and primates. Also, many other vertebrates, like water birds, were present. The area at the time of deposition (Late Eocene through

Early Oligocene) was probably very wet, with slow-moving rivers, standing water, swampy conditions, and lots of trees. In short, it was an excellent place for primates.

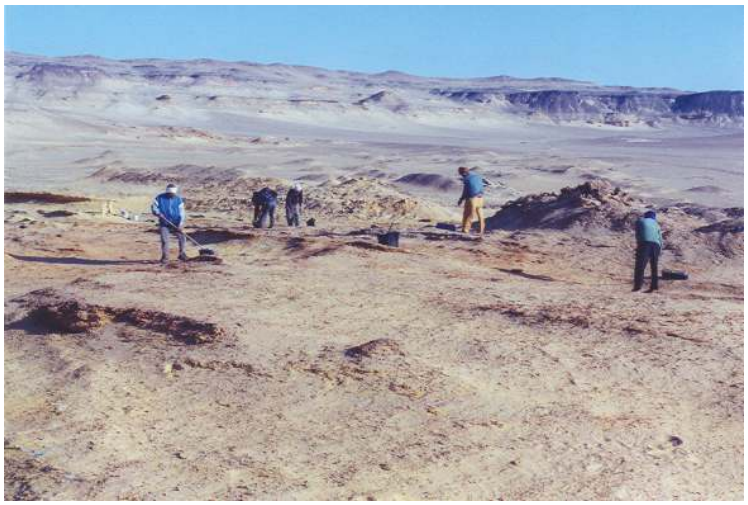


Figure 36. Egyptian workers sweeping Quarry I in the Fayum Basin (2004). This is a technique called wind harvesting that removes the desert crust and permits wind to blow out fine sediment and reveal fossils.

Monkey Dispersal to South America

Today there is an impressive diversity of primates in South and Central America. Primates colonized South America sometime in the Eocene from an African source – likely those ancestors discovered in the Fayum. How monkeys arrived in Central and South America is a great debate – partly because South America was an island in the Eocene. Primates needed to cross open ocean to get there from either North America or Africa, although the distance from the former was shorter. The first known primates in South America have more in common morphologically with African primates than with North American ones.

The means by which a population of small North African primates managed to disperse across the Atlantic and survive to colonize South America remains a mystery. The most plausible scenario is one of rafting. That is, primates must have been trapped on vegetation that was blown out to sea by a storm. The vegetation then became a sort of life raft, which eventually landed ashore, dumping its passengers in South America. Rodents probably arrived in South America in the same way.

Once ashore, these monkey ancestors must have crossed South America fairly rapidly because the earliest-known primates from that continent are from Peru. By the Miocene epoch (between about 23 million to 5 million years ago), monkeys were living in extreme southern Argentina and were exploiting a variety of feeding niches. The story of South and Central American monkeys seems to be one of amazing dispersal, followed by rapid diversification and widespread geographic colonization of much of South America. After that, dramatic extinctions resulted in the current, much smaller geographic distribution of of these monkeys. These extinctions were probably caused by changing climates, leading to the contraction of forests.

Planet of Apes

The Miocene Epoch was a time of mammalian diversification and extinction, global climate change, and ecological turnover. In the Miocene, there was an initial warming trend across the globe with the expansion of subtropical forests, followed by widespread cooling and drying with the retreat of tropical forests and replacement with more open woodlands and eventually grasslands. It was also a time of major geologic activity. On one side of the globe, South America experienced the rise of the Andes Mountains. On the other side, the Indian subcontinent collided with mainland Asia, resulting in the rise of the Himalayan Mountains. In Africa, volcanic activity promoted the development of the East African Rift System. Critical to the story of ape evolution was the exposure of an intercontinental landbridge between East Africa and Eurasia, permitting a true planet of apes (Figure 37).

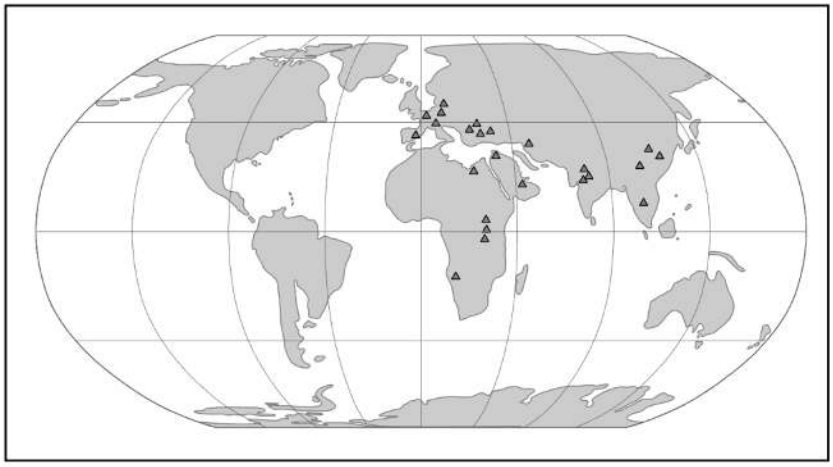


Figure 37. Map of the world in the Miocene, highlighting fossil ape localities.

The world of the Miocene had tremendous ape diversity compared to today. The earliest records of fossil apes are from Early Miocene deposits in Africa. Though most of these early apes left no modern descendants, some of them gave rise to the ancestors of modern apes—including **hominins.** The Early Miocene of Africa has yielded around 14 genera of early apes. Many of these taxa have been reconstructed as frugivorous arboreal quadrupeds. Overall, the African ape fossil record in the Late Miocene is sparse, with seven fossil localities dating between eleven and five million years ago. Nevertheless, most species of great apes live in Africa today. Where did the progenitors of modern African apes arise? Did they evolve in Africa or somewhere else? The paucity of apes in the Late Miocene of Africa stands in contrast to the situation in Eurasia. There, ape diversity was high.

The fossil record of the extant apes is somewhat underwhelming: it ranges from being practically nonexistent for some taxa (e.g., chimpanzees) to being a little better for others (e.g., humans). There are many possible reasons for these differences in fossil abundance, and many are associated with the environmental conditions necessary for the fossilization of bones. One way to understand the evolution of extant apes that is not so dependent on the fossil record is via molecular evolutionary analyses. This can include counting up the differences in the genetic sequence between two closely related species to estimate the amount of time since these species shared a common ancestor. This is called a molecular clock, and it is often calibrated using fossils of known absolute age that stand in for the last common ancestor of a particular clade. Molecular clock estimates have placed the split between Hylobatidae and Hominidae between 19.7 million and 24.1 million years ago, followed by an African ape and Asian ape split between 15.7 million and 19.3 million years ago, and, finally, with the more recent radiation of Hylobatidae into its current genera between 6.4 million and 8 million years ago (Israfil et al. 2011).

The most extensive fossil record of a modern great ape is that of our own genus, *Homo*. The evolutionary history of the Asian great ape, the orangutan (*Pongo*), is becoming clearer. Today, orangutans are found only on the islands of Borneo and Sumatra. However, Pleistocene-aged teeth, attributed to *Pongo*, have been found in Cambodia, China, Laos, Peninsular Malaysia, and Vietnam—demonstrating the vastness of the orangutan's previous range. *Sivapithecus* from the Miocene of India and Pakistan is represented by many specimens, including parts of the face. *Sivapithecus* is very similar to *Pongo*, especially in the face, and it probably is closely related to ancestral orangutans. Postcranial bones of *Sivapithecus*, however, suggest a more generalized locomotor mode—including terrestrial locomotion—than seen in *Pongo*.

In Africa, the first fossil to be confidently attributed to *Pan*, and known to be the earliest evidence of a chimpanzee, was described based on teeth found in Middle Pleistocene deposits in the Eastern Rift Valley of Kenya. Paleoenvironmental reconstructions of this locality suggest that this early chimpanzee was living in close proximity to early *Homo* in a closed-canopy wooded habitat. Similarly, fossil teeth and mandibular remains attributed to two species of Middle-Late Miocene apes—*Chororapithecus abyssinicus* (from Ethiopia) and *Nakalipithecus nakayamai* (from Kenya)—have been suggested as basal members of the gorilla clade.

Clearly, more work is needed to fill in the large gaps in the fossil record of the non-human great apes. The 20th century witnessed the discovery of many hominin fossils in eastern Africa, which have been critical for improving our understanding of human evolution. While 21st-century conservationists fight to prevent the extinction of the living great apes, perhaps efforts by 21st-century paleoanthropologists will yield the evolutionary story of these, our closest relatives.

Why study primates

The Order Primates is a diverse and fascinating group of animals united in sharing a suite of characteristics—visual specialization, grasping hands and feet, large brains, and extended life histories—that differentiates us from other groups of mammals. In this chapter, we surveyed the major taxonomic groups of primates, discussing where humans fit among our close relatives as well as discovering that primates are interesting animals in their own right. We discussed a range of key traits used to distinguish between the many taxa of living primates, including dietary, locomotor, and behavioral characteristics. Because of our long, shared evolutionary history with these animals, non-human primates provide a crucial resource for understanding our current biology.

Terms You Should Know

Activity pattern

Arboreal

Bilophodont Molars

Bipedalism

Brachiation

Clade

Convergent Evolution

Derived trait

Diastema

Dry nose

Evolutionary trade-off

Folivore

Frugivore

Generalized trait

Grooming claw

Gummivore

Heterodont

Hominins

Homology

Insectivore

Ischial callosities

Knuckle-walking

Locomotion

Opposable Digits

Pentadactyly

Polymorphic color vision

Postorbital bar

Prehensile tail

Primitive Trait

Quadrupedalism

Sagittal crest

Sexual dimorphism

Specialized trait

Tactile pads

Tapetum lucidum

Taxa

Terrestrial

Tooth comb

Trichromatic color vision

Vertical clinging and leaping

Study Questions

1. Why does the field of anthropology, a field dedicated to the study of humans, include the study of non-human animals? What important things can we learn from non-human primates in anthropology?
2. Draw out a tree showing the major taxonomic group of primates described here, making sure to leave room in between each level. Underneath each taxon, list some of the key features of this group so that you can compare traits between groups.
3. How does a primate's ecology affect their diet and interactions with other organisms?

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2.3: Early Hominins and Homo

Learning Objectives

By the end of this chapter, you should be able to:

- Define what is meant by “hominin”.
- Understand what is meant by “derived” and “primitive” traits and why this is relevant for understanding early hominin evolution.
- Understand changing paleoclimates and paleoenvironments during early human evolution, and contextualize them as potential factors influencing adaptations during this time.
- Describe the anatomical changes associated with bipedalism in early hominins and the implications for changes in locomotion.
- Describe early hominin genera and species, including their currently understood dates and geographic expanses and what we know about them.
- Identify the characteristics that define the genus *Homo*.
- Explain the major developments associated with *Homo erectus*

Defining Hominins

The first apes on our lineage evolved during the Miocene, and one of the key differences between those apes and other Miocene species is that our ancestors were **bipedal,** or habitually walking upright on two feet. **Hominin,** then, means everyone on “our” side of the evolutionary lineage: humans and all of our extinct bipedal ancestors and relatives since our divergence from the last common ancestor (LCA) with chimpanzees. Hominins are apes defined by their reliance on bipedalism and also on their **reduced canine size**: unlike other primates and apes, our ancestors did not have big canines for social communication.

Historic interpretations of our evolution, prior to our finding of early hominin **fossils**, varied. Debates from the mid-1800s regarding hominin origins focused on two key issues:

1. Where did we evolve?
2. Which traits evolved first?

Within this conversation, naturalists and early **paleoanthropologists** (people who study human evolution) speculated as to which human traits came first. These included the evolution of a big brain (**encephalization**), the evolution of the strange way in which we move about on two legs (**bipedalism**), and the evolution of our strange flat faces and small teeth. We now know that bipedal locomotion is one of the first things that evolved in our lineage, with early relatives having small brains and more apelike dentition. In this chapter, we will tease out the details of what this looks like in terms of morphology (i.e. the study of the form or size and shape of things; in this case, skeletal parts).

We also know that early human evolution occurred in a very complicated fashion in Africa. We have multiple species and genera that are diverse in the extent to which they move like us and the diets on which they subsisted. Specimen finds have been made all along the **Eastern African Rift System** (**EARS**; in Ethiopia, Kenya, Tanzania, and Malawi), in limestone caves in South Africa, and in Chad. Dates of these early relatives range from around 7 million years ago (mya) to around 1 mya, overlapping temporally with members of our genus, *Homo* (Figure 1).



Figure 1. Eastern African Rift System.

Yet there is still so much to understand. Modern debates now look at the relatedness of these species to us and to one another. Discussions regarding which of these species were able to make and use tools continue. Every discovery in the patchy hominin fossil record tells us more about our evolution. New scientific techniques provide us with insight into the diets, environments, and lifestyles of these ancient relatives that was not available to researchers even ten years ago.

A Note on Brain Size

It is worth noting that while brain size expansion is seen primarily in our genus, *Homo*, earlier hominin brain sizes were highly variable between and within taxa, from 300 cc (cranial capacity, cm^3), estimated in *Ardipithecus*, to 550 cc, estimated in *Paranthropus boisei*. The lower estimates are well within the range of variation of non-human extant great apes, and body size variability also plays a role in the interpretation of whether brain size could be considered large or small for a particular species or specimen.

Increases in brain size do not necessarily correlate with an increase in intelligence in animals, especially if body size is not taken into consideration. However, the brain is an expensive tissue to build and maintain. Researchers therefore argue that the cost of maintenance must yield some evolutionary benefit. This is more easily understood in hominins where the stone tool record (an indication of behavior and intelligence) is well associated with the species.

Hominin Taxonomy

In an earlier chapter, you were introduced to ways of organizing living **taxa**. In the past, taxonomy was primarily based on morphology (i.e., the physical features of organisms). Today they are tied to known relationships based on **molecular phylogeny** or a combination of the two. This technique is complicated when applied to living taxa, but it becomes immensely more difficult when we seek to categorize ancestor-descendant relationships in long-extinct forms, where molecular information is no longer preserved. In many ways, we find ourselves falling back on morphological comparisons (often on teeth and partially fossilized skeletal material) in the absence of genetic material.

It is also worth considering the process of fossil discovery and publication. Some fossils are easily diagnostic to a species level and allow for easy and accurate interpretation. Some, however, are more controversial. This could be because they do not easily preserve or are incomplete, making it difficult to compare and place the fossil within a specific species. Researchers often need to make several important claims when announcing or publishing a find: a secure date (if possible), clear association with other finds, and an adequate comparison among multiple species (both extant and fossil). It is therefore not uncommon for the scientific community to know that an important find was made years before it is scientifically published.

Paleoenvironment and Hominin Evolution

There is so much more to paleoanthropology than digging up and grouping fossil hominins: the discipline seeks to explain and understand the evolution of our ancestors' behavior and morphology. There is no doubt that one of the major drivers in hominin evolution is the environment. Large-scale changes in global and regional climate, as well as alterations to the environment, are all linked to hominin diversification, dispersal, and extinction (Maslin et al. 2014).

Environmental reconstructions often use modern analogs. Let us take, for instance, the hippopotamus. It is an animal that thrives in environments that have abundant water to keep its skin cool and moist. If the environment for some reason becomes drier, it is expected that hippopotamus populations will decline. If a drier environment becomes wetter, it is possible that hippopotamus populations may be attracted to the new environment and thrive. Such instances have occurred multiple times in the past, and the bones of some animals, like the hippopotamus, that are sensitive to these changes give us insights into these events.

Reconstructing a **paleoenvironment** relies on a range of techniques, which vary depending on whether research interests focus on local changes or more global environmental changes/reconstructions. For local environments (reconstructing those of a single site or region), looking at the **faunal assemblages,** collections of fossils of other animals found at a site, and comparing them to animals found in certain modern environments allow us to determine if the environments in the past mirror those seen today in the region. Changes in the faunal assemblages, as well as when they occur and how they occur, tell us about past environmental changes. Other techniques are also useful in this regard. Isotopes of these fauna, for instance, tell us about the relative diets of individual fauna (e.g., using carbon isotopes to differentiate between species eating more grassland-heavy diets and those consuming bushland/tree-heavy diets) and whether the environment of individual animals was wetter or drier than the present day (Kingston & Harrison 2007).

Global climatic changes in the distant past, which fluctuated between being colder and drier and warmer and wetter on average, would have global implications for environmental change (Figure 2). These can be studied by using marine core and terrestrial soil

data and by comparing these lines of evidence across multiple localities/sites/regions. These techniques allow us to use chemistry, such as nitrogen and oxygen isotopes in shells and sediments, or pollen grains, which show directly the kinds of plants surviving in an environment at a specific time period. This means that there are multiple lines of evidence that allow us to visualize global trends over millions of years (although it should be noted that the direction and extent of these changes could differ by geographic region).

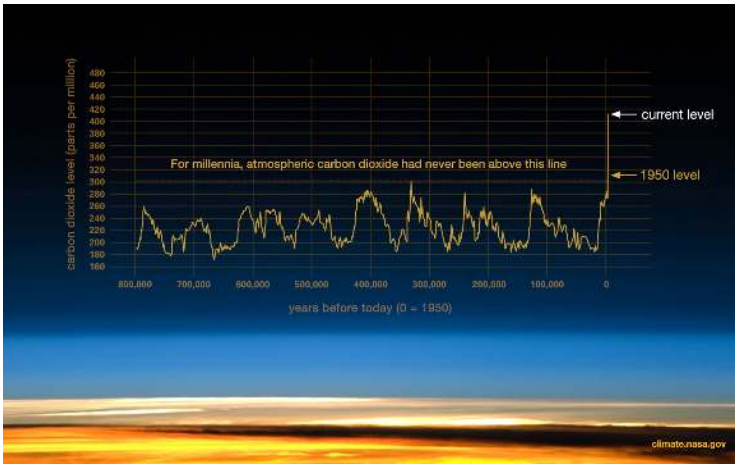


Figure 2. This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, illustrates how atmospheric CO_2 has fluctuated over time and increased sharply since the Industrial Revolution.

Both local and global climatic/environmental changes have been used to understand parameters affecting our evolution (DeHeinzelin et al. 1999; Kingston 2007). There are numerous hypotheses regarding how climate has driven and continues to drive human evolution. Environmental change acts as an important keystone in hypotheses regarding the onset of several important hominin traits that are seen in early hominins and which are discussed in this chapter. Namely, the environment has been interpreted as the driving force behind:

1. The evolution of bipedalism (terrestrial locomotion on two legs),
2. The changing and diversifying of early hominin diets, and
3. The diversification of multiple early hominin species.

Here, we will explore a few popular hypotheses.

Savannah Hypothesis (or Aridity Hypothesis)

This popular theory was first penned by Charles Darwin and supported by anthropologists like Raymond Dart (Darwin 1871; Dart 1925). It suggests that the expansion of the savannah (or less densely forested, drier environments) forced early hominins from an **arboreal** lifestyle to a terrestrial one where bipedalism was a more efficient form of locomotion (Figure 3). This hypothesis stems from the idea that the Last Common Ancestor (LCA) between us and chimpanzees was a **knuckle-walking** quadruped like chimpanzees and gorillas. However, this idea was supported by little fossil or paleoenvironmental evidence and was later refined as the **Aridity Hypothesis**. The Aridity Hypothesis states that the long-term aridification and, thereby, expansion of savannah biomes were drivers in diversification in early hominin evolution (deMenocal 2004). It advocates particularly for periods of accelerated aridification leading to early hominin speciation events.

While early bipedal hominins are often associated with wetter, more closed environments (i.e., not supporting the Savannah Hypothesis), both marine and terrestrial records seem to support general cooling, drying conditions, with isotopic records indicating an increase in grasslands (i.e., colder and wetter climatic conditions) between 8 mya and 6 mya across the African continent (Cerling et al. 2011). This can be contrasted with later climatic changes derived from aeolian dust records (sediments transported to the site of interest by wind), which demonstrate increases in seasonal rainfall between 3 mya and 2.6 mya, 1.8 mya and 1.6 mya, and 1.2 mya and 0.8 mya (deMenocal 2004).

Despite a relatively scarce early hominin record, it is clear that two important factors occur around the time period in which we see increasing aridity. The first factor is the diversification of taxa, where high morphological variation between specimens has led to the naming of multiple hominin genera and species. The second factor is the observation that the earliest hominin fossils appear to have traits associated with bipedalism and are dated to around the drying period (as based on isotopic records). Some have argued

that it is more accurately a combination of bipedalism and arboreal locomotion, which will be discussed later. However, the local environments in which these early specimens are found (as based on the faunal assemblages) do not appear to have been dry.



Figure 3. The African savannah grew during early hominin evolution. This may have forced early hominins from an arboreal lifestyle to a terrestrial one, where bipedalism was a more efficient form of locomotion.

Forest Hypothesis

Based on contrasting environmental evidence to the Savannah hypothesis, R. J. Rayner and colleagues (1993) hypothesized that forested environments, rather than savannahs, were a key influence on the development of bipedalism in hominins. Unlike the Savannah Hypothesis, one prediction from this hypothesis is that the last common ancestor (LCA) between chimpanzees and us used an arboreal form of bipedal locomotion (i.e., walking along branches using the arms for stability), similar to orangutans, and was not a knuckle-walker like contemporary chimpanzees.

Pollen evidence from the site of Makapansgat in South Africa indicated that around the time early hominins occupied the area, it was a closed, wooded environment. Similarly, the earliest evidence for bipedalism occurs in specimens (associated with taxa such as *Orrorin* and *Ardipithecus spp*. as well as *Australopithecus anamensis*) found in sites with evidence of **closed habitats** (Suwa et al. 2009). Furthermore, evidence of knuckle-walking in older hominin species is sorely lacking or highly contested.

This hypothesis can be considered in contrast to the Savannah Hypothesis, and it does appear to be evidence based. However, it is worth noting that preservation and resulting fossilization might be better in these kinds of environments, biasing this interpretation of the fossil record.

Variability Selection Hypothesis

This hypothesis was first articulated by paleoanthropologist Richard Potts (1998). It links the high amount of climatic variability over the last 7 million years to both behavioral and morphological changes. Unlike previous notions, this hypothesis states that hominin evolution does not respond to habitat-specific changes or to specific aridity or moisture trends. Instead, long-term environmental unpredictability over time and space influenced morphological and behavioral adaptations that would help hominins survive, regardless of environmental context. The Variability Selection Hypothesis states that hominin groups would experience varying degrees of natural selection due to continually changing environments and potential group isolation. This would allow certain groups to develop genetic combinations that would increase their ability to survive in shifting environments. These populations would then have a genetic advantage over others that were forced into habitat-specific adaptations.

The evidence for this theory is large climatic variability and higher survivability of generalist species versus specialists. However, this hypothesis accommodates for larger time-scales of extinction and survival events. In this way, the Variability Selection Hypothesis allows for a more flexible interpretation of the evolution of bipedalism in hominins, accommodating the discrepancies in evidence between the conflicting Savannah and Forest Hypotheses. In some ways, this hypothesis accommodates both environmental data and our interpretations of an evolution toward greater variability among species and the survivability of generalists.

Derived Adaptations: Bipedalism

The unique form of locomotion exhibited by modern humans, called **obligate bipedalism**, is important in distinguishing our species from the other extant great apes. The ability to walk habitually upright is one of the defining attributes of the hominin

lineage. We also differ from other animals that walk bipedally (such as kangaroos) in that we do not have a tail to balance us as we move.

There are many current ideas regarding selective pressures that would lead to early hominins adapting upright posture and locomotion. Many of these selective pressures, as we have seen in the previous section, coincide with a shift in environmental conditions, supported by paleoenvironmental data. In general, however, it appears as though early hominins thrived in forested regions, similar to extant great apes, with dense tree coverage, which would indicate an arboreal lifestyle. As the environmental conditions changed and a savannah/grassland environment became more widespread, the tree cover would become less dense, scattered, and sparse and bipedalism therefore would become more important.

There are several proposed selective pressures for bipedalism:

1. Energy conservation: modern bipedal humans conserve more energy than extant chimpanzees, which are predominantly knuckle-walking quadrupeds when walking over land. While chimpanzees, for instance, are faster than humans terrestrially, they expend large amounts of energy being so. Adaptations to bipedalism include “stacking” the majority of the weight of the body over a small area around the center of gravity (i.e., the head is above the chest, which is above the pelvis, which is over the knees, which is above the feet). This reduces the amount of muscle needed to be engaged during locomotion to “pull us up” and allows us to travel longer distances expending far less energy.
2. **Thermoregulation:** less surface area (i.e., only the head and shoulders) is exposed to direct sunlight during the hottest parts of the day (i.e., midday). This means that the body is exposed to less heat and has less need to employ additional “cooling” mechanisms such as sweating, which additionally means less water loss.
3. Bipedalism freed up our ancestors’ hands such that they could more easily gather food and carry tools or infants. This further enabled the use of hands for more specialized adaptations associated with the manufacturing and use of tools.

These selective pressures are not mutually exclusive, and bipedality could have evolved from a combination of these selective pressures, in ways that increased the chances of early hominin survival.

Skeletal Adaptations for Bipedalism

Humans, as the only obligate bipedal species among primates, have highly specialized adaptations to facilitate this kind of locomotion (Figure 4). Many of these adaptations occur within the soft tissue of the body (e.g., muscles and tendons). However, when analyzing the paleoanthropological record for evidence of the emergence of bipedalism, all that remains is the fossilized bone. Interpretations of locomotion are therefore often based on comparative analyses between fossil remains and the skeletons of extant primates with known locomotor behaviors.

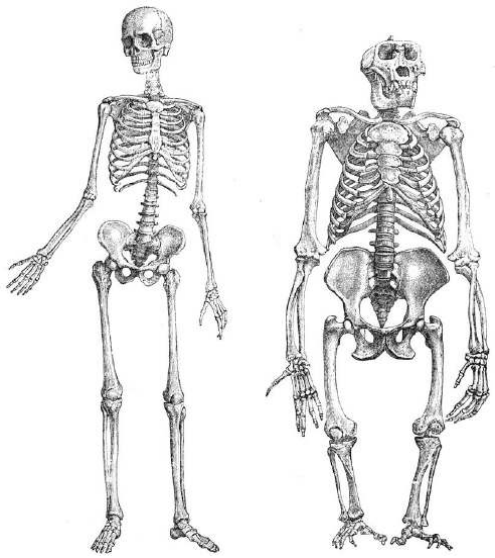


Figure 4. Compared to gorillas (right) and other apes, humans (left) have highly specialized adaptations to facilitate bipedal locomotion.

The majority of these adaptations occur in the **postcranium,** the skeleton from below the head, and are outlined in the chart below. In general, these adaptations allow for greater stability and strength in the lower limb, by allowing for more shock absorption, for a

larger surface area for muscle attachment, and for the “stacking” of the skeleton directly over the center of gravity to reduce energy needed to be kept upright. These adaptations often mean less flexibility in areas such as the knee and foot.

However, these adaptations come at a cost. Evolving from a non-obligate bipedal ancestor means that the adaptations we have are evolutionary compromises. For instance, the valgus knee (angle at the knee) is an essential adaptation to balance the body weight above the ankle during bipedal locomotion. However, the strain and shock absorption at an angled knee eventually takes its toll, with runners often experiencing joint pain. Similarly, the long neck of the femur absorbs stress and accommodates for a larger pelvis, but it is a weak point, resulting in painful damage to the hip joint being commonplace among the elderly, especially in cases where the bone additionally weakens through osteoporosis. Finally, the S-shaped curve in our spine allows us to stand upright, relative to the more curved C-shaped spine of an LCA. Yet the weaknesses in the curves lead to pinching of nerves and back pain. Since many of these problems primarily are only seen in old age, they can potentially be seen as an evolutionary compromise.

Region	Feature	Obligate Biped *(H. sapiens)*	Non-obligate Biped
Cranium	Position of the **foramen magnum**	Positioned inferiorly (immediately under the cranium) so that the head rests on top of the vertebral column for balance and support (head is perpendicular to the ground	Posteriorly positioned (to the back of the cranium). Head is positioned parallel to the ground
Postcranium	Body proportions	Shorter upper limb (not used for locomotion)	Non-human apes: Longer upper limbs (used for locomotion: brachiation or knuckle-walking)
Postcranium	Spinal curvature	S-curve due to pressure exerted on the spine from bipedalism (lumbar lordosis)	C-curve
Postcranium	Vertebrae	Robust lumbar (lower-back) vertebrae (for shock absorbance and weight bearing). Lower back is more flexible than that of apes as the hips and trunk swivel when walking (weight transmission).	Gracile lumbar vertebrae compared to those of modern humans
Postcranium	Pelvis	Shorter, broader bowl-shaped pelvis (for support); very robust. Broad sacrum with large sacroiliac joint surfaces	Longer, flatter, elongated ilia, more narrow and gracile, narrower sacrum, relatively smaller sacroiliac joint surface

Region	Feature	Obligate Biped *(H. sapiens)*	Non-obligate Biped
Postcranium	Lower limb	In general, longer, more robust lower limbs and more stable, larger joints Large femoral head and longer neck (absorbs more stress and increases the mechanical advantage). Valgus angle of knee, positions knee over the ankle and keeps the center of gravity balanced over stance leg during stride cycle (shock absorbance). Distal tibia (lower leg) of humans has a large medial malleolus for stability.	In general, smaller, more gracile limbs with more flexible joints Femoral neck is smaller in comparison to modern humans and has a shorter neck. The legs bow outward, there is no valgus angle of the knee (no "knock-knees"). The distal tibia in chimpanzees is trapezoid (wider anteriorly) for climbing and allows more flexibility.
Postcranium	Foot	Rigid, robust foot, without a midtarsal break. Non-opposable and large, robust big toe (for push off while walking) and large heel for shock absorbance.	Flexible foot, midtarsal break present (which allows primates to lift their heels independently from their feet), opposable big toe for grasping.

Despite relatively few postcranial fragments, the fossil record in early hominins indicates a complex pattern of emergence of bipedalism. Key features, such as a more anteriorly placed foramen magnum, are argued to be seen even in the earliest discovered hominins, indicating an upright posture (Dart 1925). Some early species appear to have a mix of primitive (arboreal) and derived (bipedal) traits, which indicates a mixed locomotion and a more **mosaic evolution** of the trait. Some early hominins appear to, for instance, have bowl-shaped pelvises (hip bones) and angled femurs suitable for bipedalism but also have retained an opposable big toe or curved fingers and longer arms (for arboreal locomotion). These mixed morphologies may indicate that earlier hominins were not fully obligate bipeds and thus thrived in mosaic environments.

It is also worth noting that, while not directly related to bipedalism per se, other postcranial adaptations are evident in the hominin fossil record from some of the earlier hominins. For instance, the hand and finger morphologies of many of the earliest hominins indicate adaptations consistent with arboreality. These include longer hands, more curved metacarpals and phalanges, and a shorter, relatively weaker thumb. This allows for gripping onto curved surfaces during locomotion. The earliest hominins appear to have mixed morphologies for both bipedalism and arborealism. However, among Australopiths, there are indications for greater reliance on bipedalism as the primary form of locomotion. Similarly, adaptations consistent with tool manufacture (shorter fingers and a longer, more robust thumb, in contrast to the features associated with arborealism) have been argued to appear before the genus *Homo*.

Derived Adaptations: Early Hominin Dentition

The Importance of Teeth

Teeth are abundant in the fossil record, primarily because they are already highly mineralized as they are forming, far more so than even bone. Because of this, teeth preserve readily. And, because they preserve readily, they are well-studied and better understood than many skeletal elements. Even in the sparse hominin and primate fossil record, teeth are, in some cases, all we have.

Teeth also reveal a lot about the individual from whom they came. We can tell what they evolved to eat, which other species they may be more closely related to, and even, to some extent, the level of sexual dimorphism, or general variability, within a given species. This is powerful information that can be contained in a single tooth. With a little more observation, the wear patterns on a tooth can tell us about the diet of the individual in the weeks leading up to its death. Furthermore, the way in which a tooth is formed, and the timing of formation, can reveal information about changes in diet, or even mobility, over infancy and childhood, using isotopic analyses. When it comes to our earliest hominin relatives, this information is vital for understanding how they lived.

The purpose of comparing different hominin species is to better understand the functional morphology as it applies to dentition. In this, we mean that the morphology of the teeth or masticatory system (which includes jaws) can reveal something about the way in which they were used and, therefore, the kinds of foods these hominins ate. When comparing the features of hominin groups, it is worth considering modern analogs to make more appropriate assumptions about diet. In this way, hominin dentition is often compared with that of chimpanzees, gorillas (our two closest relatives), and/or modern humans.

The most divergent group, however, is humans. Humans around the world have incredibly varied diets. Among hunter-gatherers, it can vary from a honey- and plant-rich diet, as seen in the Hadza in Tanzania, to a diet almost entirely reliant on animal fat and protein, as seen in Inuits in polar regions of the world. We are therefore considered generalists, more general than the largely **frugivorous** chimpanzee or the [**pb_glossary id="1684"]folivorous[/pb_glossary]** gorilla.

One way in which all humans are similar is our reliance on the processing of our food. We cut up and tear meat with tools using our hands, instead of using our front teeth (incisors and canines). We smash and grind up hard seeds, instead of crushing them with our hind teeth (molars). This means that, unlike our ape relatives, we can rely more on developing tools to navigate our complex and varied diets. Evolutionarily, partially in response to our increased reliance on our hands and brain, our teeth have reduced in size and our faces are flatter. Similarly, a reduction in teeth and a more generalist dental morphology could also indicate an increase in softer and more variable foods, such as the inclusion of more meat. These trends begin early on in our evolution.

General Dental Trends in Early Hominins

Early on in human evolution, we see a reduction in canine size. This implies strongly that, over evolutionary time, the need for display and dominance among males has reduced, as has our sexual dimorphism. This implies a less sexually dimorphic social structure in the earlier hominins relative to modern-day chimpanzees and gorillas.

Earliest Hominins: *Sahelanthropus*

We see evidence for bipedalism in some of the earliest fossil hominins, dated from within genetic estimates of our divergence from chimpanzees. These hominins, however, also indicate evidence for arboreal locomotion.

The earliest dated hominin find (between 6 mya and 7 mya, based on radiometric dating of volcanic tufts) has been argued to come from Chad and is named *Sahelanthropus tchadensis* (Figure 5; Brunet et al. 2002). The find has a small cranial capacity (360 cc) and has canines smaller than those in extant great apes, yet still larger and pointier than those in humans. A short cranial base and a **foramen magnum,** the hole through which the spinal cord enters the cranium, that is more humanlike in positioning have been argued to indicate upright walking. However, the inclusion of *Sahelanthropus* in the hominin family has been debated by researchers, since the evidence for bipedalism was initially based on cranial evidence alone.

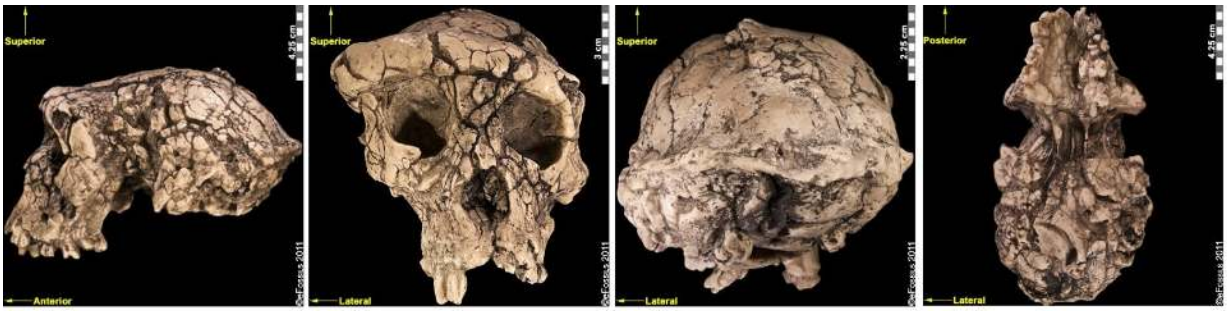


Figure 5. Sahelanthropus tchadensis exhibits a set of a set of derived features, including a long, low cranium; a small, ape-sized braincase; and relatively reduced prognathism.

Earliest Hominins: The Genus *Ardipithecus*

Another genus, *Ardipithecus*, is argued to be represented by at least two species: *Ardipithecus ramidus* and *Ardipithecus kadabba*.

Ardipithecus ramidus ("ramidu" means root in the Afar language) is currently the best known of the earliest hominins (Figure 6). Dated to 4.4 mya, *Ar. ramidus* was found in Ethiopia, in the Middle Awash region and in Gona. Unlike *Sahelanthropus*, this species has a large sample size, with over 110 specimens from the site of Aramis alone. This species was announced in 1994 by American palaeoanthropologist Tim White, based on a partial female skeleton nicknamed "Ardi" (ARA-VP-6/500; White et al. 1994). Ardi demonstrates a mosaic of ancestral and derived characteristics in the postcranial skeleton. For instance, she had an opposable big toe (hallux), similar to chimpanzees (i.e., ancestral), which could have aided in climbing trees effectively. However, the pelvis and hip show that she could walk upright (a derived trait), supporting her hominin status. A small brain (300 cc to 350 cc), midfacial

projection, and slight prognathism show retained ancestral cranial features, but the cheek bones are less flared and robust than in later hominins.



Figure 6. Researchers believe that Ardipithecus ramidus was able to walk upright, although not as efficiently as later humans. It possessed the musculature required for tree climbing, and while moving quadrupedally, it likely placed weight on the palms of the hands rather than on the knuckles.

Ardipithecus kadabba (the species name means "oldest ancestor" in the Afar language) is known from localities on the western margin of the Middle Awash region, the same locality where *Ar. ramidus* has been found.

The Genus *Australopithecus*

The Australopithecines are a diverse group of hominins comprising various species, though they can all be described as small-bodied, bipedal apes. *Australopithecus* is the given group or genus name. It stems from the Latin word *Australo*, meaning "southern," and the Greek word *pithecus*, meaning "ape." Within this section, we will outline these differing species' geological and temporal distributions across Africa, unique derived and/or shared traits, and importance in the fossil record.

Between 3 mya and 1 mya, there seems to be differences in dietary strategy between species of hominins designated as Australopithecines, which is evident from the peculiar size of the molars in one of the groups. This pattern of larger posterior dentition (even relative to the incisors and canines), thick enamel, and cranial evidence for large chewing muscles is far more pronounced in a group known as the robust australopithecines, as opposed to their earlier contemporaries or predecessors, the gracile australopithecines**,** and certainly larger than those seen in early *Homo*, which emerges during this time. This pattern of incredibly large posterior dentition (and very small anterior dentition) has led people to refer to robust australopithecines as megadont hominins (Figure 7).



Figure 7. Robust Australopithecines (left) had large molars and chewing muscles compared to modern humans (right).

This section has been categorized into "gracile" and "robust" Australopithecines, highlighting the morphological differences between the two groups (which many researchers have designated as separate genera: *Australopithecus* and *Paranthropus*,

respectively) and then focusing on the individual species. It is worth noting, however, that not all researchers accept these clades as biologically or genetically distinct, with some researchers insisting that the relative gracile and robust features found in these species are due to parallel evolutionary events, toward similar dietary niches.

Despite this genus' ancestral traits and small cranial capacity, all members show evidence of bipedal locomotion. It is generally accepted that *Australopithecus* species display varying degrees of arborealism and bipedality—these individuals were walking on the ground on two legs but were probably still comfortable with climbing trees.

Eastern African Gracile Australopithecines

This section below describes individual species from across Eastern Africa. These species have coined the term "**gracile australopithecines**" because of the less exaggerated, smaller, and less robust features seen in them.

The earliest known Australopithecine, *Australopithecus anamensis* (after "Anam," meaning "lake" from the Turkana region in Kenya) is dated to 4.2 mya to 3.8 mya. (Leakey et al. 1995; Patterson and Howells 1967). The species is currently found from sites in the Turkana region of Kenya and Middle Awash of Ethiopia. A small brain size (370 cc), relatively large canines, projecting cheekbones, and primitive earholes show more ancestral features as compared to those of more recent Australopithecines. The most important element discovered associated with this species that indicates bipedalism is a fragment of a tibia (shinbone), which demonstrates features associated with weight transfer during bipedal walking. Ancestral traits in the upper limb (such as the humerus) indicate some retained arboreal locomotion. Almost 100 specimens, representing over 20 individuals, have been found to date.



Figure 8. As seen in this mandible, Australopithecus anamensis had relatively large canine teeth.

Australopithecus afarensis is one of the oldest and most well-known australopithecine species and consists of a large number of fossil remains. *Au. afarensis* (which means "from the Afar region") is dated to between 2.9 mya and 3.9 mya and is found in sites all along the EARS system, in Tanzania, Kenya, and Ethiopia. The most famous individual stemming from this species is a partial female skeleton discovered in Hadar in Ethiopia, which was later nicknamed "Lucy," after the Beatles' song "Lucy in the Sky with Diamonds," which was played in celebration of the find (Johanson et al. 1978). This skeleton was found in 1974 by Donald Johanson and dates to approximately 3.2 mya (Figures 9 and 10). In addition, in 2002 a juvenile of the species was found by Zeresenay Alemseged and given the name "Selam" (meaning "peace," DIK 1-1), though it is popularly known as "Lucy's Child" or as the "Dikika Child"(Alemseged et al. 2006). Similarly, the Laetoli Footprints were made by *Australopithecus afarensis* have drawn much attention.



Figure 9 Artistic reconstructions of Australopithecus afarensis by artist John Gurche. Female “Lucy” is left and a male is on the right.

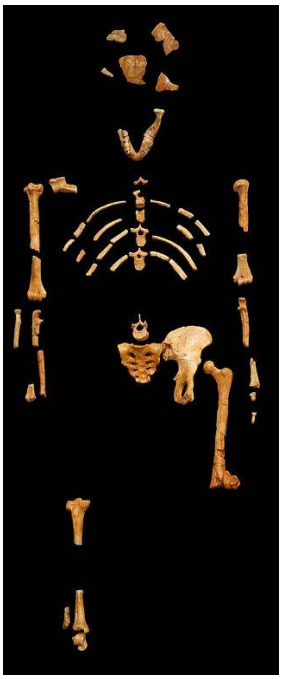


Figure 10. The humanlike femoral neck, valgus knee, and bowl-shaped hip seen in the “Lucy” skeleton indicates that Australopithecus afarensis was bipedal.

Skeletal evidence indicates that this species was bipedal, primarily through examining the pelvis and lower limb, which demonstrate a humanlike femoral neck, a valgus knee, and bowl-shaped hip. More evidence of bipedalism is found not in the skeleton but in the footprints of this species. *Au. afarensis* is associated with the Laetoli Footprints, a 24-meter trackway of hominin fossil footprints preserved in volcanic ash discovered by Mary Leakey in Tanzania and dated to 3.5 mya to 3 mya. This set of prints is thought to have been produced by three bipedal individuals as there are no knuckle imprints, no opposable big toes, and a clear arch is present. The infants of this species are thought to have been more arboreal than the adults, as was discovered through analyses of the foot bones of the Dikika Child dated to 3.32 mya (Alemseged et al. 2006).

Although not found in direct association with stone tools, potential evidence for cut marks on bones, found at Dikika, and dated to 3.39 mya indicates a potential temporal/geographic overlap between meat eating, tool use, and this species. However, this evidence is fiercely debated. Others have associated the cut marks with the earliest tool finds from Lomekwi, Kenya, temporally (3.3 mya) and in close geographic proximity to this species.

South African Gracile Australopithecines

Since the discovery of the Taung Child in 1924, there have been numerous Australopithecine discoveries from the region in South Africa known as “The Cradle of Humankind,” recently given UNESCO World Heritage Site status as “The Fossil Hominid Sites of South Africa.” The limestone caves found in the Cradle allow for the excellent preservation of fossils. Past animals navigating the landscape and falling into cave openings, or caves used as dens by carnivores, led to the accumulation of deposits over millions of years.

While these sites have historically been difficult to date, with mixed assemblages accumulated over large time periods, advances in techniques such as uranium-series dating have allowed for greater accuracy. Historically, the excellent faunal record from East Africa has traditionally been used to compare sites based on **relative dating**. In this, the knowledge of environmental/faunal changes and extinction events allows us to know which hominin finds are relatively younger or older than others.

Research Highlight: The Taung Child

The well-known fossil of a juvenile *Australopithecine*, the "Taung Child," was the first early hominin evidence ever discovered and was the first to demonstrate our common human heritage in Africa (Figure 11; Dart 1925). The tiny facial skeleton and natural endocast were discovered in 1924 by a local quarryman in the North West Province in South Africa and was painstakingly removed from the surrounding cement-like breccia by Raymond Dart using his wife's knitting needles. When first shared with the scientific community in 1925, it was discounted as being nothing more than a young monkey of some kind. Prevailing biases of the time made it too difficult to contemplate that this small-brained hominin could have anything to do with our own history. The fact that it was discovered in Africa simply served to strengthen this bias.

It was not until adult specimens of the species began to be discovered at Sterkfontein Caves that scientific and public opinion began to be swayed. The most complete of these remains is best known as "Mrs. Ples" and was discovered in 1947 (Broom 1947).

The Taung Child is an excellent example of how understanding the morphology and physiology of teeth can reveal information about our evolution. While many introductory lectures will showcase how the foramen magnum is more anteriorly placed (indicating a head that sits centrally on the body, ideal for bipedalism), Taung Child also shows very human-like dentition. For one, the canine teeth were relatively small compared to other apes. In addition, there was little to no diastema (or gap) between the canines and incisors. The incisors themselves were vertical and close together, and not at an angle to the mouth (procumbent), as seen in other apes. Furthermore, the overall shape of the dental arcade was more rounded, or parabolic. Even though these features were related to deciduous teeth, they were overwhelmingly more human like than those seen in other apes.



Figure 11. The Taung Child has a nearly complete face, mandible, and partial endocranial cast.

The discovery of the Taung Child shifted the focus of palaeoanthropological research from Europe to Africa, although acceptance of this shift was slow. The species with which it is assigned, ***Australopithecus africanus*** (name meaning "Southern Ape of Africa"), is currently dated to between 3.3 mya and 2.1 mya (Pickering and Kramers 2010), with discoveries from Sterkfontein, Taung, Makapansgat, and Gladysvale in South Africa (Figure 12). A relatively large brain (400 cc to 500 cc), small canines without an associated diastema, and more rounded cranium and smaller teeth than *Au. afarensis* indicate some derived traits. Similarly, the postcranial remains (in particular, the pelvis) indicate bipedalism. However, the sloping face and curved phalanges, indicative of retained arboreal locomotor abilities, show some primitive features.



Figure 12. An artistic reconstruction of Australopithecus africanus by John Gurche.

Another famous *Au. africanus* skull (the skull of "Mrs. Ples") was previously attributed to *Plesianthropus transvaalensis*, meaning "near human from the Transvaal," the old name for Gauteng Province, South Africa (Broom 1947. The name was shortened by contemporary journalists to "Ples" (Figure 13). Due to the prevailing mores of the time, the assumed female found herself married, at least in name, and has become widely known as "Mrs. Ples." It was later reassigned to *Au. africanus* and is now argued to be a young male rather than an adult female cranium (Thackeray et al. 2002).



Figure 13. The "Mrs. Ples" brain case is small in size (like apes) but has a less prognathic face and its foramen magnum is positioned more like modern humans than in African apes.

Paranthropus "Robust" Australopithecines

In the **robust australopithecines**, the specialized nature of the teeth and masticatory system, such as flaring zygomatic arches (cheekbone) to accommodate the large temporalis (chewing) muscle, indicated a shift in diet in these taxa. Some argued that the diet of the robust australopithecines was so specific that any change in environment would have accelerated their extinction. The generalist nature of the teeth of the gracile australopithecines, and certainly early *Homo*, would have made these hominins more capable of surviving through and adapting to to environmental change. However, some have suggested that the features of the robust australopithecines might have developed more in response to effectively eating **fallback foods** in hard times rather than indicating a lack of adaptability.

Paranthropus is usually referred to by scholars as the "robust" australopithecine, because of its defining distinct morphological features. Features that are closer to those of the assumed ancestral type are referred to as *P. aethiopicus*, and those that have become derived are referred to as both *P. boisei* and *P. robustus*. These features include a large, broad, dish-shaped face and zygomatic arches that are forward facing, including a large mandible with extremely large posterior dentition. These three species have been grouped together by a majority of scholars as a genus as they share more derived features and are more closely related to each other than the other australopithecines. As a collective, this genus spans 2.7 mya to 1.0 mya, although the dates of the individual species differ.

In terms of diet, the tougher, chewing diets of the robust australopithecines are supported by the extreme morphology of their face and cranium. The earliest of the Paranthropus species, *Paranthropus aethiopicus*, is dated to between 2.7 mya and 2.3 mya and is currently found in Tanzania, Kenya, and Ethiopia. It is well known because of the "Black Skull" (KNM–WT 17000), so called because of the mineral manganese that stained it black during fossilization (Figure 16). As with all robust Australopithecines, *P. aethiopicus* has the shared derived traits of large, flat premolars and molars; large, flaring zygomatic arches for accommodating large chewing muscles (the temporalis muscle); a sagittal crest for increased muscle attachment of the chewing muscles to the skull; and a robust mandible and supraorbital torus (brow ridge).



Figure 16. The “Black Skull” (Paranthropus aethiopicus) had a large sagittal crest and large, flared zygomatic arches that indicate it had large chewing muscles and a powerful biting force.



Figure 17. Artistic reconstruction of a Paranthropus boisei, male, by John Gurche.

First attributed as *Zinjanthropus boisei* (with the first discovery going by the nickname “Zinj” or sometimes “Nutcracker Man”), *Paranthropus boisei* was discovered in 1959 by Mary Leakey (see Figures 17 and 18; Leakey 1959). This “robust” australopith species is distributed across countries in East Africa at sites in Kenya (Koobi Fora, West Turkana, and Chesowanja), Malawi (Malema-Chiwondo), Tanzania (Olduvai Gorge and Peninj), and Ethiopia (Omo River Basin and Konso). The specimens of this species have been found by researchers to date to roughly 2.4 mya to 1.4 mya. Due to the nature of its exaggerated, larger, and more robust features, *P. boisei* has been termed hyper-robust**,** that is, even more heavily built than other robust forms, with very large, flat posterior dentition. Despite the cranial features of *P. boisei* indicating a tough diet of tubers, nuts, and seeds, isotopes indicate a diet high in C4 foods (e.g., grasses, such as sedges). This differs from what is seen in *P. robustus*. Another famous specimen from this species is the Peninj mandible from Tanzania, found in 1964 by Kimoya Kimeu.



Figure 18.“Nutcracker Man” (Paranthropus boisei) had hyper-robust features including very large dentition, flaring zygomatic arches, a broad concave face. It had a powerful and extremely efficient chewing force.

Paranthropus robustus was the first taxon to be discovered within the genus in Kromdraai B by a school boy named Gert Terblanche, and subsequent fossil discoveries were made by researcher Robert Broom in 1938 (Figure 19; Broom 1938). *Paranthropus robustus* dates approximately to 2.0 mya to 1 mya and is the only taxon from the genus to be discovered in South Africa. It has been found in sites all over the Cradle of Humankind, such as Kromdraai B, Swartkrans, Gondolin, Drimolen, and Coopers Cave. *P. robustus* features are neither as “hyper-robust” as *P. boisei* nor as primitive as *P. aethiopicus*; instead, they have been described as being less derived, more general features that are shared with both East African species.



Figure 19. Paranthropus robustus had less derived, more general features; it was not as robust as P. boisei and not as primitive as P. aethiopicus. It also appeared to be prone to a tooth defect (enamel hypoplasia), making the enamel thinner and more prone to decay.

Early Tool Use and Technology

The **Early Stone Age (ESA)** marks the beginning of recognizable technology as made by our human ancestors. Stone-tool (or **lithic**) technology is defined by the fracturing of rocks and the manufacture of tools through a process called **knapping**. The Stone Age lasted for more than 3 million years and is broken up into chronological periods called the Early (ESA), Middle (MSA), and Later Stone Ages (LSA). Each period is further broken up in different techno-complexes, as explained below. The ESA spanned the largest technological time period of human innovation from over 3 million years ago to around 300,000 years ago and is associated almost entirely with hominin species prior to modern *Homo sapiens.*

Currently, the oldest known stone tools, which form the techno-complex the Lomekwian, date to 3.3 mya (Harmand et al. 2015). They were found at a site called Lomekwi 3 in Kenya. This techno-complex is the most recently defined and pushed back the oldest known date for lithic technology. There is only one known site thus far and, due to the age of the site, it is associated with species prior to *Homo*. The pieces are very chunky and do not display the same fracture patterns as seen in later techno-complexes. Lomekwian knappers likely aimed to get a sharp-edged piece on a flake, which would have been functional.

Stone tool use, however, is not only understood through the direct discovery of the tools. Cut marks on fossilized animal bones may illuminate the functionality of stone tools. In one study in 2010, researchers argued that cut marks on a pair of animal bones from Dikika in Ethiopia, dated to 3.4 mya, were from stone tools. The discoverers suggested that they be more securely associated, temporally, with *Au. afarensis*. However, others have noted that these marks are consistent with teeth marks from carnivores.

The **Oldowan** techno-complex is far more established in the scientific literature (Leakey 1971). It is called the Oldowan because it was originally discovered in Olduvai Gorge, Tanzania, but the oldest assemblage is from Gona in Ethiopia, dated to 2.6 mya (Semaw 2000). The techno-complex is defined as a core and flake industry. Like the Lomekwian, there was an aim to get sharp-edged flakes, but this was achieved through a different production method. Hominins were able to actively hold or manipulate the core being knapped, which they could directly hit using a hammerstone.

Defining the Genus *Homo*

The next stage of human evolution comprises those hominins who share our genus, *Homo*. Since our discipline is fundamentally concerned with what makes us human, defining our own genus takes on special significance for anthropologists. These species were even more like us, very much like us in some cases, and knowing their stories helps us understand our evolutionary inheritance.

There is general agreement that species classified as *Homo* should share characteristics broadly similar to our species. These include the following:

- a relatively large brain size, indicating a high degree of intelligence;
- a smaller and flatter face;
- smaller jaws and teeth; and
- increased reliance on culture, particularly the use of stone tools, to exploit a greater diversity of environments (adaptive zone).

Climate and the *Homo* genus

Chronologically, the species of the Homo genus mostly evolved during the Pleistocene epoch. Early hominins evolved during the late Pliocene, when Earth's climate was considerably warmer and wetter than at present. The subsequent **Pleistocene** epoch (2.6 million years to 11,000 years ago) ushered in major environmental change. The Pleistocene is popularly referred to as the Ice Age. Since the term "Ice Age" tends to conjure up images of glaciers and woolly mammoths, one would naturally assume that this was a

period of uniformly cold climate around the globe. But this is not actually the case. Instead, climate became much more variable, cycling abruptly between warm/wet (interglacial) and cold/dry (glacial) cycles.

Data on ancient geography and climate help us understand how our ancestors moved and migrated to different parts of the world, and the constraints under which they operated. When periods of global cooling dominated, sea levels were lower as more water was captured as glacial ice. This exposed continental margins and opened pathways between land masses. During glacial periods, the large Indonesian islands of Sumatra, Java, and Borneo were connected to the Southeast Asian mainland, while New Guinea was part of the southern landmass known as greater Australia. There was a land bridge connection between Britain and continental Europe, and an icy, treeless plain known as Beringia connected Northern Asia and Alaska. At the same time, glaciation made some northern areas inaccessible to human habitation. In Africa, paleoclimate research has determined that grasslands (shown in Figure 20) expanded and shrank multiple times during this period, even as they expanded over the long term (deMenocal 2014). From studies of fossils, paleontologists have been able to reconstruct Pleistocene animal communities and to consider how they were affected by the changing climate. The fossil record shows that animal species moved back and forth between Africa and Eurasia during the Pliocene and Pleistocene epochs.



Figure 20. A savanna grassland in East Africa. Habitats such as this were becoming increasingly common during the Pleistocene.

Members of the genus *Homo*, faced with the unstable African climate and shifting landscape, evolved bigger brains that enabled them to rely on cultural solutions such as crafting stone tools that opened up new foraging opportunities. This strategy of behavioral flexibility served them well during this unpredictable time and led to new innovations such as increased meat-eating, cooperative hunting, and the exploitation of new environments outside Africa.

Homo Habilis: The Earliest Members of Our Genus

Homo habilis has traditionally been considered the earliest species placed in the genus *Homo*. Compared to the australopithecines, *Homo habilis* has a somewhat larger brain size–an average of 650 cubic centimeters (cc) compared to less than 500 cc for *Australopithecus*. Additionally, the skull is more rounded and the face less prognathic. However, the postcranial remains show a body size and proportions similar to *Australopithecus*.

The first fossils to be named *Homo habilis* were discovered at the site of Olduvai Gorge in Tanzania, East Africa, by members of a team led by Louis and Mary Leakey. The hand bones were similar to humans' in that they were capable of a precision grip. This increased the likelihood that stone tools found earlier at Olduvai Gorge were made by this group of hominins. Based on these findings, the authors inferred that it was a new species that should be classified in the genus *Homo*. They gave it the name *Homo habilis*, meaning "handy" or "skilled."

Since its initial discovery, many more *Homo habilis* were discovered in East and South African sites (Figures 21 and 22). Known dates for fossils identified as *Homo habilis* range from about 2.5 million years ago to 1.7 million years ago. Recently, a partial lower jaw dated to 2.8 million years from the site of Ledi-Geraru in Ethiopia has been tentatively identified as belonging to the genus *Homo* (Villmoare et al. 2015). If this classification holds up, it would push the origins of our genus back even further. These *Homo habilis* specimens, however, show substantial variability. While some resembled the fossil specimen first published by Leakey and colleagues, others had larger cranial capacity and tooth size.

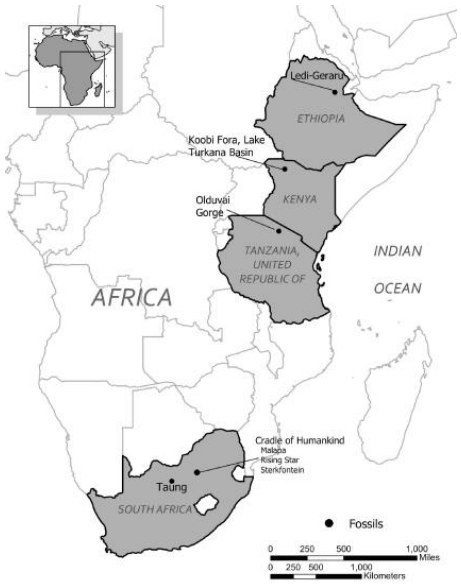


Figure 21 Map showing major sites where Homo habilis fossils have been found.



Figure 22. Homo habilis fossil specimens. From left to right they are: OH-24 (found at Olduvai Gorge), KNM-ER-1813 (from Koobi Fora, Kenya), and the jaw of OH-7, which was the type specimen found in 1960 at Olduvai Gorge, Tanzania.

Homo Habilis Culture and Lifeways

Early Stone Tools and Diet

The larger brains and smaller teeth of early *Homo* are linked to a different adaptive strategy than that of earlier hominins: one dependent on modifying rocks to make stone tools and exploit new food sources. As we've seen, while the earliest stone were made by Australopithecines, stone tools become more frequent at sites dating to about 2 million years ago, the time of *Homo habilis* (Roche et al. 2009). This suggests that these hominins were increasingly reliant on stone tools to make a living.

The oldest stone tool industry is the **Oldowan**, named after the site of Olduvai Gorge where the tools, and *Homo habilis*, were first discovered. The time period of the Oldowan is generally considered to last from about 2.5 mya to 1.6 mya. The tools of this industry are described as "flake and chopper" tools—the choppers consisting of stone cobbles with a few flakes struck off them (Figure 23). To a casual observer, these tools might not look much different from randomly broken rocks. However, they are harder to make than their crude appearance suggests. The rock selected as the core must be struck by the rock serving as a hammerstone at just the right angle so that one or more flat flakes are removed. This requires selecting rocks that will fracture predictably instead of chunking, as well as the ability to plan ahead and envision the steps needed to create the finished product.

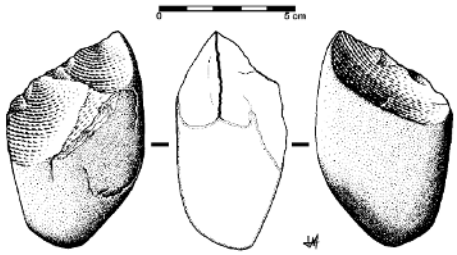


Figure 23 Drawing of an Oldowan-style tool. This drawing shows a chopper; the flakes removed from the cores functioned as cutting tools.

What were the hominins doing with the tools? One key activity seems to have been butchering animals. Animal bones with cutmarks start appearing at sites with Oldowan tools. Studies of animal bones at the site show leg bones are often cracked open, suggesting that they were extracting the marrow from the bone cavities. It is interesting to consider whether the hominins hunted these animals or acquired them through other means. The butchered bones come from a variety of African mammals, ranging from small antelope to animals as big as wildebeest and elephants! It is difficult to envision slow, small-bodied *Homo habilis* with their Oldowan tools bringing down such large animals. One possibility is that the hominins were scavenging carcasses.

The Oldowan toolmakers were exploiting a new ecological niche that provided them with more protein and calories. And it was not just limited to meat-eating—stone tool use could have made available numerous other subsistence opportunities. A study of microscopic wear patterns on a sample of Oldowan tools indicates that they were used for processing plant materials such as wood, roots or tubers, and grass seeds and stems (Lemorini et al. 2014). In fact, it has been pointed out that the Oldowan toolmakers' cutting ability (whether for the purposes of consuming meat and plants or for making tools, shelters or clothing) represents a new and unique innovation, never seen before in the natural world! (Roche et al. 2009).

Overall, increasing use of stone tools allowed hominins to expand their ecological niche and exert more control over their environment. As we'll see shortly, this pattern continued and became more pronounced with *Homo erectus*.

Homo Erectus: Biological and Cultural Innovations

After 2 million years ago, a new hominin appeared on the scene. Known as *Homo erectus*, the prevailing scientific view was that this species was much more like us. These hominins were equipped with bigger brains and large bodies with limb proportions similar to our own. Perhaps most importantly, their way of life is now one that is recognizably human, with more advanced tools, hunting, use of fire, and colonizing new environments outside of Africa.

Homo erectus Anatomy

Compared to *Homo habilis*, *Homo erectus* showed increased brain size, smaller teeth, and a larger body.

Although the head of *Homo erectus* was less ape-like in appearance than the australopithecines, neither did it resemble modern humans (Figure 24). Compared to *Homo habilis*, *Homo erectus* had a larger brain size (average of about 900 cc compared to 650 cc to 750 cc). Instead of having a rounded shape like our skulls have, the *erectus* skull was long and low like a football, with a receding forehead. The cranial bones are thicker than those of modern humans, and they had large, shelf-like brow ridges over the eyes.

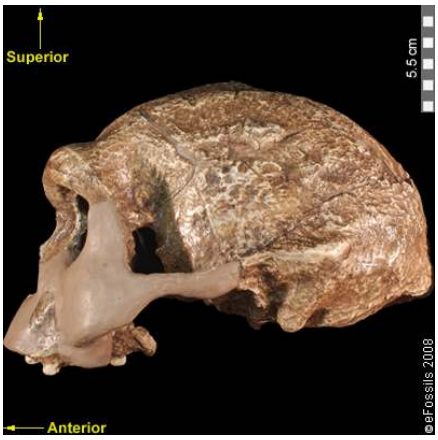


Figure 24 Replica of Homo erectus from Java, Indonesia. This cranium (known as Sangiran 17) dates to approximately 1.3 million to 1 million years ago.

Homo erectus was thought to have a body size and proportions more similar to modern humans. Unlike *Homo habilis* and the australopithecines, both of whom were small-statured with long arms and short legs, *Homo erectus* shows evidence of being fully committed to life on the ground. This meant long, powerfully muscled legs that enabled these hominins to cover more ground efficiently. Indeed, studies of the *Homo erectus* body form have linked several characteristics of the species to long-distance running in the more open savanna environment (Bramble and Lieberman 2004). Many experts think that hominins around this time had lost much of their body hair, were particularly efficient at sweating, and had darker-pigmented skin—all traits that would support the active lifestyle of such a large-bodied hominin.

How we became Hairless, Sweaty Primates

As an anthropology instructor, one question about human evolution that students often ask me concerns human body hair—when did our ancestors lose it and why? It is assumed that our earliest ancestors were as hairy as modern-day apes. Today, though, we lack thick hair on most parts of our bodies except in the armpit and pubic regions and on the tops of our heads. Humans actually have about the same number of hair follicles per unit of skin as chimpanzees. But, the hairs on most of our body are so thin as to be practically invisible. When did we develop this peculiar pattern of hairlessness? Which selective pressures in our ancestral environment were responsible for this unusual characteristic?

Many experts believe that the driving force behind our loss of body hair was the need to effectively cool ourselves. Along with the lack of hair, humans are also distinguished by being exceptionally sweaty: we sweat larger quantities and more efficiently than any other primate. Humans have a larger amount of eccrine sweat glands than other primates and these glands generate an enormous volume of watery sweat. Sweating produces liquid on the skin that cools you off as it evaporates. It seems likely that hairlessness and sweating evolved together, as a recent DNA analysis has identified a shared genetic pathway between hair follicles and eccrine sweat gland production (Kamberov et al 2015).

Which particular environmental conditions led to such adaptations? In this chapter, we learned that the climate was a driving force behind many changes seen in the hominin lineage during the Pleistocene. At that time, the climate was increasingly arid and the forest canopy in parts of Africa was being replaced with a more open grassland environment, resulting in increased sun exposure for our ancestors. Compared to the earlier australopithecines, members of the genus *Homo* were also developing larger bodies and brains, starting to obtain meat by hunting or scavenging carcasses, and crafting sophisticated stone tools.

According to Nina Jablonski, an expert on the evolution of human skin, the loss of body hair and increased sweating capacity are part of the package of traits characterizing the genus *Homo*. While larger brains and long-legged bodies made it possible for humans to cover long distances while foraging, this new body form had to cool itself effectively to handle a more active lifestyle. Preventing the brain from overheating was especially critical. The ability to keep cool may have also enabled hominins to forage during the hottest part of the day, giving them an advantage over savanna predators, like lions, that typically rest during this time.

When did these changes occur? Although hair and soft tissue do not typically fossilize, there are several indirect methods that have been used to explore this question. One method tracks a human skin color gene. Since chimpanzees have light skin under their hair, it is probable that early hominins also had light skin color. Apes and other mammals with thick fur coats have protection against the sun's rays. As our ancestors lost their fur, it is likely that increased melanin pigmentation was selected

for to shield our ancestors from harmful ultraviolet radiation. A recent genetic analysis determined that one of the genes responsible for melanin production originated about 1.2 million years ago (Jablonski 2010).

Another line of evidence tracks the coevolution of a rather unpleasant human companion—the louse. A genetic study identified human body louse as the youngest of the three varieties of lice that infest humans, splitting off as a distinct variety around 70,000 years ago. Because human body lice can only spread through clothing, this may have been about the time when humans started to regularly wear clothing. However, the split between human head and pubic lice is estimated to have occurred much earlier, about three million years ago (Reed et al. 2007). When humans lost much of their body hair, lice that used to roam freely around the body were now confined to two areas: the head and pubic region. As a result of this "geographic" separation, the lice population split into two distinct groups.

Homo erectus fossil remains

The first discovery of *Homo erectus* was in the late 1800s in Java, Indonesia. A Dutch anatomist named Eugene Dubois searched for human fossils with the belief that since orangutans lived there, it might be a good place to look for remains of early humans. He discovered a portion of a skull, a femur, and some other bone fragments on a riverbank. While the femur looked human, the top of the skull was smaller and thicker than a modern person's. Dubois named the fossil *Pithecanthropus erectus* ("upright ape-man"), popularized in the media at the time as "Java Man." After later discoveries of similar fossils in China and Africa, they were combined into a single species (retaining the *erectus* name) under the genus *Homo*.

Although the earliest discoveries of *Homo erectus* fossils were from Asia, the greatest quantity and best-preserved fossils of the species come from eastern African sites. The earliest fossils in Africa identified as *Homo erectus* come from the East African site of Koobi Fora, around Lake Turkana in Kenya, and are dated to about 1.8 million years ago. Other fossil remains have been found in East African sites in Kenya, Tanzania, and Ethiopia. Other notable African *Homo erectus* finds are a female pelvis from the site of Gona, Ethiopia (Simpson et al 2008), and a cranium from Olduvai Gorge known as Olduvai 9, thought to be about 1.4 million years old with massive brow ridges.

It is generally agreed that *Homo erectus* was the first hominin to migrate out of Africa and colonize Asia and later Europe. Key locations and discoveries of *Homo erectus* fossils, along with the fossils' estimated age are shown on Figure 25.

Figure 25. Map showing the locations of Homo erectus fossils around Africa and Eurasia.

Region	Dates	Significance of Fossils
East and West Lake Turkana, Kenya; Olduvai Gorge, Tanz	1.8 to 1.4 mya	Earliest evidence of *H. erectus*; significant variation in skull and facial features.

Region	Dates	Significance of Fossils
Dmanisi, Republic of Georgia	1.75 mya	Smaller brains and bodies than *H. erectus* from other regions.
Western Europe, Spain (Atapuerca, Gran Dolina)	1.2 mya– 400,000 ya	Partial jaw from Atapuerca is oldest evidence of *H. erectus* in Western Europe. Fossils from Gran Dolina (dated to about 800,000 years) sometimes referred to as *H. antecessor.*

Region	Dates	Significance of Fossils
Simadel Elefante and Grande Dolina cave)		

Region	Dates	Significance of Fossils
Ngandong, Java, Sangiran, Java	1.6 mya	Early dispersal of *H. erectus* to East Asia; Asian *H. erectus* features.

Region	Dates	Significance of Fossils
Zhoukoudian, China Lantian, China Loess Plateau (Lantian)	780,000 – 400,000 ya 2.1 mya	Large sample of *H. erectus* fossils and artifacts. Recent evidence of stone tools from Loess Plateau suggests great antiquity of *Homo* in East Asia.

HOMO ERECTUS LIFEWAYS

Homo erectus shows significant cultural innovations in its lifeways – including diet, technology, life history, environments occupied, and perhaps even social organization. Indeed, some of them you will probably recognize as more "human-like" than any of the hominins previously covered.

Tool Technology: Acheulean Tool Industry

In early African sites associated with *Homo erectus*, stone tools such as flakes and choppers identified to the **Oldowan** Industry dominate. Starting at about 1.5 million years ago, some *Homo erectus* populations began making different forms of tools. These tools–classified together as constituting the **Acheulean** tool industry–are more complex in form and more consistent in their manufacture. Unlike the Oldowan tools, which were cobbles modified by striking off a few flakes, Acheulean toolmakers carefully shaped both sides of the tool. One of the most common tool forms, the handaxe, is shown in Figure 26.

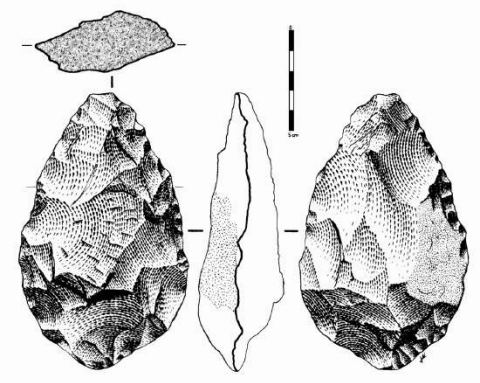


Figure 26. Drawing of an Acheulean handaxe. This specimen is from Spain. When drawing a stone tool, artists typically show front and back faces, as well as top and side profiles.

One striking aspect of Acheulean tools is their uniformity. They are more standardized in form and mode of manufacture than the earlier Oldowan tools. For example, the aforementioned handaxes vary in size, but they are remarkably consistent in regard to their shape and proportions. They were also an incredibly stable tool form over time—lasting well over a million years with little change.

What (if anything) do the Acheulean tools tell us about the mind of *Homo erectus*? Clearly, they took a fair amount of skill to manufacture. Apart from the actual shaping of the tool, other decisions made by toolmakers can reveal their use of foresight and planning. Analysis of Acheulean stone tools suggest that at some sites, the toolmakers selected their raw materials carefully—traveling to particular rock outcrops to quarry stones and perhaps even removing large slabs of rock at the quarries to get at the most desirable material. Such complex activities would require advanced planning. They also likely required cooperation and communication with other individuals, as such actions would be difficult to carry out solo.

Subsistence and Diet

In reconstructing the diet of *Homo erectus*, researchers can draw from multiple lines of evidence. These include stone tools used by *Homo erectus*, animal bones and occasionally plant remains from *Homo erectus* sites, and the bones and teeth of the fossils themselves. These data sources suggest that compared to the australopithecines, *Homo erectus* consumed more animal protein. Coinciding with the appearance of *Homo erectus* fossils in Africa are archaeological sites with much more abundant stone tools and larger concentrations of butchered animal bones.

It makes sense that a larger body and brain would be correlated with a dietary shift to more calorically dense foods. This is because the brain is a very energetically greedy organ. Indeed, our own human brains require more than 20% of one's calorie total intake to maintain. When biologists consider the evolution of intelligence in any animal species, it is often framed as a cost/benefit analysis: In order for large brains to evolve, there has to be a compelling benefit to having them and a way to generate enough energy to fuel them.

One solution that would allow for an increase in human brain size would be a corresponding reduction in the size of the digestive tract (gut). According to the "expensive tissue hypothesis," initially formulated by Leslie Aiello and Peter Wheeler (1995), a smaller gut would allow for a larger brain without the need for a corresponding increase in the organism's metabolic rate. Judging from their skeleton, australopithecines have a wider rib cage and trunk region more similar to apes than humans. It is thought that the australopithecines had large gut sizes similar to today's great apes because they were eating mainly plant foods, which require more gut bacteria to digest. More meat in the diet would allow for a smaller gut and could also fuel the larger brain and body size seen in the genus *Homo*. Some researchers also believe that body fat percentages increased in hominins (particularly females) around this time, which would have allowed them to be better buffered against environmental disruption such as food shortages.

As indicated above, evidence from archaeology and the inferences about *Homo erectus* body size suggest increased meat eating. How much hunting did *Homo erectus* engage in compared to the earlier Oldowan toolmakers? Although experts continue to debate

the relative importance of hunting versus scavenging, there seems to be stronger evidence of hunting for these hominins. For example, at sites such as Olorgesailie in Kenya (Figure 27), there are numerous associations of Acheulean tools with butchered remains of large animals.



Figure 27. Excavations at the site of Olorgesailie, Kenya. Dated from between 1.2 million years ago and 490,000 years ago, Olorgesailie has some of the most abundant and well-preserved evidence of Homo erectus activity in the world. Fossils of large mammals, such as elephants, along with thousands of Acheulean tools, have been uncovered over the decades.

However, *Homo erectus* certainly ate more than just meat. Studies of the tooth surfaces and microscopic wear patterns on hominin teeth indicate that *Homo erectus* ate a variety of foods, including some hard, brittle plant foods (Unger and Scott 2009). This would make sense, considering the environment was changing to be more dominated by grasslands in some areas. Roots, bulbs, and tubers (known as underground storage organs) of open savanna plants may have been a primary food source. In the unstable environment of the early Pleistocene, dietary versatility would be a definite advantage.

Tool Use, Cooking, and Fire

One key characteristic of the genus *Homo* is smaller teeth compared to *Australopithecus*. Why would teeth get smaller? Besides the change in the type of foods eaten, there may have also been changes in how food was prepared and consumed. Think about how you would eat if you didn't have access to cutting tools. What you couldn't rip apart with your hands would have to be bitten off with your teeth—actions that would require bigger, more powerful teeth and jaws. During this time, stone tools were becoming increasingly important. If hominins were using these tools to cut up, tenderize, and process meat and plants, they wouldn't have to use their teeth so vigorously.

Cooking food could also have contributed to the reduction in tooth and jaw size. In fact, anthropologist Richard Wrangham (2009) asserts that cooking played a crucial role in human evolution. Cooking provides a head start in the digestive process because of how heat begins to break down food before food even enters the body, and it can help the body extract more nutrients out of meat and plant foods such as starchy tubers. According to Wrangham's model, this improved diet had a number of far-reaching consequences for human evolution. Most importantly, it allowed for the larger brain and body size (and smaller gut size) seen in *Homo erectus*.

Obviously cooking requires fire, and the earliest use of fire is a fascinating topic in the study of human evolution. Fire, of course is not limited to humans; it occurs naturally as a result of lightning strikes. Like other wild animals, early hominins must have been terrified of wildfires, but at some point in time learned to control fire and put it to good use. Cooking, warmth, and scaring off wild animals are just some of the benefits of fire. Consider the potential social benefits of having a light source after dark. Rather than just going to sleep, members of the group could repair tools, plan the next day's activities, or socialize—just as you might do sitting around a campfire with family or friends. Isn't it intriguing to think about how such activities might have encouraged the development of language?

Migration out of Africa

Homo erectus is generally thought to be the first hominin species to leave the continent of Africa and settle in Eurasia in places such as the Republic of Georgia, Indonesia, and northern China. We previously discussed the timing and fossil evidence for the

appearance of *Homo erectus* at those sites; now we can address why the species traveled such vast distances to these far-flung regions. To do this, we have to consider what we have learned about the biology, culture, and environmental circumstances of *Homo erectus*. The larger brain and body size of *Homo erectus* were fueled by a diet consisting of more meat, and longer more powerful legs made it possible to walk and run longer distances to acquire food. Since they were eating higher on the food chain, it was necessary for them to extend their home range to find sufficient game. Cultural developments including better stone tools and new technology such as fire gave them greater flexibility in adapting to different environments. Finally, the major Pleistocene climate shift discussed earlier in the chapter certainly played a role. Changes in air temperature, precipitation, access to water sources, and other habitat alteration had far-reaching effects on animal and plant communities; this included *Homo erectus*. If hominins were relying more on hunting, the migration patterns of their prey could have led them increasingly long distances.

Hominin Charts

Hominin	*Sahelanthropus tchadensis*
Dates	7 mya to 6 mya
Region(s)	Chad
Famous discoveries	The initial discovery, made in 2001.
Brain size	360 cc average
Dentition	Smaller than in extant great apes, larger and pointier than in humans. Canines worn at the tips.
Cranial features	A short cranial base and a foramen magnum (hole in which the spinal cord enters the cranium) that is more humanlike in positioning, has been argued to indicate upright walking.
Postcranial features	Currently little published postcranial material.
Culture	N/A
Other	The extent to which this hominin was bipedal is currently heavily debated. If so, it would indicate an arboreal bipedal ancestor of hominins, not a knuckle-walker like chimpanzees.

Hominin	*Orrorin tugenensis*
Dates	6 mya to 5.7 mya
Region(s)	Tugen Hills (Kenya)
Famous discoveries	Original discovery in 2000.
Brain size	N/A
Dentition	Smaller cheek teeth (molars and premolars) than even more recent hominins (i.e., derived), thick enamel, and reduced, but apelike, canines.
Cranial features	Not many found
Postcranial features	Fragmentary leg, arm, and finger bones have been found. Indicates bipedal locomotion.
Culture	Potential toolmaking capability based on hand morphology, but nothing found directly.
Other	This is the earliest species that clearly indicates adaptations for bipedal locomotion.

Hominin	*Ardipithecus ramidus*

Dates	4.4 mya
Region(s)	Middle Awash region and Gona (Ethiopia)
Famous discoveries	A partial female skeleton nicknamed “Ardi” (ARA-VP-6/500).
Brain size	300 cc to 350 cc
Dentition	Little differences between the canines of males and females (small sexual dimorphism).
Cranial features	Midfacial projection, slightly prognathic. Cheekbones less flared and robust than in later hominins.
Postcranial features	Ardi demonstrates a mosaic of ancestral and derived characteristics in the postcrania. For instance, an opposable big toe similar to chimpanzees (i.e., “primitive” or more ancestral), which could have aided in climbing trees effectively. However, the pelvis and hip show that she could walk upright (i.e., it is derived), supporting her hominin status.
Culture	None directly associated
Other	Over 110 specimens from Aramis

Hominin	*Ardipithecus kadabba*
Dates	5.2 mya to 5.8 mya
Region(s)	Middle Awash (Ethiopia)
Famous discoveries	This species discovery in 1997 by Yohannes Haile-Selassie.
Brain size	N/A
Dentition	Larger hind dentition than in modern chimpanzees. Thick enamel and larger canines than in later hominins.
Cranial features	N/A
Postcranial features	A large hallux (big toe) bone indicates a bipedal “push off.”
Culture	N/A
Other	Faunal evidence indicates a mixed grassland/woodland environment.

Hominin	*Australopithecus anamensis*
Dates	4.2 mya to 3.8 mya
Region(s)	Turkana region (Kenya), Middle Awash (Ethiopia)
Famous discoveries	A 2019 find from Ethiopia, named MRD.
Brain size	370 cc
Dentition	Relatively large canines compared with more recent Australopithecines.
Cranial features	Projecting cheekbones and primitive earholes.
Postcranial features	Lower limb bones (tibia and femur) indicate bipedality; arboreal features in upper limb bones (humerus) found.

Culture	N/A
Other	Almost 100 specimens, representing over 20 individuals, have been found to date.

Hominin	*Australopithecus afarensis*
Dates	2.9 mya to 3.9 mya
Region(s)	Afar Region, Omo, Maka, Fejej, and Belohdelie (Ethiopia); Laetoli (Tanzania); Koobi Fora (Kenya).
Famous discoveries	Lucy, Selam (Dikika Child), Laetoli Footprints.
Brain size	380 cc to 430 cc
Dentition	Reduced canines and molars relative to great apes, but larger than in modern humans.
Cranial features	Prognathic face, facial features indicate relatively strong chewing musculature (compared with *Homo*), but less extreme than in *Paranthropus*.
Postcranial features	Clear evidence for bipedalism from lower limb postcranial bones. Laetoli Footprints indicate humanlike walking. Dikika Child bones indicate retained primitive arboreal traits in the postcrania.
Culture	None directly; but close in age and proximity to controversial cut marks at Dikika and early tools in Lomekwi.
Other	*Au. afarensis* is one of the oldest and most well-known australopithecine species and consists of a large number of fossil remains.

Hominin	*Australopithecus bahrelghazali*
Dates	3.6 mya
Region(s)	Chad
Famous discoveries	“Abel,” the holotype.
Brain size	N/A
Dentition	N/A
Cranial features	N/A
Postcranial features	N/A
Culture	N/A
Other	Arguably within range of variation of *Au. afarensis*

Hominin	*Australopithecus deyiremada*
Dates	3.5 mya to 3.3 mya
Region(s)	Woranso-Mille (Afar region, Ethiopia)
Famous discoveries	First fossil mandible bones were discovered in 2011 in the Afar region of Ethiopia by Yohannes Haile-Selassie.

Brain size	N/A
Dentition	Smaller teeth with thicker enamel than seen in *Au. afarensis*, with a potentially hardier diet.
Cranial features	Larger mandible and more projecting cheekbones than in *Au. afarensis*.
Postcranial features	N/A
Culture	N/A
Other	Contested species designation; arguably a member of *Au. afarensis*.

Hominin	*Australopithecus garhi*
Dates	2.5 mya
Region(s)	Middle Awash (Ethiopia)
Famous discoveries	N/A
Brain size	450 cc
Dentition	Larger hind dentition than seen in other gracile Australopithecines.
Cranial features	N/A
Postcranial features	A femur of a fragmentary partial skeleton, argued to belong to *Au. garhi*, indicates this species may be longer-limbed than *Au. afarensis*, although still able to move arboreally.
Culture	Crude/primitive stone tools resembling Oldowan (described later) have been found in association with *Au. garhi*.
Other	This species is not well documented or understood and is based on only a few fossil specimens.

Hominin	*Australopithecus africanus*
Dates	3.3 mya to 2.1 mya
Region(s)	Sterkfontein, Taung, Makapansgat, Gladysvale (South Africa)
Famous discoveries	Taung Child, “Mrs. Ples,” Little Foot (?).
Brain size	400 cc to 500 cc
Dentition	Smaller teeth (derived) relative to *Au. afarensis*. Small canines with no diastema.
Cranial features	A rounder skull compared with *Au. afarensis* in East Africa. A sloping face (primitive).
Postcranial features	Similar postcranial evidence for bipedal locomotion (derived pelvis) with retained arboreal locomotion (e.g., curved phalanges —fingers), as seen in *Au. afarensis*.
Culture	None with direct evidence.
Other	A 2015 study noted that the trabecular bone morphology of the hand was consistent with forceful tool manufacture and use, suggesting potential early tool abilities.

Hominin	*Australopithecus sediba*
Dates	1.97 mya
Region(s)	Malapa Fossil Site (South Africa)
Famous discoveries	Karabo (MH1)
Brain size	420 cc to 450 cc
Dentition	Small dentition with Australopithecine cusp-spacing.
Cranial features	Small brain size (*Australopithecus*-like), but gracile mandible (*Homo*-like).
Postcranial features	Scientists have interpreted this mixture of traits (such as a robust ankle but evidence for an arch in the foot) as a transitional phase between a body previously adapted to arborealism (tree climbing, particularly in evidence from the bones of the wrist) to one that adapted to bipedal ground walking.
Culture	None of direct association, but some have argued that a modern hand morphology (shorter fingers and a longer thumb) means that adaptations to tool manufacture and use may be present in this species.
Other	It was first discovered through a clavicle bone in 2008 by nine-year-old Matthew Berger, son of paleoanthropologist Lee Berger.

Hominin	*Australopithecus prometheus*
Dates	3.7 mya (debated)
Region(s)	Sterkfontein (South Africa)
Famous discoveries	“Little Foot” (StW 573)
Brain size	408 cc (Little Foot estimate)
Dentition	Heavy anterior dental wear patterns, relatively large anterior dentition and smaller hind dentition, similar to *Au. afarensis*.
Cranial features	Relatively larger brain size, robust zygomatic arch, and a flatter midface.
Postcranial features	The initial discovery of four ankle bnes indicated bipedality.
Culture	N/A
Other	Highly debated new species designation.

Hominin	*Paranthropus aethiopicus*
Dates	2.7 mya to 2.3 mya
Region(s)	West Turkana (Kenya), Laetoli (Tanzania), Omo River Basin (Ethiopia)
Famous discoveries	The ‘Black Skull” (KNM–WT 17000)
Brain Size	410 cc
Dentition	*P. aethiopicus* has the shared derived traits of large flat premolars and molars, although few teeth have been found.

Cranial features	Large flaring zygomatic arches for accommodating large chewing muscles (the temporalis muscle), a sagittal crest for increased muscle attachment of the chewing muscles to the skull, and a robust mandible and supraorbital torus (brow ridge).
Postcranial features	A proximal tibia indicates bipedality, and similar size to *Au. afarensis*.
Culture	N/A
Other	The “Black Skull” is so called because of the mineral manganese that stained it black during fossilization.

Hominin	*Paranthropus boisei*
Dates	2.4 mya to 1.4 mya
Region(s)	Koobi Fora, West Turkana, and Chesowanja (Kenya), Malema-Chiwondo (Malawi), Olduvai Gorge and Peninj (Tanzania), and Omo River basin and Konso (Ethiopia)
Famous discoveries	“Zinj,” or sometimes “Nutcracker Man” (OH5), in 1959 by Mary Leakey. The Peninj mandible from Tanzania, found in 1964 by Kimoya Kimeu.
Brain size	500 cc to 550 cc
Dentition	Very large, flat posterior dentition (largest of all hominins currently known). Much smaller anterior dentition. Very thick dental enamel.
Cranial features	Indications of very large chewing muscles (e.g., flaring zygomatic arches and a large sagittal crest).
Postcranial features	Evidence for high variability and sexual dimorphism, with estimates of males at 1.37 meters tall and females at 1.24 meters.
Culture	Richard Leakey and Bernard Wood have both suggested that *P. boisei* could have made and used stone tools. Tools dated to 2.5 mya in Ethiopia have been argued to possibly belong to this species.
Other	Despite the cranial features of *P. boisei* indicating a tough diet of tubers, nuts, and seeds, isotopes indicate a diet high in C4 foods (e.g., grasses, such as sedges). This differs from what is seen in *P. robustus*.

Hominin	*Paranthropus robustus*
Dates	2.3 mya to 1 mya
Region(s)	Kromdraai B, Swartkrans, Gondolin, Drimolen, and Coopers Cave (South Africa)
Famous discoveries	SK48 (original skull)
Brain size	410 cc to 530 cc

Dentition	Large posterior teeth with thick enamel, consistent with other Robust Australopithecines. Enamel hypoplasia is also common in this species, possibly because of instability in the development of large, thick enameled dentition.
Cranial features	*P. robustus* features are neither as "hyper-robust" as *P. boisei* or as primitive as *P. aethiopicus*, but have been described as less derived more general features that are shared with both East African species, e.g., the sagittal crest and zygomatic flaring.
Postcranial features	Reconstructions indicate sexual dimorphism.
Culture	N/A
Other	Several of these fossils are fragmentary in nature, distorted, and not well preserved, because they have been recovered from quarry breccia using explosives.

Hominin	*Kenyanthopus platyops*
Dates	3.5 mya to 3.2 mya
Region(s)	Lake Turkana (Kenya)
Famous discoveries	KNM–WT 40000
Brain size	Difficult to determine, but appears within the range of *Australopithecus afarensis*.
Dentition	Small molars/dentition (*Homo*-like characteristic)
Cranial features	Flatter (i.e., orthognathic) face
Postcranial features	N/A
Culture	Some have associated the earliest tool finds from Lomekwi, Kenya, temporally (3.3 mya) and in close geographic proximity to this species/specimen.
Other	Taxonomic placing of this species is quite divided. The discoverers have argued that this species is ancestral to *Homo*, in particular to *Homo ruldolfensis*.

Hominin	*Homo habilis*
Dates	2.5 million years ago to 1.7 million years ago
Region(s)	East and South Africa
Famous Discoveries	Olduvai Gorge, Tanzania; Koobi Fora, Kenya; Sterkfontein, South Africa
Brain Size	650 cc average (range from 510 cc to 775 cc)
Dentition	Smaller teeth with thinner enamel compared to *Australopithecus*; parabolic dental arcade shape
Cranial Features	Rounder cranium and less facial prognathism than *Australopithecus*
Postcranial Features	Small stature; similar body plan to *Australopithecus*
Culture	Oldowan tools

Hominin	*Homo erectus*
Dates	1.8 million years ago to about 200,000 years ago
Region(s)	East and South Africa; West Eurasia; China and Southeast Asia
Famous Discoveries	Lake Turkana, Olorgesailie, Kenya; Zhoukoudian, China; Dmanisi, Republic of Georgia
Brain Size	Average 900 cc; range between 650 cc and 1,100 cc
Dentition	Smaller teeth than *Homo habilis*
Cranial Features	Long, low skull with robust features including thick cranial vault bones and large brow ridge, sagittal keel, and occipital torus
Postcranial Features	Larger body size compared to *Homo habilis*; body proportions (longer legs and shorter arms) similar to *Homo sapiens*
Culture	Acheulean tools (in Africa); evidence of increased hunting and meat-eating; use of fire; migration out of Africa

For Further Exploration

The Smithsonian website hosts descriptions of fossil species, an interactive timeline and much more! It is a highly recommended website. http://humanorigins.si.edu/evidence

The Maropeng Museum website hosts a wealth of information regarding South African Fossil Bearing sites in the Cradle of Humankind. https://www.maropeng.co.za/content/page/human-evolution

A collation of 3-D files for visualizing (or even 3-D printing) for homes, schools, and universities: https://www.hetmp.com/

A wealth of information from the Australian Museum website, including species descriptions, family trees, and explanations of bipedalism and diet: https://australianmuseum.net.au/learn/science/human-evolution/

Terms You Should Know

Acheulean

Arboreal

Aridity Hypothesis

Bipedalism

Breccia

Closed habitat

Context

Cores

Early Stone Age (ESA)

East African Rift System (EARS)

Encephalization

Fallback foods

Faunal assemblages

Flakes

Foramen magnum

Fossil

Gracile Australopithecines

Holotype

Hominin

Knapping

Large Cutting Tools (LCT)

Molecular Phylogeny

Obligate bipedalism

Oldowan

Orthognathic

Paleoanthropologists

Paleoenvironment

Pleistocene

Postcranium

Prognathic

Relative dating

Robust Australopithecines

Taxa

Techno-complex

Thermoregulation

Study Questions

1. What is the difference between a “derived” versus a “primitive” trait? Give an example of both, seen in Au. afarensis.
2. How does past environment relate to the physical traits developed by hominins? To the diversity of hominin species?
3. Which anatomical features for bipedalism do we see in early hominins? Are these primarily obligate bipeds? Explain.
4. List the hominin species argued to be associated with stone tool technologies. Are you convinced of these associations? Why/why not?
5. List the key anatomical characteristics that are generally agreed to define the genus *Homo*.
6. Name some specific behaviors associated with *Homo erectus* in the areas of tool use, subsistence practices, migration patterns, and other cultural innovations.

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2.4: Modern Human Origins and Agriculture

Learning Objectives

By the end of this chapter, you should be able to:

- Identify the skeletal and behavioral traits that represent modern *Homo sapiens*.
- Critically evaluate different types of evidence for the origin of our species in Africa, and our expansion around the world.
- Understand how the human lifestyle changed when people transitioned from foraging to agriculture.

Defining Characteristics of Archaic *Homo Sapiens*

Archaic *Homo sapiens* share our species name but are distinguished by the term "archaic" as a way of recognizing both the long period of time between their appearance and ours, as well as the way in which human traits have continued to evolve over time—making archaic *Homo sapiens* look slightly different from us today, despite technically being considered the same species. Living throughout Europe and Asia during the Middle Pleistocene, archaic *Homo sapiens* are considered, in many ways, transitional between *Homo erectus* and modern *Homo sapiens* (see chart). All archaic *Homo sapiens* share the defining trait of an increased brain size—specifically a brain of at least 1,100 cc and averaging 1,200 cc—but are also characterized by significant regional and temporal variations. Because of these variations, scientists disagree on whether these fossils represent a single, variable species or multiple, closely related species (sometimes called *Homo antecessor*, *Homo heidelbergensis*, *Homo georgicus*, *Homo neanderthalensis*, and *Homo rhodesiensis*). For simplicity, we are going to lump them all together under the heading of archaic *Homo sapiens* and discuss them as a unit, with the exception of a particularly unique and well-known population living in Europe and West Asia known as the Neanderthals, which we will examine separately.

Trait	***Homo erectus***	**Archaic *Homo sapiens***	**Anatomically Modern *Homo sapiens***
Average Brain Size	900 cc	1,200 cc (1,500 cc when including Neanderthals)	1,400 cc
Skull Shape	Long and low Angular	Intermediate	Short and high **Globular**
Forehead	Absent	Emerging	Present
Nasal Region	Projecting nasal bones (bridge of the nose), no midfacial prognathism	Wider nasal aperture and midfacial prognathism	Narrower nasal aperture, no midfacial prognathism
Chin	Absent	Absent	Present
Other Facial Features	Large brow ridge and large projecting face	Intermediate	Small brow ridge and retracted face
Other Skull Features	Nuchal torus, sagittal keel, thick cranial bone	Projecting occipital bone, often called occipital bun in Neanderthals; intermediate thickness of cranial bone	Small bump on rear of skull, if anything; thin cranial bone
Dentition	Large teeth, especially front teeth	Slightly smaller teeth; front teeth still large; retromolar gap in Neanderthals	Smaller teeth
Postcranial Features	Robust bones of skeleton	Robust bones of skeleton	More gracile bones of skeleton

When comparing *Homo erectus*, archaic *Homo sapiens*, and anatomically modern *Homo sapiens* across several anatomical features, one can see quite clearly that archaic *Homo sapiens* are intermediate in their physical form. To identify a set of features that is unique to archaic *Homo sapiens* is a challenging task, due to both individual variation—these developments were not all

present to the same degree in all individuals—and the transitional nature of their features. Neanderthals are an exception, as they have several clearly unique traits that make them notably different from modern *Homo sapiens* as well as their closely related archaic cousins.

Due to the transitional nature of archaic *Homo sapiens*, identifying the time period they are associated with is complex. Generally, it is agreed upon that archaic *Homo sapiens* lived between 600,000 and 200,000 years ago. But regionally this varies, with considerable overlap between *Homo erectus* on the early end of the spectrum and modern *Homo sapiens* and Neanderthals on the latter end. The earliest-known archaic *Homo sapiens* fossils tentatively date to about 600,000 years ago in Africa, whereas archaic *Homo sapiens* fossils in Asia appear around 300,000 years ago and in Europe around 350,000 years ago (and potentially as early as 600,000 years ago). The end point of archaic *Homo sapiens* is also problematic since it largely depends upon when the next subspecies of *Homo sapiens* appears and the classification of highly intermediate specimens. For example, in Africa, the end of archaic *Homo sapiens* is met with the appearance of modern *Homo sapiens*, while in Europe it is the appearance of Neanderthals that is traditionally seen as the end of archaic *Homo sapiens.*

Archaic *Homo sapiens* mark an important chapter in the human lineage, bridging more ancestral forms, such as *Homo erectus*, with modern *Homo sapiens*. During this period of climatic transition and fluctuation, archaic *Homo sapiens* mirror the challenges of their environments. Showing increasing regional variation due to the need for local adaptation, there is no single archetype for this group but, rather, multiple variations; their transitional nature is one of their key defining characteristics.

Neanderthals

One particularly well-known population of archaic *Homo sapiens* are the Neanderthals, named after the site where they were first discovered in the Neander Valley, or “thal” in German, located near Dusseldorf, Germany. Popularly known as the stereotypical “cavemen,” recent research is upending long-held beliefs about this group. Neanderthals have long been thought to be dumb brutes who were, behaviorally speaking, not much different from apes. However, today, scientists agree that Neanderthal behavior was increasingly complex and nuanced, far beyond what was exhibited by even other archaic *Homo sapiens.*

It is important to understand why Neanderthals are typically separated from other archaic *Homo sapiens*. Unlike the rest of archaic *Homo sapiens*, Neanderthals are easily defined and identified in many ways. There is a clear geographic boundary of where Neanderthals lived: western Europe, the Middle East, and western Asia. The time period for when Neanderthals lived is widely accepted as between 150,000 and 35,000 years ago. Additionally, Neanderthals have a unique and distinct cluster of physical characteristics. While a few aspects of Neanderthals are less clear cut and are shared among some archaic *Homo sapiens*, such as the types of tools they created and used, most attributes of Neanderthals, both anatomically and behaviorally, are unique to them.

Neanderthals lived during some of the coldest times during the last Ice Age and at far northern latitudes. This means Neanderthals were living very close to the glacial edge, and not in a more temperate region of the globe, like many of their archaic *Homo sapiens* relatives. Their range likely expanded and contracted along with European glacial events, moving into the Middle East during glacial events when Europe became even cooler, and when the animals they hunted would have moved for the same reason. During interglacials, when Europe warmed a bit, Neanderthals and their prey would have been able to move back into Western Europe.

Many of the Neanderthals’ defining physical features are more extreme and robust versions of traits seen in other archaic *Homo sapiens*, clustered in this single population (Figure 1). Brain size is one of the Neanderthal features that continues to follow the same patterns as seen with other archaic *Homo sapiens*, namely an enlargement of the cranial capacity. The average Neanderthal brain size is around 1,500 cc, and the range for Neanderthal brains can extend to upwards of 1,700 cc. The majority of the increase in the brain occurs in the occipital region, or the back part of the brain, resulting in a skull that has a large cranial capacity with a distinctly long and low shape that is slightly wider than previous forms at far back of the skull. Modern humans have a brain size comparable to that of Neanderthals; however, our brain expansion occurred in the frontal region of the brain, not the back, as in Neanderthal brains. This difference is also the main reason why Neanderthals lack the vertical forehead that modern humans possess. They simply did not need an enlarged forehead, because their brain expansion occurred in the rear of their brain. Due to cranial expansion, the back of the Neanderthal skull is less angular (as compared to *Homo erectus*) and is more rounded, a feature similar to that of modern *Homo sapiens*.

Another feature that continues the trend noted in previous hominins is the enlargement of the nasal region, or the nose. Neanderthal noses are large and have a wide nasal aperture, which is the opening for the nose. The teeth of the Neanderthals follow a similar pattern seen in the archaic *Homo sapiens*, which is an overall reduction in size, especially as compared to the extremely large teeth seen in the **robust australopithecines**. However, while the teeth have continued to reduce, the jaw size does not keep pace, leaving

Neanderthals with an interesting situation. Their jaw is oversized for their teeth, leaving a gap between their final molar and the end of their jaw.

Continuing the archaic *Homo sapiens* trend, Neanderthal brow ridges are prominent but somewhat smaller in size than those of *Homo erectus* and earlier archaic *Homo sapiens*. In Neanderthals, the brow ridges are also often slightly less arched than those of other archaic *Homo sapiens*.

The Neanderthal postcrania are also unique in that they demonstrate increased robusticity in terms of the thickness of bones and body proportions that show a barrel-shaped chest and short, stocky limbs, as well as increased musculature. These body portions are seen across the spectrum of Neanderthals—in men, women, and children.

Many of the unique traits that Neanderthals possess can be attributed to adaptation to the extreme cold environments in which they often lived. For example, Bergmann's and Allen's Rules dictate that an increased body mass and short, stocky limbs are common in animals that live in cold conditions. Neanderthals match the predictions of Bergmann's and Allen's Rules perfectly. In addition, the Neanderthal skull also exhibits adaptations to the cold. Neanderthals' large infraorbital foramina allow for larger blood vessels, increasing the volume of blood that is found closest to the skin, which helps to keep the skin warmer. Their enlarged noses may also have been beneficial to have in cold weather due to longer nasal passages and mucus membranes for cold air to travel through before reaching the lungs. It is very uncomfortable and challenging to breathe and exert oneself in exceptionally cold, dry air. The more time the air spends in the mucus membranes, the warmer and more moist the air will be before it reaches the lungs. The Neanderthals' larger nose has long been thought to have acted as a humidifier, easing physical exertion in their climate, although research on this particular trait continues to be studied and debated.

Distinct Neanderthal Anatomical Features	
Brain Size	1,500 cc average
Skull Shape	Long and low
Brow Ridge Size	Large
Nose Size	Large, with midfacial prognathism
Dentition	Reduced, but large jaw size, creating retromolar gap
Occipital Region	Enlarged occipital region, occipital bun
Other Unique Cranial Features	Large infraorbital foramina
Postcranial Features	Short and stocky body, increased musculature, barrel-shaped chest



Figure 1. La Ferrassie 1 Neanderthal is representative of many classic Neanderthal features including a large brain, large nose, large infraorbital foramina, large brow ridges, and robust postcrania.

In summary, Neanderthal characteristics are a distinct cluster of features, some of which were apparent in previous hominins and others that were unique. Additionally, it is clear that Neanderthals were specially adapted to a particular environment—a very cold one. A classic example of a Neanderthal with all of the characteristics mentioned above is the La Ferrassie 1 Neanderthal, from

France. The skeleton is near complete, which is not necessarily unique among Neanderthal fossils as many partially complete remains have been found, but it does provide us with a lot of information. The La Ferrassie 1 Neanderthal, who was male, had a brain size of around 1640cc and had an extremely large nose and infraorbital foramina. Additionally, the brow ridges are marked in size, and the overall skeleton is robust (Figure 11.7).

What are the benefits or the potential challenges Neanderthals could have faced for being highly specialized to one particular environment, when we know their environment and climate were in flux?

Neanderthal Culture and Lifeways

One key Neanderthal adaptation was their cultural innovations. Cultural innovation is a key way that hominins adapt to their environment. As you recall, the culture of *Homo erectus* was marked by the development of a bifacial tool, the Acheulean handaxe, which allowed them differential access to meat on animal carcasses when compared to their predecessors. For *Homo erectus*, the Acheulean handaxe allowed more efficient removal of meat and calculated scavenging. The increase in their body and brain size, along with their more effective tools, allowed them to track predators and snatch their kills sometimes even before the predators themselves had even fed.

Neanderthal tools mark a significant innovation both in tool-making technique and their use. Known as **Mousterian tools**, after the Le Moustier site in southwest France, the Neanderthal's toolkit was truly that—a set of tools with specific applications and unique forms for each desired purpose. Mousterian tools were significantly smaller, thinner, and lighter than Acheulean handaxes. The materials used for Mousterian tools were of higher quality, which allowed for both more precise toolmaking and tool reworking when the tools broke or dulled after frequent reuse. The use of higher-quality materials is also indicative of required forethought and planning to acquire them for tool manufacture. It is noteworthy that the Neanderthals, unlike *Homo erectus*, saved and reused their tools, rather than making new ones each time a tool was needed.

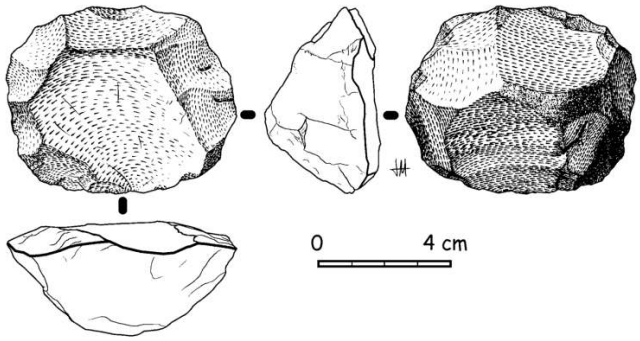


Figure 2. The Levallois technique is used to create Mousterian tools. The multistep process involves preparing the core, or raw material, in a specific way that will yield flakes that are roughly uniform in dimension. The flakes are then turned into individual tools.

Neanderthal tools were used for a variety of purposes. They would have constructed a tool for each specific task they needed to complete, such as cutting, butchering, woodworking or antler working, and hide working. Additionally, because the Mousterian tools were lighter than previous stone tools, Neanderthals could attach the tool onto a handle, as the stone would not have been too heavy. Neanderthals attached stone blades onto short wood or antler handles to make knives or other small weapons, as well as attached larger blades onto longer shafts to make spears. New research examining tar-covered stones and black lumps at several Neanderthal sites in Europe suggests that Neanderthals may have been making tar by distilling it from birch tree bark, which could have been used to glue the stone tool onto its handle. If Neanderthals were, in fact, manufacturing tar to act as glue, this would predate evidence of modern humans in Africa making tree resin or similar adhesives by nearly 100,000 years! While research on specific applications continues, it is clear that Neanderthal tool manufacturing was much more complex than previous tool-making efforts, requiring skill and patience to carry out.

With their more sophisticated suite of tools, Neanderthals were better armed for hunting than previous hominins and had very robust bodies with larger muscles. The animal remains in Neanderthal sites show that unlike earlier archaic *Homo sapiens*, Neanderthals were very effective hunters who were able to kill their own prey. Oftentimes, this included very large animals like deer, horses, and bovids (relatives of the cow). In fact, isotopes from Neanderthal bones show that meat was a primary and significant component of their diet, similar to that seen in carnivores like wolves (Bocherens et al. 1999).

Though more sophisticated than the tools of earlier hominins, the Neanderthal spear was not the kind of weapon that would have been thrown; rather, it would have been used in a jabbing fashion (Kortlandt 2002). This may have required Neanderthals to hunt in groups rather than individually, and it almost certainly meant that they would have had to approach their prey quite closely. Remember, the animals living with Neanderthals were also large-bodied due to their adaptations to cold weather. But in addition to large bovids, prey included ibex, seals, rabbits, and pigeons. Though red meat was a critical component of the Neanderthal diet, evidence shows that at times they also ate limpets, mussels, and pine nuts. Tartar examined from Neanderthal teeth in Iraq and Belgium reveal that plant material including wheat, barley, date palms, and tubers were also eaten by Neanderthals and were cooked to make them palatable.

While the close-range style of hunting used by Neanderthals was effective, it also had some major consequences. Many Neanderthal skeletons have been found with significant injuries, which could have caused paralysis or severely limited their mobility. Many of the injuries are to the head, neck, or upper-body. Thomas Berger and Erik Trinkaus (1995) conducted a statistical comparative analysis of Neanderthal injuries compared to those recorded in modern day workers' compensation reports and found that the closest match was between Neanderthal injuries and those of rodeo workers. Rodeo professionals have a high rate of head and neck injuries that are similar to the Neanderthals' injuries. What do Neanderthals and rodeo workers have in common? They were both getting very close to large, strong animals, and at times their encounters might have gone awry.

The extensive injuries sustained by Neanderthals are evident in many fossil remains. Shanidar 1 (Figure 3), an adult male found at the Shanidar site in northern Iraq and dating to 45,000 ya, has a lifetime of injuries recorded in his bones. Shanidar 1 sustained—and healed from—an injury to his face that would have likely caused blindness. His lower right arm was missing and his right humerus shows severe atrophy, likely due to disuse. This pattern has been interpreted to indicate a substantial injury that required or otherwise resulted in amputation or wasting away of the lower arm. Additionally, Shanidar 1 suffered from severe arthritis in his feet and bony growths in his inner ear that would have significantly impaired his hearing. He also exhibited extensive anterior tooth wear, matching the pattern of wear found among modern populations who use their teeth as a tool. Rather than an anomaly, the type of injuries evident in Shanidar 1 are similar to those found in many other Neanderthal fossils, revealing injuries likely sustained from hunting large mammals as well as demonstrating a long life of physical activity.



Figure 3. Like many other Neanderthals, Shanidar 1 has a lifetime of injuries recorded in his bones. Shanidar 1 sustained—and healed from—an injury to his face that would have likely caused blindness. His lower right arm was missing and his right humerus shows severe atrophy, likely due to disuse.

The pattern of injuries is as significant as the fact that Shanidar 1 and other injured Neanderthals often show evidence of having *survived* their severe injuries. The care expressed in taking care of the sick or injured may have been expressed upon death as well. Full Neanderthal skeletons are not uncommon in the fossil record, and many of these skeletons were so well preserved due to having been placed in deliberate burials. These burials appear intentional, as the graves are dug down a bit, and the bodies found in the graves are in specific positions quite distinct from the natural position the body automatically goes into after death during rigor mortis. Some tantalizing evidence for symbolism and ritual is the frequent occurrence of natural pigments, such as **ochre** (red) and manganese dioxide (black) in Neanderthal sites. Such pigments could have been used for art, like some of the spectacular cave paintings produced by modern humans who lived in this area after the Neanderthals. However, how these pigments were actually used by Neanderthals themselves is unclear, as there is very little evidence of art or paintings in Mousterian sites. One exception may be the recent discovery in Spain of a perforated shell that appears to be painted with an orange pigment, which may be some

of the best evidence of Neanderthal art and jewelry. However, many pigments also have properties that make them good emulsifiers in adhesive (like for attaching a stone tool to a wooden handle) or useful in tanning hides.

The more recent time period in which Neanderthals lived and extensive excavations completed across Europe allow for a much more complete archaeological record from this time period. Additionally, the increased cultural complexity such as complex tools and ritual behaviors expressed by Neanderthals left a more detailed record than previous hominins. Intentional burials enhanced preservation of the dead and potentially associated ritual behaviors. Such evidence allows for a more complete and nuanced picture of this species.



Figure 4. Artistic reconstruction of Neanderthals.

Additional analyses are possible on many Neanderthal finds, due to increased preservation of bone, the amount of specimens that have been uncovered, and the recency in which Neanderthals lived. These additional studies include the examination of dental calculus and even DNA analysis. While limited, samples of Neanderthal DNA have been successfully extracted and analyzed. Studies thus far have identified specific genetic markers that show some Neanderthals were light-skinned and probably red-haired with light eyes. Genetic analyses, different than the typical hominin reconstruction done with earlier species, allow scientists to further investigate soft tissue markers of Neanderthals and other more recent hominin species. These studies and Neanderthal cultural behavior have given scientists a wealth of information to study and offer striking conclusions regarding Neanderthal traits, their physical appearance, and their culture, as reflected in these artists' reconstructions (Figure 4).

The Neanderthals' more complicated behavior likely stems, in part, from their larger brains. Evidence shows that raw materials used by Neanderthals came from distances as far away as 100 km. This could indicate a variety of things regarding Neanderthal behavior, including a limited trade network with other Neanderthal groups, or simply a large area scoured by Neanderthals when collecting raw materials. Additionally, we know that Neanderthals lived in groups and may have relied on their group members for survival. Shanidar 1 and the "Old Man at La Chapelle" would have struggled to acquire and consume food on their own, strongly suggesting that they may have been assisted by relatives of other group members. In other nonhuman primates (like chimpanzees) and earlier hominins, injured individuals would have been left on their own, to either survive or perish.

Where Did They Go? The End of Nanderthals

While hominins living in Africa were increasingly successful and ultimately transitioned into modern *Homo sapiens*, Neanderthals disappear from the fossil record by around 35,000 years ago. The main question that lingers, however, is what happened to them. We know, based on genetics, that modern humans come largely from the modern people who occupied Africa around 300,000 to 100,000 years ago, at the same time that Neanderthals were living in the icy portions of northern Europe and Asia. Modern humans expanded out of Africa by at least 60,000 to 40,000 years ago, rapidly entering areas of Europe and Asia inhabited by Neanderthals and other populations of archaic hominins. Despite intense interest and speculation in fictional works about possible interactions between these two groups, there is very little direct evidence of either peaceful coexistence or aggressive encounters. It is clear, though, that these two closely related hominins shared Europe for thousands of years, and recent DNA evidence suggests that they at least occasionally interbred. Geneticists have found traces of Neanderthal DNA (1% to 4%) in modern humans of European and Asian descent that is not present in modern humans from Africa. This is generally interpreted as indicating limited regional interbreeding with Neanderthals. Interestingly, while some studies suggest interbreeding was often problematic for their offspring, gene flow from Neanderthals may have benefited modern *Homo sapiens.*

While some interbreeding likely occurred, as a whole, Neanderthals did not survive. What is the cause for their extinction? This question has fascinated many researchers and several possibilities have been suggested that deserve some exploration. Possibilities include the following:

- The climate began changing considerably from the height of Neanderthal expansion. At the time that Neanderthals were disappearing from the fossil record, the climate went through both cooling and warming periods—each of which posed challenges for Neanderthal survival (Defleur and Desclaux 2019; Staubwasser et al. 2018). It has been argued that as temperatures warmed, large-bodied animals, well adapted to cold weather, moved farther north to find colder environments or face extinction themselves. A shifting resource base could have been problematic for continued Neanderthal existence, especially as additional humans, in the form of modern *Homo sapiens*, began to appear in Europe and were competing with them for available resources.
- It has been suggested that the eruption of a European volcano 40,000 years ago could have put a strain on available plant resources (Golovanova et al. 2010). The eruption would have greatly affected local microclimates, reducing the overall temperature enough to alter the growing season.
- Possible differences in cognitive development may have limited Neanderthals in terms of their creative problem solving. It has been argued that as much as they were biologically specialized for their environment, the nature of their intelligence might not have offered them the creative problem solving skills to rethink their cultural adaptations and innovate ways to adapt their culture when faced with a changing environment (Pearce, Stringer, and Dunbar 2013).
- There is evidence that suggests reproduction may have posed challenges for Neanderthals. Childbirth was thought to have been at least as difficult for female Neanderthals as anatomically modern *Homo sapiens* (Weaver and Hublin 2009). Female Neanderthals may have become sexually mature at an older age, even older than modern humans. This delayed maturation could have kept the Neanderthal population size small.
- The end of Neanderthal existence also overlaps with modern human expansion into northern Europe and Asia. There is no conclusive direct evidence to indicate that Neanderthals and modern humans lived peacefully side by side, nor that they engaged in brutal warfare, but by studying modern societies, modern humans may not have warmly embraced their close but slightly odd-looking cousins when they first encountered them. It is also completely possible that modern humans gave Neanderthals diseases to which they previously had little to no exposure, causing a mass population decline similar to what happened when the invading Spanish wiped out the Mayan and Aztec populations (Houldcroft and Underdown 2016). Estimates of energy expenditures suggest Neanderthals had slightly higher caloric needs than modern humans. When competing for similar resources, the slightly greater efficiency of modern humans might have helped them experience greater success in the face of competition—at a cost to Neanderthals.
- Finally, less dramatically yet still significantly, even a small but continuous decrease in fertility would have been enough to result in the extinction of Neanderthals (Degioanni et al. 2019).

As Neanderthal populations were fairly small to begin with (estimated between 5,000 and 70,000 individuals), one or a combination of these factors could have easily led to their demise. As more research is conducted, we will likely get a better picture of exactly what led to Neanderthal extinction.

How Do These Fit In? *Homo Naledi* and *Homo Floresiensis*

Relatively recently, fossils have been unearthed that have significantly challenged our understanding of the hominin lineage. The fossils of *Homo naledi* and *Homo floresiensis* are significant for several reasons, but are mostly known for how they don't fit the previously held patterns of hominin evolution.

Homo naledi



Figure 5. A sample of some of the 1,550 bones found representing *Homo naledi*.

Found in 2013 by recreational spelunkers, a collection of bones was uncovered in a deep cave network in Johannesburg, South Africa. The cave system, known as Rising Star, had been well documented by other cavers; however, it appears few people had ever gone as far into the cave as these spelunkers. The features of *Homo naledi* are well-documented due to the fairly large sample, which represents individuals of all sexes and a wide range of ages. The skull shape and features are very much like other members of the genus *Homo*, including features such as a sagittal keel and large brow, like *Homo erectus*, and a well-developed frontal lobe, similar to modern humans, yet the brain size is significantly smaller than its counterparts, at approximately 500 cc (560 cc for males and 465 cc for females). The teeth also exhibit features of later members of the genus *Homo*, such as Neanderthals, including a reduction in overall tooth size. *Homo naledi* also had unique shoulder anatomy and curved fingers, indicating similarities to tree-dwelling primates, which is very different from any other hominin yet found. The date on the species, which was obtained some time after the fossils were first analyzed, indicates that *Homo naledi* lived between 335,000 and 236,000 years ago. This has been perhaps the greatest shock of all about *Homo naledi*, as this places this fossil as a contemporary to modern *Homo sapiens*, despite the very primitive features it retains.



Figure 6. Several angles of the nearly complete LES1 *Homo naledi* skull. The skull shape and features are very much like other members of the genus *Homo*, including features such as a sagittal keel and large brow like *Homo erectus* and a well-developed frontal lobe, similar to modern humans. The brain size, however, is significantly smaller than its counterparts, at approximately 500 cc.

Other remarkable aspects of the find is the placement of the *Homo naledi* fossils and what it may suggest. To access the site, approximately 80 m from any known cave entrance or opening, a treacherous route would have had to have been taken—including moving through a portion that is just 25 cm wide at some points, known as “Superman’s Crawl.” The only way to get through this section is by crawling on your stomach with one arm by your side and the other raised above your head. Past Superman’s Crawl, a

jagged wall known as the Dragon's Back would have been very difficult to traverse. Below that, a narrow vertical chute would have eventually led down to the area where the fossils were discovered. While geology changes over time and the cave system likely has undergone its fair share, it is not likely that these difficult features arose after *Homo naledi* lived. This has made scientists curious as to how the bones ended up in the bottom of the cave system in the first place. Some have suggested that *Homo naledi* deposited the bones there, one way or another. Another competing idea is that a few individuals may have entered the cave system to escape a predator and then got stuck. To account for the sheer number of fossils, this would have had to happen multiple times. In contrast, if *Homo naledi* did deposit the bones, either through random disposal or intentional burial, this calls into question their symbolic behavior and other cultural traits, including the use of fire, to access a very dark cave system.

Homo floresiensis



Figure 7. Liang Bua Cave on the island of Flores, in Indonesia, where a collection of *Homo floresiensis* specimens were discovered.



Figure 8. *Homo floresiensis* had a brain that was remarkably small at 400 cc. Recent genetic studies suggest a common ancestor with modern humans that predates *Homo erectus*.

In a small cave called Liang Bua, on the island of Flores, in Indonesia, a small collection of fossils were discovered beginning in 2003 (Figure 7). The fossil fragments represent as many as nine individuals, including a nearly complete female skeleton. The features of the skull are very similar to that of *Homo erectus* (Figure 8). *Homo floresiensis*, as the new species is called, had a brain size that was remarkably small at 400 cc, and recent genetic studies suggest a common ancestor with modern humans that predates *Homo erectus*.

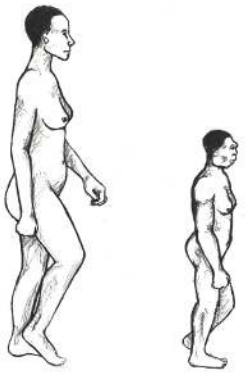


Figure 9. A reconstructed comparison between an anatomically modern human and *Homo floresiensis*. As an adult, *Homo floresiensis* was approximately 1 meter tall and would have weighed under 30 kg.

The complete female skeleton, who was an adult, was approximately a meter tall and would have weighed just under 30 kg, which is significantly shorter and just a few kilograms more than the average, modern young elementary-aged child. A reconstructed comparison between an anatomically modern human and *Homo floresiensis* can be seen in Figure 9. The small size of the fossil has earned the species the nickname "the Hobbit." Many questions have been asked about the stature of this species, as all of the specimens found also show evidence of diminutive stature and small brain size. Some explanations include pathology; however, this seems increasingly unlikely as all fossils found thus far demonstrate the same pattern. Another possible explanation lies in a biological phenomena seen in other animal species also found on the island and which date to a similar time period. This phenomenon, called **insular dwarfing**, is due to limited food resources on an island, which can create a selective pressure for large-bodied species to be selected for smaller size, as an island would not have been able to support their larger-bodied cousins for a long period of time. This phenomenon is the cause of other unique species known to have lived on the island at the same time, including the miniature stegadon, a dwarf elephant species.

Homo floresiensis fossils have been dated to have lived on the island between 100,000 and at least 60,000 years ago. There is ongoing research and debate regarding *Homo floresiensis*' dates of existence, with some researchers concluding that they lived on Flores until perhaps as recently as 17,000 years ago. Stone tools were also uncovered that have dates overlapping with those of the site and are similar in nature to other hominin stone tools found on the island of Flores. *Homo floresiensis* would have hunted a wide range of animals, including the miniature stegadon, giant rats, and other large rodents. Other animals on the island that could have threatened them include the giant komodo dragon. An interesting note about this island chain is that ancestors of *Homo floresiensis* would have had to access the open ocean in order to get there, as the nearest island is almost 10 km away, and there is little evidence to support that a land bridge connecting mainland Asia or Australia to the island would have been present. This would also have limited the number of other animals, including predators as well as human species, that would have had access to the island. Anatomically modern *Homo sapiens* arrived on the island around 30,000 years ago and may have lived there at the same time as *Homo floresiensis*, if some researchers' later dates for *Homo floresiensis'* occupation are correct. The modern population living on the island of Flores today believes that their ancestors came from the Liang Bua cave; however, recent genetic studies have determined they are not related to *Homo floresiensis*.

Homo naledi and *Homo floresiensis* are clear outliers when compared to their contemporary hominin species. Each has surprised paleoanthropologists for both their archaic traits in relatively modern times and their unique combination of traits seen in archaic species and modern species of humans. While these finds have been exciting, they have also challenged the assumed trajectory of the human lineage, causing scientists to re-examine their previously held assumptions about hominin evolution and what it means to be modern. Add this to the developments being made using ancient DNA, other new fossil discoveries, and other innovations in paleoanthropology, and you see that our understanding of archaic *Homo sapiens* and others living during this time period is rapidly developing and changing. This is a true testament to the nature of science and the scientific method!

Modern Humans



Figure 10. The excavation of an exposed cave at Jebel Irhoud, Morocco, where hominin fossils were found in the 1960s and in 2007. Dating showed that they represent the earliest-known modern Homo sapiens.

The walls of a pink limestone cave exposed to the outside world in the hillside of Jebel Irhoud jutted out of the otherwise barren landscape of the Moroccan desert (Figure 10). The year was 2007 and it turned out to be a momentous occasion for science. A fossil unearthed by a team of researchers was barely visible to the untrained eye. Just the fossil cranium's robust brows were peering out of the rock. The find was welcome but not sheer luck: Hominin fossils have been found here since their first accidental discovery by miners in 1960. This research team from the Max Planck Institute for Evolutionary Anthropology was just the latest to explore the prehistoric human presence in this part of North Africa. Excavating near the first discovery, the researchers wanted to learn more about how *Homo sapiens* lived far from East Africa, where we thought our species originated.

The scientists were surprised when they analyzed the cranium, named Irhoud 10, and other fossils. Statistical comparisons with other human crania concluded that the Irhoud face shapes were typical of recent modern humans while the braincases matched ancient modern humans. Based on the findings of other scientists, the team expected these modern *Homo sapiens* fossils to be around 200,000 years old. Instead, dating revealed that the cranium had been buried for around 315,000 years.

Together, the modern-looking facial dimensions and the older date changed the interpretation of our species, modern *Homo sapiens*. Our key evolutionary changes from archaic *Homo sapiens* to our species today happened 100,000 years earlier than what we had thought. In addition, the new information suggests that our home region covered more of the vast African continent, instead of being concentrated in the east.

This big addition to the study of modern *Homo sapiens* is just one of the latest in this continually advancing area of biological anthropology. Researchers are continually discovering amazing fossils and ingenious ways to collect data and test hypotheses about our past. Through the collective work of scientists, including archaeologists, geneticists, and anatomists, we are building an overall theory or explanation of modern human origins. We will first cover the skeletal changes from archaic *Homo sapiens* to modern *Homo sapiens*. Next, we will track how modern *Homo sapiens* expanded the range of its species around the world. Lastly, we will cover the development of agriculture and how it changed human culture to how we practice it today.

Defining Modernity

What defines a modern *Homo sapiens* when compared to an archaic *Homo sapiens*? Modern humans, like you and me, have a set of derived traits that are not seen in archaic humans or any other hominin. As with other transitions in hominin evolution, such as increasing brain size and bipedal ability, modern traits do not appear fully formed or all at once. In other words, the first modern *Homo sapiens* was not just born one day from archaic parents. The traits common to modern *Homo sapiens* appeared in a **mosaic** manner: gradually and out of sync with one another. There are two areas to consider when tracking the complex evolution of modern human traits. One is the physical change in the skeleton. The other is behavior inferred from the cranium and material culture.

Skeletal Traits

The skeleton of a modern *Homo sapiens* is less robust than that of an archaic *Homo sapiens*. In other words, the modern skeleton is **gracile**, meaning that the structures are thinner and smoother. Differences related to gracility in the cranium are seen in the braincase, the face, and the mandible. There are also broad differences in the rest of the skeleton.

Several elements of the braincase differ between modern and archaic *Homo sapiens*. Overall, the shape is much rounder, or more **globular** on a modern skull (Neubauer, Hublin, and Gunz 2018) (Figure 11). Viewed from the side, the tall vertical forehead of a modern *Homo sapiens* stands out when compared to the sloping archaic version. This is because the frontal lobe of the modern human brain is larger than the one in archaic humans, and the skull has to accommodate the expansion. The different priorities in brain regions may also indicate cognitive and behavioral differences between archaic humans and modern humans.

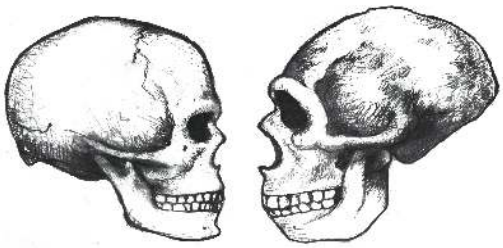


Figure 11. Comparison between modern (left) and archaic (right) *Homo sapiens* skulls. Note the overall gracility of the modern skull, as well as the globular braincase.

The trend of shrinking face size across hominins reaches its extreme with our species as well. The facial bones of a modern *Homo sapiens* are extremely gracile compared to all other hominins (Lieberman, McBratney, and Krovitz 2002). As with the shrinking of the face leading up to our species, the decreasing reliance on needing large teeth for survival may have been the reason that modern human faces are so gracile in comparison to other humans. Continuing a trend in hominin evolution, technological innovations kept reducing the importance of teeth in reproductive success. As natural selection favored smaller and smaller teeth, the surrounding bone holding these teeth also shrank.

Connected to the face, the mandible is also gracile in modern humans when compared to archaic humans and other hominins. Interestingly, our mandibles have pulled back so far from the **prognathism** of earlier hominins that we gained an extra structure at the most anterior point, called the mental eminence. You know this structure as the chin. The chin acts as structural support to withstand strain on the otherwise gracile mandible. In other words, as natural selection favored smaller dentition, the chin developed to maintain structural integrity of the mandible.

Overall, a modern *Homo sapiens* post-cranial skeleton has thinner bone, smoother features, and more slender shapes when compared to archaic *Homo sapiens* (Figure 12). Comparing whole skeletons, modern humans have longer limb proportions relative to the length and width of the torso, giving us lankier outlines.

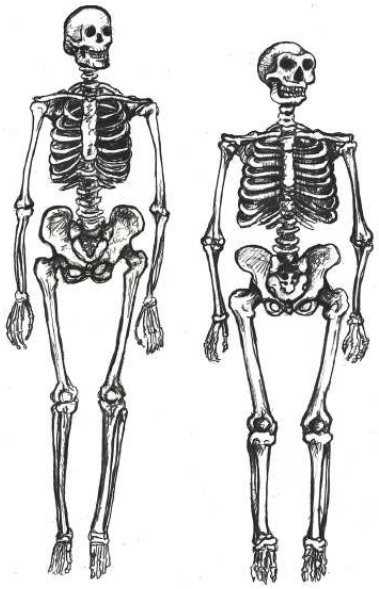


Figure 12. Anterior views of modern (left) and archaic (right) *Homo sapiens* skeletons. The modern human has an overall gracile appearance at this scale as well.

A slender frame is adapted for the efficient long-distance running ability that started with *Homo erectus*. Furthermore, slenderness is a genetic adaptation for cooling an active body in hotter climates, which aligns with the ample evidence that Africa was the home continent of our species.

Behavioral Modernity

Aside from physical differences in the skeleton, researchers have also tracked clues of behavioral changes from archaic to modern humans. From the anthropology of our species today, we know that we practice a very complex version of culture, with many layers to our language, art, social organization, and technology, among other areas. Did cultural complexity increase gradually or quickly with the first modern humans? This question is being actively investigated. A major obstacle to answering this question is that it is hard to define and measure cultural complexity. Since we cannot directly observe humans of the distant past, we have to infer these measures of human behavior from other types of evidence. Two particularly illuminating areas are archaeology and the analysis of reconstructed brains.

Archaeology tells us much about the behavioral complexity of past humans by interpreting the significance of material culture. In terms of evolved advanced culture, items created with an artistic flair, or as a decorative piece, speak of abstract thought processes (Figure 13). The demonstration of difficult artistic techniques and technological skills hints at social learning and cooperation as well. For example, most of your skills were taught to you by a more experienced person, upon which you've developed your own style with practice. Some day you may pass on what you know to someone else using language to convey your knowledge. The same process is believed to have happened with early modern humans in areas such as toolmaking and craftwork, producing the sophisticated material culture that we can now study. According to paleoanthropologist John Shea (2011), one way to track the complexity of past behavior through artifacts is by measuring the variety of tools found together. The more types of tools constructed with different techniques and for different purposes, the more modern the behavior. Turning this view to ourselves, think of all of the tools we have available to us today at a typical hardware store and the cumulative knowledge they represent. This idea of measuring past behavior is promising, but researchers are still working on an archaeological way to measure cultural complexity that is useful across time and place.



Figure 13. Carved ivory figure called the Lion-Man of the Hohlenstein-Stadel. It dates to the Aurignacian culture, between 35 and 40 kya. What does this artifact suggest about the culture and technical skill of its artist?

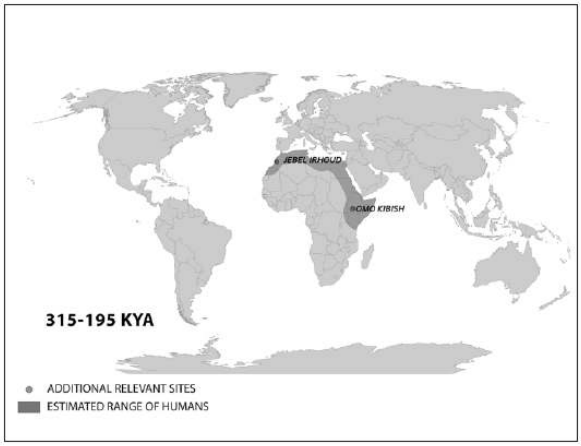
The interpretation of brain anatomy is another promising approach to studying the evolution of human behavior. When looking at the body of work on this topic in modern *Homo sapiens* brains, researchers found a weak association between brain size and test-measured intelligence (Pietschnig et al. 2015). This means that there are more significant factors that affect tested intelligence than just brain size. Additionally, they found no association between intelligence and biological sex. Since the sheer size of the brain is not useful for weighing intelligence, paleoanthropologists are instead investigating the differences in certain brain structures. The differences in organization between modern *Homo sapiens* brains and archaic *Homo sapiens* brains may reflect different cognitive priorities that account for modern human culture. Researchers have hypothesized that the expanded frontal and parietal lobes in the globular modern human braincases mean that we can do more complex thinking regarding memory and social ability than the Neanderthals could. In contrast, the Neanderthal brain prioritized the visual regions where the occipital bun was located, with fewer neurons in the frontal area for complex thinking. As with the archaeological line of research in the preceding paragraph, this is a very active area of investigation. New discoveries will refine what we know about the human brain and apply that knowledge to studying the distant past.

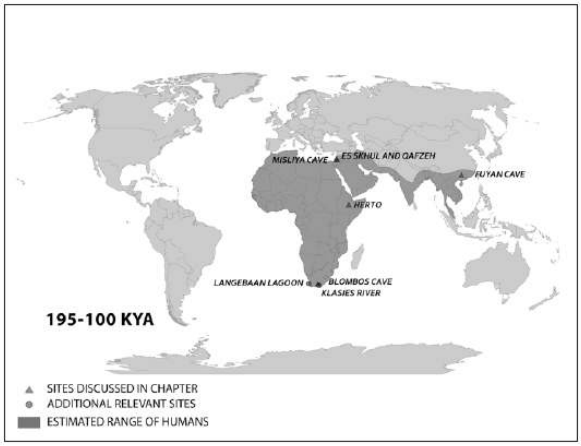
Taken together, the cognitive abilities in modern humans may have translated into an adept use of tools to enhance survival. The ability to process a new environment, adapt to it with innovative technology, and pass on that knowledge may be the key behind the success of modern *Homo sapiens*.

First Africa, Then the World

What enabled modern *Homo sapiens* to expand its range further in 300,000 years than *Homo erectus* did in 1.5 million years? The key is the set of derived biological traits discussed in the last section. The gracile frame and neurological anatomy allowed modern humans to survive and even flourish in the vastly different environments they encountered. Based on multiple types of evidence, the source of all of these modern humans, including all of us today, was Africa.

This section traces the origin of modern *Homo sapiens* and the massive expansion of our species across all of the continents except Antarctica by 12,000 years ago. While modern *Homo sapiens* first shared geography with archaic humans, modern humans eventually spread into lands where no human had gone before (Figure 14). Starting with the first-known modern *Homo sapiens*, around 315,000 years ago, we will follow our species from a time called the Middle Pleistocene to the end of the Late Pleistocene. Culturally, we will trace developments from the **Middle Stone Age** through the transition around 50,000 years ago to the **Later Stone Age.**





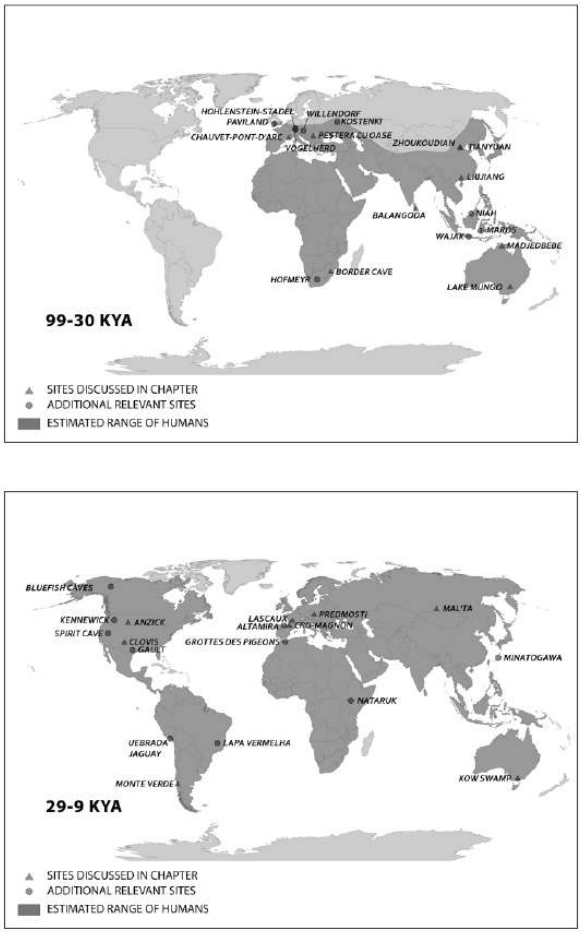


Figure 14. Maps depicting the estimated range of modern Homo sapiens through time. The shaded area is based on geographical connections across known sites. Note the growth in area starting in Africa and the oftentimes coastal routes that populations followed.

The Start of Modern *Homo sapiens* in Africa

We start with the ample fossil evidence supporting the theory that modern humans originated in Africa during the Middle Pleistocene, having evolved from African archaic *Homo sapiens*. The earliest dated fossils considered to be modern actually have a mosaic of archaic and modern traits, showing the complex changes from one type to the other. Experts have various names for these transitional fossils, such as 'Early Modern *Homo sapiens*' or 'Early Anatomically Modern Humans.' However they are labeled, the presence of some modern traits means that they illustrate the origin of the modern type. Three particularly informative sites with fossils of the earliest modern *Homo sapiens* are Jebel Irhoud, Omo, and Herto.

Recall from the start of the chapter that the most recent finds at Jebel Irhoud are now the oldest dated fossils that exhibit the traits of modern *Homo sapiens*. Besides Irhoud 10, the cranium that was dated to 315,000 years ago (Hublin et al. 2017), there were other fossils found in the same deposit that we now know are from the same time period. In total there are at least five individuals, representing life stages from childhood to adulthood (Figure 15)



Figure 15. Composite rendering of the Jebel Irhoud hominin based on micro-CT scans of multiple fossils from the site. The facial structure is within the modern human range, while the braincase is between the archaic and modern shapes.

Research separated by nearly four decades uncovered fossils and artifacts from the Kibish Formation in the Lower Omo Valley in Ethiopia. These Omo Kibish hominins were represented by braincases and fragmented postcranial bones of three individuals found kilometers apart, dating back to 195,000 years ago (McDougall, Brown, and Fleagle 2005).

Also in Ethiopia, a team led by Tim White (2003) excavated numerous fossils at Herto. There were fossilized crania of two adults (Figure 16) and a child, along with fragments of more individuals. The dates ranged between 160,000 and 154,000 years ago. The skeletal traits and stone tool assemblage were both intermediate between the archaic and modern types.



Figure 16. This model of the Herto cranium showing its mosaic of archaic and modern traits.

The combined fossil evidence paints a picture of diversity in geography and traits. Instead of evolving in just East Africa, the Jebel Irhoud find revealed that early modern *Homo sapiens* had a wide range across Middle Pleistocene Africa. The hypothesis that there was no single original home within Africa for our species is called **African multiregionalism** (Scerri et al. 2018). Supporting this explanation, fossils have different mosaics of archaic and modern traits in different places and even within the same area. The high level of diversity from just these fossils shows that the modern traits took separate paths toward the set we have today.

What about behavioral modernity? Jebel Irhoud, Omo, and Herto all bore Middle Stone Age tools of the same flaked style as archaic assemblages, even though they were separated by almost 150,000 years. No clear signs of art dating back this far have been found either. Other hypotheses not related to behavioral modernity could explain these observations. The tool set may have been suitable for thriving in Africa without further innovation. As for the lack of art, maybe works from that time were made with media that deteriorated or perhaps such works were removed by later humans.

While modern *Homo sapiens* lived across Africa, some members eventually left the continent. Generations of these pioneers entered environments far different from what their ancestors experienced in Africa.

Expansion into the Middle East and Asia

This section presents key finds showing where modern *Homo sapiens* went after the range of the species first extended out of Africa. These pioneers could have used several connections to the Middle East, or West Asia. From North Africa, they could have crossed the Sinai Peninsula and moved north to the Levant, or eastern Mediterranean. Finds in that region show an early modern human presence. There were likely multiple waves of movement producing gene flow back and forth across these regions. The expanding modern human population could have thrived by using resources along the southern coast of the Arabian Peninsula to South Asia, with side routes moving north along rivers.

Geographically, the Middle East is the ideal place for the African modern *Homo sapiens* population to inhabit upon expanding out of their home continent. In the Eastern Mediterranean coast of the Levant, there is a wealth of skeletal and material culture linked to modern *Homo sapiens*. Recent discoveries from Saudi Arabia further add to our view of human life just beyond Africa.



Figure 17. This Skhul V cranium model shows the sharp browridges. The contour of a marked occipital bun is barely visible from this angle.

The Caves of Mount Carmel in present-day Israel have preserved skeletal remains and artifacts of modern *Homo sapiens*, the first-known group living outside Africa. From 120,000 to 90,000 years ago, fossils of multiple individuals across life stages were found in the caves of Es-Skhul and Qafzeh (Shea and Bar-Yosef 2005). The skeletons had many modern *Homo sapiens* traits, such as globular crania and more gracile postcranial bones when compared to Neanderthals. Still, Skhul V had a particularly impressive brow ridge that was short in height but sharply jutted forward above the eyes (Figure 17). The high level of preservation is due to the intentional burial of some of these people. Besides skeletal material, there are signs of artistic or symbolic behavior. For example, the adult male Skhul V had a boar's jaw on his chest. Similarly, Qafzeh 11, a juvenile with healed cranial trauma, had an impressive deer antler rack placed over his torso (Figure 18). Perforated seashells colored with **ochre** were also found in Qafzeh.



Figure 18. This cast of the Qafzeh 11 burial shows the antler's placement over the upper torso. The forearm bones appear to overlap the antler.

One remaining question is, what happened to the modern humans of the Levant after 90,000 years ago? Another site attributed to our species did not appear in the region until 47,000 years ago. Competition with Neanderthals may have accounted for the disappearance of modern human occupation since the Neanderthal presence in the Levant lasted longer than the dates of the early modern *Homo sapiens*.

A long history of paleoanthropology in China has found ample evidence of modern human presence. Four notable sites are the caves at Fuyan, Liujiang, Tianyuan, and Zhoukoudian. In the distant past, these caves would have been at least seasonal shelters that unintentionally preserved evidence of human presence for modern researchers to discover.



Figure 19. The Liujiang cranium shows the tall forehead and overall gracile appearance typical of modern Homo sapiens.

At Fuyan Cave in Southern China, paleoanthropologists found 47 adult teeth associated with cave formations dated to between 120,000 and 80,000 years ago (Liu et al. 2015). It is currently the oldest-known modern human site in China, though other

researchers question the validity of the date range. The teeth have the small size and gracile features of modern *Homo sapiens* dentition. No lithics have been found in Fuyan Cave. The fossil Liujiang (or Liukiang) hominin has derived traits that classified it as a modern *Homo sapiens*, though primitive archaic traits were also present (Figure 19). Dating methods suggested an age of around 67,000 years. A mandible fragment, teeth, and postcranial skeletal remains of a single adult of indeterminate sex was found by tree farmers in Tianyuan, 50 km from Beijing. Radiocarbon dating of the bones estimated that they were from 42,000 to 39,000 years ago.

The last Chinese site to describe here is the one that has been studied the longest. In the Zhoukoudian Cave system, where *Homo erectus* and archaic *Homo sapiens* have also been found, there were three crania that fit the modern *Homo sapiens* set of traits (Figure 7.11). These crania were in a part of the cave called the Upper Cave, dating to between 34,000 and 10,000 years ago. Comparison of cranial measurements to other populations past and present found no connection with modern East Asians. These findings again show that human variation was very different from what we see today.

As in Africa, the finds of the Middle East have shown that humans were biologically diverse and had complex relationships with their environment. Work in the Levant showed an initial expansion north from the Sinai Peninsula that did not last. Local resources were used to make lithics and decorative items. The early Asian presence of modern *Homo sapiens* was complex and varied as befitting the massive continent. What the evidence shows is that people adapted to a wide array of environments that were far removed from Africa. Faunal and floral remains found in these shelters speak to the flexibility of the human omnivorous diet as local wildlife and foliage became nourishment. Decorative items, often found as burial goods in planned graves, show a flourishing cultural life. Eventually, modern humans at the southeastern fringe of the geographical range of the species found their way southeast until some became the first humans in Australia.

Crossing to Australia

Expansion of the first modern human Asians, still following the coast, eventually entered an area called Sunda by researchers before continuing on to modern Australia. Sunda was a landmass made up of the modern-day Malay Peninsula, Sumatra, Java, and Borneo. Lowered sea levels connected these places with land bridges, making them easier to traverse. Proceeding past Sunda meant navigating Wallacea, the archipelago that includes the Indonesian islands east of Borneo. Prehistorically, there were many **megafauna**, large animals that migrating humans would have used for food and materials such as hides and bones. Further southeast was another prehistoric landmass called Sahul, which included New Guinea and Australia as one contiguous continent. This land had never seen hominins or any other primates before modern *Homo sapiens* arrived. Sites along this path offer clues about how our species handled these changes to the local environment to live successfully as foragers.

The skeletal remains at Lake Mungo are the oldest known in Australia. The lake, now dry, was one of a series located along the southern coast of Australia in New South Wales, far from where the first people entered from the north. Two individuals dating to around 40,000 years ago show signs of artistic and symbolic behavior, including intentional burial. The bones of Lake Mungo 1 (LM1), an adult female, were crushed repeatedly, colored with red ochre, and even cremated (Bowler et al. 1970).

Kow Swamp, also in southern Australia, contained human crania that looked distinctly different from the ones at Lake Mungo. The Kow Swamp crania had extremely robust brow ridges and thick bone walls, but these were paired with globular features on the braincase (Figure 20). The frontal bones had extremely linear slopes from the brow to the top of the cranium, resembling intentional cranial modification seen in other parts of the world. If the crania were shaped on purpose, they are another sign of symbolic behavior, as the practice has linked to ideas of group cultural identity. By the time of the Kow Swamp people, between 9,000 and 20,000 years ago, cranial modification may have been a meaningful part of culture in southern Australia.



Figure 20. Replica of the Kow Swamp 1 cranium. The shape of the braincase could be due to artificial cranial modification. A competing hypothesis is that it reflects the primitive shape of *Homo erectus*.

The presence of the first humans in Australia along the current northern and southern coasts suggests that they used a route that wrapped around the perimeter of the continent. This path allowed access to both coastal and inland resources. Megafauna was a likely source of food and other resources. The mythology of Australian aborigines today has been linked by researchers to extinct life, such as marsupial tapirs and lions. Predation by humans may be why the megafauna became extinct, leaving the oral tradition of their existence.

The abundant evidence matching the criteria for behavioral modernity shows that the early Australians had a rich artistic and symbolic life. Raw materials must have been transported or traded across long distances in order to make art and color both human and nonhuman skeletal remains. The local varieties of stone tools and art may reflect cultural variation across distant regions of the continent.

Northwest to Europe

The first modern human expansion into Europe occurred after other members of our species settled East Asia and Australia. As the evidence from the Levant suggests, modern human movement to Europe may have been hampered by the presence of Neanderthals. Another obstacle was that the colder climate was incompatible with the biology of African modern *Homo sapiens*, which was adapted for exposure to high heat and ultraviolet radiation. Still, by 40,000 years ago, modern *Homo sapiens* had enough of a presence in Europe to leave evidence for researchers to find. This time was also the start of the **Later Stone Age**. Connected with the history of science in general, early modern *Homo sapiens* in Europe have been studied for centuries. Due to the bias in research focus favoring Europe, there is a wealth of evidence to explore.

In Romania, the site of Peștera cu Oase (Cave of Bones) had the oldest known remains of modern *Homo sapiens* in Europe, dated to around 40,000 years ago (Trinkaus et al. 2003). Among the bones and teeth of cave bears, wolves, ibex, and other animals were the fragmented cranium of one person and the mandible of another (the two bones did not fit each other). The DNA from Oase 1 is equally similar to DNA from present-day Europeans and Asians. This means that Oase 1 was not the direct ancestor of modern Europeans.

The term “Cro-Magnon” has entered public usage as a name for any prehistoric modern European *Homo sapiens*, and maybe any “caveman” of our species, but it technically refers to four adults (three male and one female) and an infant found in the Cro-Magnon rock shelter in France in 1868. The remains are dated to 28,000 years ago and may all have been intentionally buried along with over 300 pierced seashells and nonhuman skeletal remains. The Cro-Magnon crania are easily identifiable by their rectangular eye orbits, which are more angular than any contemporary (Figure 21). Compared to Neanderthal skeletons of the same region, the Cro-Magnons are extremely gracile. The adults also show signs of much pathology, including fused neck vertebrae and healed fractures. The individual Cro-Magnon 1 has skeletal lesions typical of neurofibromatosis type 1, a rare genetic disease that causes tumor growth. The combination of disease markers suggest that life for the Cro-Magnons was so physically demanding that it greatly affected the skeleton.



Figure 21. This reconstruction of the Cro-Magnon 1 skull shows the gracility of modern *Homo sapiens* along with a disease that marked the bone.

Dating to around 26,000 years ago, Předmostí near Přerov in the Czech Republic was a site where people buried over 30 individuals along with many artifacts. Eighteen individuals were found in one mass burial area, a few covered by the scapulae of woolly mammoths . While the recovered human skeletons were destroyed in World War II, finely detailed photographic negatives allowed comparisons to other human groups (Figure 22). Besides the human remains, the site contained the bones of over a thousand mammoths. Some of the mammoth remains were shaped by humans, including a limb bone fragment with a carved abstract female figure. There is also skeletal evidence of dog domestication, such as the presence of dog skulls with shorter snouts

than in wild wolves. In total, Předmostí could have been a settlement dependent on mammoths for subsistence with people participating in artistic behaviors and the artificial selection of early domesticated dogs.



Figure 22. This illustration is based upon one of the surviving photographic negatives since the original fossil was lost in World War II. The modern human chin is prominent, as is an archaic occipital bun.

Among the many European sites dating to the Later Stone Age, the famous cave art sites deserve mention. Chauvet-Pont-d'Arc Cave in southern France dates to separate Aurignacian occupations 31,000 years ago and 26,000 years ago. Over a hundred art pieces representing 13 animal species are preserved. Some depicted species are common to European cave art, such as deer and horses. Others are rare, such as rhinos and owls. Two possible human figures are in the deepest gallery of the cave system. Besides the painted figures, the tracks and skulls of cave bears and an ibex were also found in the cave. Another famous French cave with art is Lascaux, which is several thousand years younger at 17,000 years ago in the Magdalenian period. At this site, there are over 6,000 painted figures on the walls and ceiling (Figure 23). The paint was made of a mix of mineral pigments in liquid binder made from fat or clay. Scaffolding and lighting must have been used to make the paintings on the walls and ceiling deep in the cave. Overall, visiting Lascaux as a contemporary must have been an awesome experience: trekking deeper in the cave lit only by torches giving glimpses of animals all around as mysterious sounds echoed through the galleries. The professionally lit photographs of today do not give the original context justice, though replicas have been built to simulate the experience for tourists. Both Chauvet and Lascaux have been closed to all but researchers due to the degradation of the art when tourism was allowed.

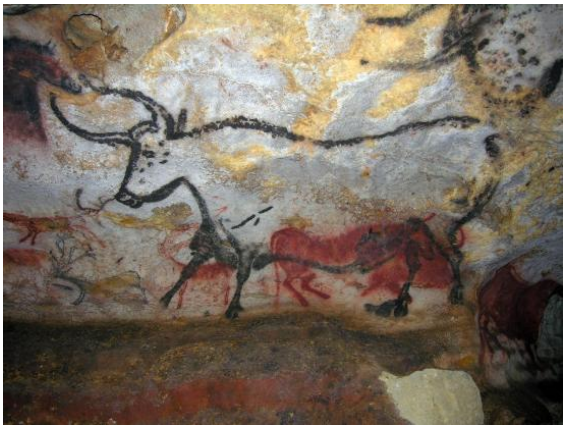


Figure 23. Photograph of just one surface with cave art at Lascaux Cave. The most prominent piece here is the Second Bull, found in a chamber called the Hall of Bulls. Smaller cattle and horses are also visible.

Study of Europe in the Upper Paleolithic gives a more detailed view of the general pattern of biological and cultural change linked with the arrival of modern *Homo sapiens*. The modern humans experienced a rapidly changing culture that from our perspective went through four major growths in complexity and refinement. The cave art sites showed a deeper use of expression and symbolism, though the exact meaning is unclear. With survival dependent on the surrounding ecology, painting the figures may have connected people to important and impressive wildlife at both a physical and spiritual level. Both reverence for animals and the use of caves for an enhanced sensory experience are common to cultures today and through recorded history.

Distant Relations: Interbreeding with Archaic Humans Outside Africa

As the modern human population grew beyond Africa, they interbred with the archaic *Homo sapiens* who were already there, descendants of the *Homo erectus* populations before them. This statement does not mean that modern humans are the direct descendants of the archaic Neanderthals. Instead, the building evidence suggests a more complex connection between archaic and

modern humans outside of Africa. Three *Homo sapiens* groups interbred with one another: modern *Homo sapiens* and two archaic groups, the Neanderthals and the Denisovans (Figure 24).

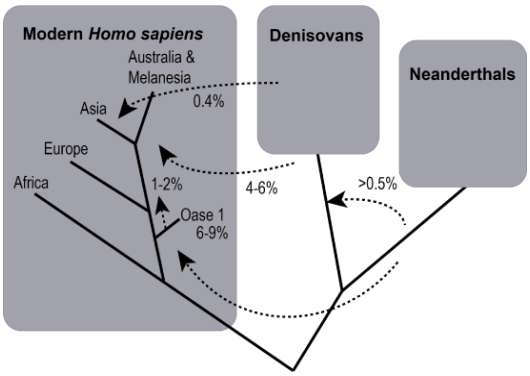


Figure 24. This diagram shows the amount of DNA introgression between Neanderthals, Denisovans, and various regional lineages of modern *Homo sapiens*. The 6–9% Neanderthal DNA found in the modern human Oase 1 was narrowed down to 1–2% in later modern humans. Denisovans share a few percent of their DNA with modern Australasians and Melanesians but just a fraction of a percent with modern East Asians.

Interbreeding with Neanderthals

Since the first finds of Neanderthal remains, researchers have sought evidence of a biological connection with modern Europeans. While there are no sites that show Neanderthals and modern *Homo sapiens* lived together (such as both types of skeletons found together in a common burial), interbreeding has been suggested by the appearance of Neanderthal traits in otherwise modern human skeletons found in their common geographical range.

A new source of evidence arrived with the invention of ancient DNA (aDNA) analysis, which has built up more evidence of Neanderthal and modern human interbreeding. DNA samples from Neanderthal fossils have been compared to DNA from both prehistoric and present-day modern *Homo sapiens* to trace the amount of gene flow between these groups. The amount of transfer is more indicative of **introgression**, the entrance of small, uneven portions of Neanderthal DNA into modern humans, rather than an even hybridization over time (Dannemann and Racimo 2018). The introgression could have been caused by an imbalance in population size: the continually growing modern population with gene flow from Africa could have diluted the incoming Neanderthal DNA to the low percentage seen today.

The findings of Neanderthal DNA analysis and comparison with modern human genomes worldwide have revealed surprising details about the interactions between these groups. An unexpected result is that modern Asians have more DNA from Neanderthals than modern Europeans despite the separation in geography (Wall and Yoshihara Caldeira Brandt 2016). Today, non-Africans have around 1%–2% Neanderthal DNA in their genomes, with Asians having more than Europeans.

While the study of skeletal traits suggested archaic-modern interbreeding, the use of DNA analysis provided solid evidence of these events between archaic and modern *Homo sapiens* in Europe and Asia. This is a very active field as the technology keeps improving and more samples are analyzed. A consistent picture is forming, but many of the details concerning the timing and context of interbreeding are still unclear. At this point, we know that three human groups interbred with each other at different times and places. DNA originating from Neanderthals and Denisovans was found in prehistoric modern humans and is present in some Europeans and Asians of today. The introgressed DNA has affected the traits of our own species and they are just being discovered.

African Developments

We now switch our view back to Africa to see what developments occurred after members of our species first crossed to the Middle East and beyond. Our survey of modern *Homo sapiens* expansion left Africa around 150,000 years ago to see where people pushed the fringes of our geographical range. It is important to remember the species did not all leave Africa together. While modern humans found ways to survive in the Middle East, Asia, Sahul, and Europe, many others remained in Africa. Evidence of what *Homo sapiens* did in Africa from the end of the Middle Stone Age to the Later Stone Age is concentrated in South African sites. There, Blombos Cave and Border Cave show that complex human behavior was developing in the home continent, with the earliest evidence of many cultural practices.

Blombos Cave is located along the present shore of the Cape of Africa facing the Indian Ocean and is notable for having a wide variety of artifacts. The material culture shows that toolmaking and artistry were more complex than previously thought for the

Middle Stone Age. Excavations and analysis have been carried out since the 1990s by a research team including Francesco d'Errico, Christopher Henshilwood, and Marian Vanhaeren. In a layer dated to 100,000 years ago, researchers found two intact ochre-processing kits made of abalone shells and grinding stones (Henshilwood et al. 2011). Chemical analysis found the likely ingredients of the ochre-based paint, including crushed bone, animal fat, and charcoal. More ochre fragments, including some marked with notches, were found all throughout the site. The team performed numerous analyses and experiments to show that perforated marine snail shell beads from 75,000 years ago were shaped by people using bone points found in the cave (Figure 25). Together, the evidence shows that the Middle Stone Age occupation at Blombos Cave incorporated resources from a variety of local environments into their culture, from caves (ochre), open land (animal bones and fat), and the sea (abalone and snail shells). This complexity shows a deep knowledge of the region's resources and their use—not just for survival but also for symbolic purposes.

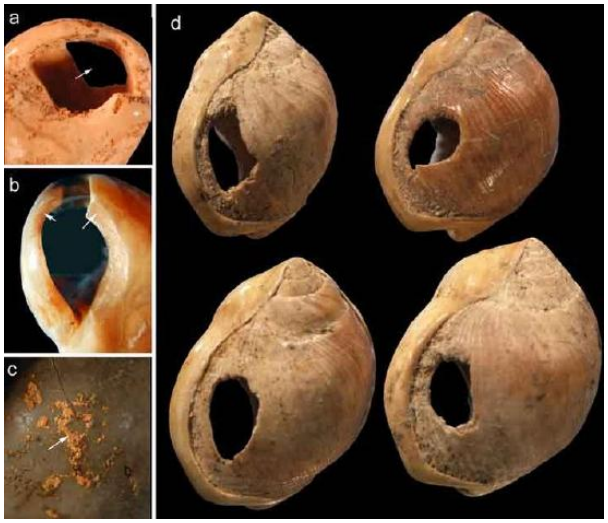


Figure 25. Examples of the perforated shell beads found in Blombos Cave, South Africa: (a) view of carved hole seen from the inside; (b) arrows indicate worn surfaces due to repetitive contact with other objects, such as with other beads or a connecting string; (c) traces of ochre; and (d) four shell beads showing a consistent pattern of perforation.

On the eastern coast of South Africa, Border Cave shows new African cultural developments at the start of the Later Stone Age. Paola Villa and colleagues (2012) identified several changes in technology around 43,000 years ago. Stone tool production transitioned from a slower, measured process to one that took less time to finish but made many **microliths**. An adhesive made from tree bark was found on some of the microliths. The researchers hypothesize that hunting technology moved from large crafted spearheads to smaller bone arrow points that were adhered to shafts and even tipped with poison for more effectiveness. Changes in decorations were also found across the Later Stone Age transition. Beads were made from a new resource: fragments of ostrich eggs. Unlike the snail shell beads, which retained the shape of the original structure, ostrich shell beads were shaped into circular forms, resembling present-day breakfast cereal O's. While a subtle difference, these beads show a higher level of altering one's own surroundings and a move from the natural to the abstract in terms of design.

Summary of Continuing Modern *H. sapiens* in Africa

African culture experienced a long phase of development called the Middle Stone Age followed by a faster burst of change produced additional innovations and new styles. The change was not one moment but rather a ramping up in development. Later Stone Age culture introduced elements seen across many cultures, including the construction of composite tools and even the use of strung decorations such as beads. These developments appear in the Later Stone Age of other regions, such as with the Balangoda of Sri Lanka and the Aurignacian tradition of Europe. Based on the early date of the African artifacts, Later Stone Age culture likely originated in Africa and passed from person to person and region to region, with people adapting the general technique to their local resources and viewing the meaning in their own way. Unfortunately, information about modern humans in Africa from 40,000 to 12,000 years ago is scarce.

Discovering the Americas

By 20,000 years ago, our species was the only member of *Homo* left on Earth. Gone were the Neanderthals, Denisovans, and *Homo floresiensis*. The range of modern *Homo sapiens* kept expanding eastward into—using the name given to this area by Europeans

much later—the Western Hemisphere. This section will address what we know about the peopling of the Americas, from the first entry to these continents to the rapid spread of prehistoric Native Americans across its lush and varied environments.

The Changing Role of Beringia

Evidence points to a prehistoric land bridge called **Beringia** that allowed people to cross from Asia to North America, just as expansion to Australia was made easier with lowered sea levels that exposed Sunda and Sahul. Beringia connected what is now northeastern Siberia with Alaska. What people did to cross this land bridge is still being investigated. Currently there are two competing models for this event, called the **Ice-Free Corridor model** and the **Coastal Route model**, though the latter has been gaining intriguing evidence.

For most of the 20th century, the accepted theory was that prehistoric northeast Asians (East Asians and Siberians) first expanded across Beringia inland through an ice-free corridor between glaciers that opened into the western Great Plains of the United States, just east of the Rocky Mountains, around 13,000 years ago. While life up north in the cold environment would have been harsh, migrating birds and an emerging forest might have provided sustenance as generations expanded through this land. These residents would have used a stone tool style that developed into the common Clovis style found later in North America.

In recent decades, researchers accumulated evidence against the ice-free corridor as the original path the first Native Americans took. For example, some archaeological sites around the Americas date to a time before the corridor was open. While one site with a date that contradicts the model could be dismissed as an error at first, several more sites were found that brought more scrutiny to the Ice-Free Corridor model. The route between glaciers was available later, and was likely used at that time, but there was already a more accessible path between the hemispheres.

The reconstruction of past geography, climate, and ecology led to the formation of the Coastal Route model that explains how people reached the Americas through Beringia. The new focus is the southern edge of the land bridge instead of its center: About 16,000 years ago, members of our species expanded along the coastline from northeast Asia, east through Beringia, and south down the Pacific Coast of North America while the inland was still sealed off by ice. Reconstructing the geography and climate of Beringia, the coast would have been free of ice at least part of the year by 16,000 years ago, earlier than when the ice-free corridor was completely opened. Studies of past ecology found that the coastal route would have provided abundant plant and animal resources for most of the path. Besides migrating birds, many useful fish (e.g., salmon), shellfish, mammals (e.g., whales, seals, and otters), and plants (e.g., seaweed) would have been available on the coast.

Other lines of evidence are also compatible with the Coastal Migration model. One indirect archaeological connection between prehistoric Japan and the Americas is a certain style of stone tool. Coastal tanged or stemmed lithics, which are stone points with a thin projection at the base, have been found in both of these distant regions (Erlandson and Braje 2011). The similarity could indicate a cultural tie. Genetic analysis of Native American DNA also shows shared ancestry with northeast Asians, linking them biologically as well.

While many factors such as reconstructions of climate and ecology indirectly support the Coastal Migration model, researchers have also begun to find archaeological sites along the route. That effort is complicated by the warming trend since 18,000 years ago that reduced glaciers and raised the sea level, so that much of the prehistoric coast that would have been occupied by the first coastal migrants to North America is currently over 100 meters underwater.

South through the Americas

However the first modern *Homo sapiens* reached the Western Hemisphere, the spread through the Americas was rapid. Multiple migration waves crossed from North to South America (Posth et al. 2018). Our species took advantage of the lack of hominin competition and the bountiful resources both along the coasts and inland. The Americas had their own wide array of megafauna, which included woolly mammoths, mastodons, camels, horses, ground sloths, giant tortoises, and—a favorite of researchers—a two-meter-tall beaver. The reason we cannot find these amazing animals today may be that ancient humans hunted them all to extinction, though climate chance may also play a role. Resources gained from these fauna must have been an important part of survival for people over 12,000 years ago. Several sites are notable for what they add to our understanding of American prehistory, including interactions with megafauna and other elements of the environment.

Monte Verde is a landmark site that shows that the human population had expanded down the whole vertical stretch of the Americas to Chile by 14,600 years ago, only a few thousand years after humans first entered the Western Hemisphere from Alaska. The site has been excavated by archaeologist Tom D. Dillehay and his team (2015), revealing fragile material culture that is rarely preserved, including human footprints, animal hides, and wooden tools.

Named after the town in New Mexico, the Clovis stone tool style is the first example of a widespread culture across much of North America, between 13,400 and 12,700 years ago. Instead of a stem-shaped base, Clovis points were fluted with two small projections, one on each end of the base, facing away from the head (Figure 26). The stone points found at this site match those found as far as the Canadian border and northern Mexico, and from the west coast to the east coast of the United States. Fourteen Clovis sites also contained the remains of mammoths or mastodons, suggesting that hunting megafauna with these points was an important part of life for the Clovis people. Other Clovis sites show that other types of hunting and gathering were important to people's subsistence, too. After the spread of the Clovis style, it diversified into several regional styles, keeping some of the Clovis form but also developing their own unique touches.



Figure 26. The Clovis point has a wider tip and the base has two small projections instead of a single large stem. This example was carved from chert and found in north central Ohio, dated to around 11 kya.

Summary of Modern H. sapiens in the Americas

Research in prehistoric Native American origins found some surprising details, refining older models. Genetically, the migration can be considered one long period of movement, with splits into regional populations. This finding matches the sudden appearance of the homegrown Clovis culture, its rapid expansion, and the radiation of descendant cultures in North America. A few thousand years after arrival into the hemisphere, people had already covered the Americas from north to south.

The peopling of the Americas also had a lot of common elements with the prior spread of humans across Africa, Europe, Asia, and Australia. In all of these expansions, people explored new lands that tested both the cultural and biological adaptations of the pioneers. Besides stone tool technology, the use of ochre as decoration was seen from South Africa to South America. The coasts and rivers were likely avenues in the movement of people, artifacts, and ideas, outlining the land masses while providing access to varied environments. The presence of megafauna aided human success, but this resource was eventually depleted in many parts of the world.

The Big Picture: The Assimilation Model

How do researchers make sense of all of these modern *Homo sapiens* discoveries that cover over 300,000 years of time and stretch across every continent except Antarctica? How was modern *Homo sapiens* related to archaic *Homo sapiens*? Over the past few decades, paleoanthropologists have engaged in spirited debates based on their interpretation of the data.

One competing model was called the **Out of Africa model** or Recent African Origin model. Supporters of this model saw evidence that modern *Homo sapiens* first evolved in Africa, then expanded into the other continents without interaction with the archaic *Homo sapiens* of Europe and Asia. Researchers on this side noted that the oldest modern *Homo sapiens* fossils were found in Africa, suggesting that that continent was the origin. Genetic analysis found the same conclusion.

The other model was called **Multiregionalism** or the Multiregional Continuity model. The view of the data by scientists on this side was that modern *Homo sapiens* evolved from the archaic humans in Africa, Europe, and Asia simultaneously. Gene flow would have kept the species cohesive across the great distance while producing local variation as well. The multiregionalist experts pointed to the sharing of traits from *Homo erectus*, through archaic *Homo sapiens*, and then to the modern humans in different parts of the world as supporting their model.

Eventually, researchers noticed that both the Out of Africa model and the Multiregionalism model had elements that were supported by data and elements that were not supported. Taking the supported parts of each model and combining them formed an

explanation that was more complicated, but explained much more of the scientific evidence. The merging of two models to form a better one suits the name of the improved version: the Assimilation model.

The **Assimilation model** proposes that modern *Homo sapiens* evolved in Africa first and expanded out (from the Out of Africa model) but also interbred with the archaic *Homo sapiens* they encountered outside Africa (from the Multiregionalism model) (Figure 27). True multiregionalism occurred just within Africa as the species evolved from a web of interactions between varied groups. As the modern human population expanded from Africa, they assimilated the alleles of archaic humans they encountered through interbreeding. The Assimilation model is powerful since it explains why Africa has the oldest modern human fossils, why early modern humans found in Europe and Asia bear a resemblance to the regional archaics, and why traces of archaic DNA can be found in our genomes today (Smith et al. 2017).

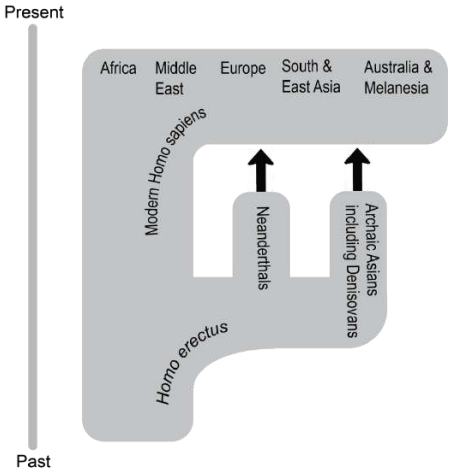


Figure 27. This diagram depicts the connections between archaic and modern *Homo sapiens* of different regions. Having evolved from *Homo erectus*, the archaic humans expanded from Africa and established the Neanderthal and Denisovan groups. In Africa, the remaining archaic humans evolved the modern set of traits and expanded from the continent as well, encountering and interbreeding with two archaic groups across Europe and Asia.

While scientific progress has produced a model that satisfies the data, there are still a lot of questions for paleoanthropologists to answer regarding our origins. What were the patterns of migration in each part of the world? Why did the archaic humans go extinct? In what ways did archaic and modern humans interact? How large were the past populations? How did biological, cultural, and environmental factors influence the material culture found in different parts of the world? The definitive explanation of how our species started and what our ancestors did is still out there to be found. You are now in a great place to welcome the next discovery about our distant past—maybe you'll even contribute to our understanding as well.

"Cavemen" in Popular Culture

"Cavemen," or our prehistory in general, is a constant presence in western popular culture. From the iconic opening to *2001: A Space Odyssey* to the less iconic *10,000 B.C.*, the distant past is a common setting for dramatic stories. The prehistoric experience even gets interactive with games like *Far Cry Primal* where the player can persistence-hunt for food and ride a woolly mammoth (!) (Figure 28). The distant past has also been the setting for more comedic stories, such as *The Flintstones* and, recently, *The Croods* with Nicolas Cage.



Figure 28. Screenshot of an action scene from the videogame Far Cry Primal. While the game is set at 12 kya, one faction of humans has distinctly Neanderthal traits (center-left), though none were left by that time in reality. Note touches inspired by research, such as the use of shells for decoration on the protagonist's wrist.

Why are we interested in the past beyond a scientific understanding? Like feudal times or the Wild West, prehistory may be a setting that is rife for telling stories that excite us. With humanity stripped of the modern conveniences we are used to, situations become more intense. Prehistory takes this trope to the extreme. The viewer/game player is invited to think about what they would do if they had to live more directly off of the environment, unshielded from the dangers of the natural world. Experiencing our imaginings of that time may satisfy parts of our brain that evolved in that situation, just as people accustomed to urban life find enjoyment by camping or sitting around a fire with friends and family. Seeing the portrayal of the prehistoric world may reach those parts of our psychology that feel at home away from our constructed environment.

That said, the portrayal of the past in fiction is rarely accurate. There is a significant lag time between the scientific view of our past and when it reaches mass media. Older works age very poorly. In *Clan of the Cave Bear*, a book from 1980, the Neanderthals have limited emotions and communicate with sign language rather than speaking: two ideas that have not stood the test of time but were core to the story. Even in recent productions, prehistoric people are dim-witted and have limited vocabulary, though the evidence shows that our brains and language abilities are basically the same today as 300,000 years ago. How our media choose to represent the past may say more about our own values and views of ourselves rather than what people were actually like long ago.

As you engage in the next fiction set in our distant past, consider how the presentation differs from the scientific view and why there is this divide. Also, as you enjoy the world that is presented to you, consider that we are not so different from the cavemen. We are the ones born into the world of projectors and streaming media, and we may build on that to create the next medium, but at our core we are the same as the painters of Lascaux and the carvers of prehistoric figurines.

The Chain Reaction of Agriculture

While it may be hard to imagine today, for most of our species' existence we were **nomadic**: moving through the landscape without a singular home. Instead of a refrigerator or pantry stocked with food, we procured nutrition and other resources as needed based on what was available in the environment. Instead of collecting and displaying stuff, we kept our possessions at a minimum for mobility. This foraging lifestyle enabled the expansion of our species, but the invention of a new way of life, caused a chain reaction of cultural change taking us to the present day and beyond.

The Foraging Tradition

To understand our species is to understand **foraging**, or the search for resources in the environment. This **subsistence strategy**, or method of finding sustenance, sounds unusual to most of us today. Most of us live in cultures that practice another strategy, **agriculture**, where we shape the environment to mass produce what we need. Considering the age of modern *Homo sapiens*, however, we have spent far more time as nomadic foragers than as settled agriculturalists. As such, our traits have evolved to be primarily geared toward foraging. For instance, our efficient bipedalism allows persistence-hunting across long distances as well as movement from resource to resource. Even our psychological tendency toward our ability to form stable relationships with around 150 people may derive from the foraging lifestyle.

How does human foraging, also known as hunting and gathering, work? Anthropologists have used all four fields to answer this question. Typically, people formed **bands**, or groups of around 50, and rarely over 100. A band's organization would be

egalitarian, with a flexible hierarchy based on an individual's age, level of experience, and relationship with others. Everyone would have a general knowledge of the skills assigned to their gender roles, rather than specializing in different occupations. The ratio of plant to meat in one's diet would have depended on the local resources. As a location's resources became used up, and as human waste accumulated, the band would travel to another patch. In the varied environments that humans entered—from savannas to tropical forests, deserts, coasts, and the Arctic circle—people found sustenance needed for survival.

Why Agriculture?

After hundreds of thousands of years of foraging, some groups of people around 12,000 years ago started to practice agriculture instead. This transition is called the **Neolithic Revolution**, and it occurred at the start of the **Holocene** epoch. The reasons for this global change are still being investigated, but there are two likely causes that may have occurred together: a growing human population and natural global climate change.

Overcrowding could have affected the success of foraging in the environment, leading to the development of a more productive subsistence strategy. Foraging works the best with low population densities since each band needs a lot of space to support itself. If too many people occupy the same environment, they would deplete the area faster. This situation on a global level due to growing population and limited areas of expansion would have been an increasingly pressing issue after the human expansion through the major continents by 14,600 years ago.

A changing global climate immediately preceded the transition to agriculture, so researchers have also explored a connection between the two events. Since the Last Glacial Maximum of 23,000 years ago, the Earth slowly warmed. At 13,000 years ago, the temperature in most of the Northern Hemisphere dropped suddenly in a phenomenon called the **Younger Dryas**. Glaciers returned in Europe, Asia, and North America. In Mesopotamia, which includes the Levant, the climate changed from warm and humid to cool and dry. The change would have occurred over decades, disrupting the usual nomadic patterns and subsistence of foragers around the world. The disruption to foragers due to the temperature shift could have been a factor in spurring the transition to agriculture. Researchers Gregory K. Dow and colleagues (2009) believe that foraging bands would have clustered in the new resource-rich places where people started to direct their labor to farming the limited area. Continued practice would prompt innovations such as better tools and increasing productivity. After the Younger Dryas ended, people expanded out of the clusters. As they reinhabited the region, they brought with them a culture in which farming had become the norm, along with the technology and knowledge to succeed with this subsistence strategy.

The double threat of the limitation of human continental expansion and the sudden global climate change may have placed bands in peril as more populations outpaced their environment's carrying capacity. Not only had a growing population led to increased competition with other bands, but environments worldwide shifted to create more uncertainty. As people in different areas around the world faced this chaotic situation, they became the independent inventors of agriculture.

Agriculture around the World

Due to global changes to the human experience starting from 12,000 years ago, cultures with no knowledge of each other turned toward farming their local resources. The switch to agriculture took time and effort with no guarantee of success. Agriculture is a difficult process with fires, floods, droughts, disease, and pests being constant problems to address. Heavy physical labor with no immediate payoff was also needed to shape the landscape in a coordinated way to support agriculture. For example, people had to direct water flow to irrigate constructed fields of crops. The first farmers also engaged in artificial selection of their domesticates to enhance useful traits. The biggest success stories in the face of these obstacles became the primary centers of agriculture:

- Mesopotamia: The Fertile Crescent from the Tigris and Euphrates rivers through the Levant was where bands started to domesticate plants and animals around 12,000 years ago. The connection between the development of agriculture and the Younger Dryas was especially strong here. Farmed crops included wheat, barley, peas, and lentils. This was also where cattle, pigs, sheep, and goats were domesticated.
- South and East Asia: Multiple regions across this land had varieties of rice, millet, and soybeans by 10,000 years ago. Pigs were farmed with no connection to Mesopotamia. Chickens were also originally from this region, bred for fighting first and food second.
- New Guinea: An under-appreciated center in Melanesia, agriculture started here 10,000 years ago. Bananas, sugarcane, and taro were native to this island. Sweet potatoes were brought back from voyages to South America around the year C.E. 1,000. No known animal farming occurred here.
- Mesoamerica: Agriculture from Central Mexico to northern South America also occurred from 10,000 years ago; it was also only plant based. Maize was a crop bred from teosinte grass, which has become one of the global staples. Beans, squash, and

avocados were also grown in this region.

- The Andes: Starting around 8,000 years ago, local domesticated plants started with squash but later included potatoes, tomatoes, beans, and quinoa. Maize was brought down from Mesoamerica to join the local variety. The main farm animals were llamas, alpacas, and guinea pigs.
- Sub-Saharan Africa: This region went through a change 5,000 years ago called the Bantu expansion. The Bantu agriculturalists were established in West Central Africa and then expanded south and east. Native varieties of rice, yams, millet, and sorghum were grown across this area. Cattle were also domesticated here.
- Eastern North America: This region was the last major independent agriculture center, from 4,000 years ago. Squash and sunflower are the produce from this region that are most known today, though sumpweed and pitseed goosefoot were also farmed. Hunting was still the main source of animal products.

By 5,000 years ago, our species was well within the Neolithic Revolution. From the primary centers, agriculturalists spread to neighboring parts of the world with their domesticates, further expanding the use of this subsistence strategy. For example, the Mesopotamian farmers spread their innovations along the northern coast of the Mediterranean into Europe (Pinhasi, Fort, and Ammerman 2005). The crops of China were brought into the Korean peninsula (Lee 2011). From this point, the human species changed from being primarily foragers to primarily agriculturalists. The revolution took millennia, but it was a true revolution in that the lifestyle of our species was reshaped to something vastly different.

Conclusion

Modern *Homo sapiens* is the species that took the hominin lifestyle the furthest to become the only living member of that lineage. This last section of the chapter summarizes what we know about modern *Homo sapiens* traits, origins, and history.

The largest factor that allowed us to persist while other hominins went extinct was likely our advanced ability to culturally adapt to a wide variety of environments. Our species, with its skeletal and behavioral traits, was well suited to be generalist-specialists who successfully foraged across most of the world's environments. The biological basis of this adaptation was our reorganized brain that facilitated innovation in cultural adaptations and intelligence for leveraging our social ties. As the brain's ability increased, it shaped the skull by reducing the evolutionary pressure to have large teeth and robust cranial bones to produce the modern *Homo sapiens* face.

Our ability to be generalist-specialists is seen in the geographical range that modern *Homo sapiens* covered in 300,000 years. In Africa, our species formed from multiregional gene flow that loosely connected archaic humans across the continent. People then expanded out to the rest of the continental Old World and even further to the Americas. Wherever people went, they were enabled and connected by the shared tools and art they crafted.

For most of our species' existence, foraging was the general subsistence strategy within which people specialized to culturally adapt to their local environment. With biologically endowed omnivorousness and mobility, people found ways to extract and process resources, shaping the environment in return. When global fluctuation in climate and a sudden resource uncertainty hit the species, people around the world focused on agriculture to have a firmer control of necessities. The new strategy shifted human history toward exponential growth and innovation to address the drastic shift in lifestyle, leading to our high dependence on cultural adaptations today. We may continue this trend in the future, with global changes to human genetic diversity.

While a cohesive image of our species has formed in recent years, there is still much to learn about our past. The work of many driven researchers shows that there are amazing new discoveries made all the time that refine our knowledge of human evolution. Technological innovations such as DNA analysis enable scientists to approach lingering questions from new angles. The answers we get allow us to ask even more insightful questions that will lead us to the next revelation. Like the pink limestone strata at Jebel Irhoud, previous effort has taken us so far and you are now ready to see what the next layer of discovery holds.

Terms You Should Know

African multiregionalism

Agriculture

Assimilation model

Band

Beringia

Coastal Route model

Egalitarian

Foraging

Globular

Gracile

Holocene

Ice-Free Corridor model

Insular Dwarfism

Introgression

Later Stone Age

Megafauna

Middle Stone Age

Mousterian Tools

Mosaic

Multiregionalism

Neolithic Revolution

Nomadic

Ochre

Out of Africa model

Subsistence strategy

Younger Dryas

Study Questions

1. What are the features used to define modern humans?
2. What are the most likely scenarios for how modern humans evolved?
3. How do the discoveries mentioned in “First Africa, Then the World” fit the Assimilation model?
4. What is foraging? What adaptations do we have for this subsistence strategy? Could you train to be a skilled forager?

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CHAPTER OVERVIEW

3: Archaeology

3.1: Introduction to Archaeology
3.2: Conducting Archaeological Research
3.3: Collections, Ethics and Ownership

Thumbnail:

Temple of Kom Ombo dedicated to God Sobek on the Nile River near Aswan and Luxor. (Unsplash License; CALIN STAN via Unsplash)

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3.1: Introduction to Archaeology

Learning Objectives

By the end of this chapter, you will be able to:

- Identify and describe archaeology and archaeological fieldwork
- Describe the types of data archaeologists use
- Explain the significance of context to archaeological interpretation
- Characterize the different types of sites studied by archaeologists

From museums, science magazines, television shows, and even films, most of us have had some exposure to archaeology and have become familiar with some of the world's most famous archaeological discoveries. You have likely heard about the only surviving "Wonder of the Ancient World", The Great Pyramid of Giza. Perhaps you have a "bucket list" of famous archaeological sites you would like to visit like Stonehenge in Great Britain or the ancient Mesoamerican city of Teotihuacán. However, have you ever met an archaeologist in person? We commonly deal with many professions we see in the media, such as doctors, lawyers, police officers, firefighters, and teachers, but rarely have personal contact with archaeologists. As a result, we mostly rely on stereotypes portrayed in the media to understand archaeologists and the work they do. First surprise? Archaeology is much more than digging! As we have seen, it is a sub-discipline of the larger field of anthropology. While the interest of **anthropology** is to better understand humans and their wondrous cultural variety, in all times, at all places, **archaeology** specifically focuses on human cultures in the past. It asks similar questions but uses different kinds of data. Rather than relying on observations of living participants, archaeology focuses on **material culture**—items people made, modified, and used in the past to understand the cultures of our ancestors.



Figure 1: "Great Pyramid of Giza also known as Pyramid of Cheops or Khufu" by Holger Wirth is licensed under CC BY-ND 2.0.

Archaeologists are interested in both large- and small-scale questions. Small-scale questions are straightforward, such as: What was in this pot? Where did this stone come from? What did this person eat before he died? Large-scale questions that interest archaeologists include things like: Why did the domestication of animals and plants emerge? Why did some areas develop cities while others did not? Why do civilizations collapse and disappear? Archaeology considers these types of questions and everything in between. Often there are different levels of confidence when investigating the past. We can generally be more confident about things like diet, trade, tool use, and construction techniques than we are about the large-scale "why questions" of the past. Additionally, understanding the values and symbols systems of past societies is quite challenging, and yet is one of the most interesting aspects of archaeology and targets what we usually think of as human culture—that complex web of shared meaning that underpins how we see the world.

Every discipline has a foundation and methods with which they seek to build knowledge. Knowing is especially challenging in archaeology because of the time elapsed since the events occurred. What constitutes a good method, good evidence, and reasonable inferences? These are questions that are debated in every discipline, not just archaeology. **Hypotheses**, which are informed guesses about what happened and why, are commonly tested in archaeology but there are different methods to test those hypotheses. Some archaeologists collect quantitative data. **Quantitative data** is information that is measurable. An archaeologist, for instance, might measure the length or projectile points, or count the number of pollen grains in a soil sample, or record the quantity of animal bone on a site. Other archaeologists are more interested in **qualitative data**, that is, descriptive information. Archaeologists interested in

art and the use of symbols might be more interested in describing the nature of the artwork and its context. Of course, this is a simplified dichotomy, and archaeological studies routinely consider both quantitative and qualitative data simultaneously. Indeed, archaeologists regularly use many different types of data and lines of evidence to investigate a question, including the scientific method and focused fieldwork.

The **scientific method** is a process by which scientists ask questions, collect data, test hypotheses, and gain knowledge about the natural world. Its steps have been described in various ways but consistently address the same basic elements: observation, hypotheses, experimentation/data collection, analysis, and conclusions. When applied, these steps are more like a cycle than a straight linear process, as hypotheses can be revised after some initial data collection or experimentation, and new ideas and technologies can change the assumptions on which hypotheses were initially based. As we learn more and draw new conclusions, we develop new and different questions.

Fieldwork is the hallmark of anthropological study and the process by which anthropologists collect data. While the cultural anthropologist conducts fieldwork with groups of humans, the archaeologist tends to focus on archaeological sites. Some material collected can be analyzed in the field, while other types are analyzed in laboratories, sometimes years later. Typically, fieldwork in anthropology involves many hours of work. In archaeology, this might entail observing landscapes to identify locations of past human activity to excavate and study in archaeology.

The Archaeological Record

Archaeology's overarching goal is to preserve the archaeological record. What is the archaeological record? We have seen that archaeologists tend to focus on material culture, they primarily study **artifacts**, objects made, used, or modified by humans. However, archaeologists are interested in anything that is evidence of past human activity. This evidence can be a farmer's dwelling, a campsite, a cache of stone tools, a burial site, a scatter of flint flakes, or an ancient city. Just as anthropology itself studies "all things human", archaeology studies all things related to past human activity. Combined, the material remains of past human activity, such as the locations, artifacts, food remains, and refuse is the **archaeological record**.



Figure 2: Artifacts on display at the Regional Archaeological Curation Facility at Fort Gregg-Adams. Image by Nancy Phaup

Context is Everything

Despite what is shown in movies and on TV, most archaeological finds are not golden treasures or priceless pieces of antiquity. Most are items that were used on a regular basis and then discarded due to wear, damage, or loss. What are the types of materials that archaeologists most frequently uncover and what are the settings in which these materials are most often found?

We tend to think of archaeologists as primarily studying objects made by humans, artifacts, but there is much more to archaeological investigations! Archaeologists are most concerned with **archaeological context**—how an artifact or other type of archaeological data was found in relation to everything else at the archaeological site. A **site** is a distinct clustering of artifacts in a location that demonstrates human activity took place there. An artifact's context includes its **provenience**, exactly where the object was found (horizontally and vertically) in the site; its **association** in terms of its relationship and positioning with other objects; and the **matrix** of natural materials such as sediments surrounding and enclosing the object in place.

When a site is looted or excavated by amateurs, the context of the artifact is lost even if the artifact remaubs. But looting is not the only way to remove an artifact from its original context! Careful excavation, with precise attention to detail and note taking using a scientific method is required in archaeology so that context and provenience are maintained! This is because excavation also strips

the site of much of its most important information, the components that tell a fuller story of the artifacts and the site. If careful excavations are not done and their records preserved, this would leave behind a collection of artifacts with no story left to tell. Ideally, items found during an excavation are left **in situ**, which is Latin for "still," meaning they are in their original place of deposition. This is why archaeologists tell you to leave any item you find, especially on public land, untouched no matter how tempting it is to pick it up, look at it, and put it in your pocket to show your archaeology professor!

Elves and Fairies

For the field of modern archaeology to arise, at least two basic realities had to be recognized. The first seems obvious now; Artifacts had to be recognized as objects made by people. In Europe, it was not uncommon for people to ascribe artifacts to the work of mythical beings like Thor or even elves. In Scotland, arrowheads were called "elf-arrows," and could be worn to protect against "elf-shot." Gradually, people began pointing out that these mystical curiosities of Europe were not much different from the everyday tools used by people encountered during the colonization of Africa, Australia, and the Americas by European powers. In 1699, Edward Lhuyd, Keeper of Ashmolean Museum in Oxford concluded that mysterious objects found in Scotland were not the work of elves, but just plain old arrowheads.

> *I doubt not but you have often seen of those Arrow-heads they ascribe to elves or fairies, they are just the same as the chip'd flints the natives of New England head their arrows with at this day: and there are also several stone hachets (sic) found in this kingdom, not unlike those of the Americans.*

The second realization that paved the way for modern archaeology was the recognition of the long period of time that humans have occupied the Earth. Many scholars attempted to calculate the age of the Earth and/or people on the Earth using the available texts. Today, thanks to thousands of subsequent archaeological and geological investigations, the deep age of the earth and human existence presence is overwhelmingly clear. Humans have been in Europe for at least 40,000 years and other related species like Neanderthals were there for hundreds of thousands of years. The time depth of *Homo sapiens* is even greater in other parts of the world, as we have seen.



Figure 3: Photo of a pair of prehistoric arrowheads (so called "elf arrows") set in silver used as a defense against witchcraft. Originally from Italy. Image by user:geni

Artifacts and Ecofacts

Artifacts are objects that were used, modified, or made by people. They are also defined as portable and could have been carried by humans from place to place. Common examples of archaeological artifacts are projectile points (arrowheads), ceramic pots, baskets, nails, and glass bottles. Of course, there is a natural preference for complete artifacts since many objects at sites were

discarded and were broken before being found, entering the archaeological record because they were thrown in the trash. As a discipline, however, archaeology must analyze all types of artifacts to get the most complete picture of human occupation and behavior. It is also easy to miss single-use artifacts such as a rock used to pound a tent stake in place because no one packed a hammer or mallet. Archaeologists spend much of their time thinking about and analyzing artifacts because the items were made or used by humans and correlate directly to human behavior. Thus, many aspects of artifacts can be analyzed, such as the material from which they were made, their artistic or functional style, and their design (see Figure 4). Archaeologists will also create a **typology**, which is a way to sort and classify things by type using specific attributes. This provides a way to understand how an artifact such as a pot changed over time in shape, form, and use. Typologies also provide useful estimates of the period in which the artifacts were made. .



Figure 4: Stoneware Ceramic Fragment-Bristol Slipped. Image by Nancy Phaup

Besides artifacts, archaeological sites provide **ecofacts**: organic and environmental remains such as animal bones, plant remains, and soils that occur at archaeological sites and relate to human activity but were not made, modified, or used by humans. Ecofacts can reveal much about human behavior. For example, plant and animal remains can allow archaeologists to reconstruct the environment when humans lived there, effectively telling researchers what types of plants or animals would have been available for humans to use or eat. Another type of object found at sites is a **manuport**, which is an object brought to the site by humans but not modified by them. For example, an unusual stone material known for its excellent heating properties could be found in a hearth or fire pit. A **feature** is an artifact such as a hearth, storage pit, midden (trash pile), house, or other structure that is not portable. Together, all of these pieces of evidence observed at and collected from an archeological site make up an **assemblage**.

Sites and Their Function

Creating an archaeological site is quite simple, it happens when we do an activity and leave behind traces of some kind. An archaeological site is a reflection of human behavior and they can come in many varieties! The type of site created will naturally be influenced by the people and time period in which it was generated. This means that an archaeologist excavating a Native American site from 8,000 years ago will find different sort of materials than someone excavating a contact-period site like Powhatan's Werowocomoco. But all archaeological sites do tend to have certain similarities, they reflect patterned human behavior and for this reason archaeologists pay attention to the potential functions of a site—how the site was used by humans. Naturally, an important function of many sites is **habitation**; artifacts are concentrated where people lived for more than a few days or weeks. Sites of short-term habitation such as encampments typically offer few archaeological remains simply because of the short time humans were there. Sites where food was acquired and, in particular, processed are important parts of the archaeological record too. They include **processing sites** where humans prepared plants or animals for consumption, such as **animal kill sites** and **butchering sites**; **storage sites** where items such as grains were kept for long periods of time; **hunting blinds** and traps humans used to catch and kill animals; and **agricultural sites** where humans cultivated crops for food and other uses. Site type provides important information for archaeologists. It indicates the likely function of the site and allows archaeologists to predict the types of artifacts

and ecofacts likely to be uncovered. An **open-air site** (that has no protection from the elements), for example, will rarely contain well-preserved perishable artifacts or features because of damage from wind, rain, heat, and cold. **Natural shelter sites**, like caves or rock overhangs, which do provide protection from the elements, on other hand, are excellent places to find preserved perishable items such as wooden artifacts and basketry.

Archaeologists are interested in many other types of sites as well, including quarries (where humans often harvested stones for tools and building) and lithic scatters (where they made and repaired stone tools, which are called **lithics**). Other sites provide information about human cultures and uses of symbolism, such as **rock art** sites at which humans painted **pictographs**, carved or etched **petroglyphs**, and scraped rocks and the soil to make **geoglyphs**. Cemeteries also yield important information about a people, even without exhuming the bodies. Finally, more recent excavations have also focused sites of habitation (or **domestic sites**) and **burial sites** (like cemeteries) but they are also interested in: **military sites** (places were armed conflicts occurred or that had a military occupation), churches , hospitals and other **special purpose sites** and **industrial sites** as well as **commercial sites** (Orser 2016).



Figure 5: First Baptist Church Excavation, Williamsburg. Photo by Nancy Phaup.

As previously mentioned, context at a site is critical to understanding the archaeological data fully. Archaeologists need to understand the types of artifacts and sites they encounter, how such remains enter the archaeological record, and what can happen to them after they are deposited by humans. The study of what happens to archaeological remains after burial or deposition is called **taphonomy**. Taphonomy is important because it is likely that buried and deposited objects are not in situ when uncovered by archaeologists. Determining who or what could have caused the item to move from its original depositional location to the current location is important to understanding the complex contextual information presented at the site. For example, a plow in a field could churn the soil, disturbing an unknown archaeological site and redistributing the artifacts. This type of action, caused deliberately or accidentally by human activities, is called a **cultural formation processes**. Natural events, such as a wind storms, floods, volcanic eruptions, and even the effects of plant roots and animal burrowing, are called **natural formation processes**. When archaeologists understand what forces and events could have had an impact on the position of archaeological remains, they are better equipped to answer questions about whether marks on a bone came from animal gnawing or are signs of early human tool use and whether a collection of artifacts was deposited haphazardly or was affected by a mudslide.

Terms You Should Know

Anthropology

Archaeology

Material culture

Hypothesis

Quantitative data

Qualitative data

Fieldwork

Scientific Method

Artifacts

Archaeological record

Archaeological context

Site

Provenience

Association

Matrix

In situ

Typology

Ecofacts

Manuport

Feature

Assemblage

Habitation

Processing sites

Animal kill sites

Butchering sites

Storage sites

Hunting blinds

Agricultural sites

Open-air site

Natural-shelter site

Lithics

Petroglyphs

Pictographs

Geoglyphs

Rock art

Domestic sites

Burial sites

Military sites

Special purpose sites

Industrial sites

Commercial sites

Taphonomy

Cultural formation processes

Natural formation processes

Study Questions

1. Explain why you shouldn't pick up an artifact you come across in nature.
2. What are the differences between an artifact, an ecofact, and a feature?
3. Give an example of a natural formation process and a cultural formation process.
4. How are cultural anthropology and archaeology similar? How are they different?
5. How do archaeologists collect data?
6. Apply what you have learned about anthropologists to answer the following question. How can anthropologists use or be informed by the scientific method since most anthropologists do not generally conduct "traditional" experiments?

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3.2: Conducting Archaeological Research

Learning Objectives

By the end of this chapter, you will be able to:

- Explain the six stages of archaeological research.
- Describe the elements of a research design.
- Describe the three general approaches used by archaeologists to identify sites.
- Compare and contrast the techniques used for reconnaissance.
- Characterize the various types of evidence of archaeological sites that can be detected through remote sensing.
- Understand the different kinds of dating techniques

You may think that archaeologists just walk into the field and begin digging up amazing artifacts. Actually, many hours have been spent preparing for that moment when the archaeologists pick up their shovels. Extensive planning is required before excavation or even a survey can begin. The archaeologists must formulate a research question, which will guide all aspects of the work including where to excavate, what kinds of data to collect, and what types of artifacts are relevant to the study. This is a critical step that never gets portrayed in the movies!

Archaeological Research

In the early days of archaeology, archaeologists focused on the excavation of sites. They would find a site, dig, and study the artifacts. However, they were not as concerned about the broader context of their findings. How did humans of the time interact with their environment, for example? Today, archaeologists approach research in a more focused way with specific goals in mind. The overarching goal now is to preserve the archaeological record, which means actually digging is not the first option for research. The best way to preserve a site is to leave it in its original state! When digging does occur, it means excavating in a careful and precise way so as to preserve the **context** of the site in question and the provenance of any artifacts recovered. So, before any field or laboratory work begins, archaeologists must plan their research. Archaeological research is typically done in six general stages: research design, implementation, data acquisition, processing and analysis, interpretation, and publication (Fagan, 2006).

Research Design

The first stage of archaeological research is to carefully formulate a systematic plan to execute the research, known as **research design**. It is during this stage that background research is completed and the research questions are developed. A research design needs to be thought out and thorough including the details that will be needed to acquire funding and permissions. Sometimes excavations are related to the appled archaeology field of **cultural resource management** , often called **CRM**. This means the research plan will also need to consider compliance with local and national laws, for instance Section 106 of the National Historic Preservation Act in the United States. As the research design is being developed, there are some key elements that need to be considered.

Elements of Research Design

- Define the context of the research. A research design should include defining the goals of the project and how the findings will fit into the existing archaeological record. What will the new knowledge contribute to what we already know? Is the project addressing a problem that has been identified (problem-oriented)?
- Define the research questions. The research questions can be general or specific, but in either case, they need to be related to the goals of the project. These questions will help to develop the next element of design.
- Define the data to be collected. What data will be needed to answer the research questions and meet the goals of the project?
- Define the methods to collect data. How will the data be collected? What tools and technology will you need? Is excavation necessary or will remote sensing provide the necessary data? Can the site be left “undisturbed”?
- Define the methods of analysis and interpretation. How will the data be studied and interpreted to answer the research question?
- Define how the findings will be disseminated. How will the research findings be made accessible to the academic community and the public?

Implementation

Once the research design is in place, then the **implementation phase** begins. This is when archaeologists begin procuring the funds to undertake the research project as well as putting together the research team. At this stage they identify any consultants and volunteers, if needed, to assist with the project, as well as ensure all necessary equipment is accessible. Most importantly, archaeologists must obtain all necessary permissions from federal, state, and local governments in addition to tribal authorities before any excavation can begin. Increasingly collaboration with local and descendant communities has become an important part of archaeological research and the implementation phase is a moment to cement those relationships, though optimally those communities are involved in the research design process as well!

Data Acquisition/Fieldwork

After the team has been assembled, equipment gathered, and all permissions have been granted, the collection of data begins. However, the shovel and trowel are not the first tools for which an archaeologist reaches. Research begins with an archaeological survey using **non-intrusive tools**. An **excavation**, actual digging, is only initiated if is determined necessary after the initial survey has been completed.

Processing and Analysis

As artifacts and other aspects of material culture are collected, they are sent to the lab for processing and analysis. This phase begins during excavation and can continue long after the archaeologists have closed down the excavation and recovered the site. **Artifacts** are cleaned, labeled, classified, cataloged, and prepared for curation. This stage is when materials may be sent out for dating or samples sent to specialists for analysis.

Today, archaeological data is entered in a computer database, most often this is a **Geographic Information System** (GIS). Geographic Information Systems is a powerful new tool for mapping archaeological sites as well as the data related to those sites. In addition to generating maps, GIS can be used to perform analysis on aerial imagery and LiDAR models.

Interpretation

In the interpretation phase, all information that has been gathered from the research is brought together in a final summary or report of the findings. This explanation of the findings must relate to the original research questions. It is a report on the knowledge that has been learned through the research project. Collaboration with local and descendant communities can provide additional insight at this stage and improve archaeological interpretations.

Publication

Finally, all research results must be made accessible to, at the minimum, the academic community but preferably to the general public as well. If the results of the research is not recorded, the archaeological record of that site has been lost. The site has been destroyed by excavation and the data collected is lost. Until the research is published and recorded, the archaeological record is incomplete.

Archaeological Fieldwork

There are three steps when undertaking archaeological fieldwork: 1) finding the site, 2) assessing the site, and 3) excavating the site (Fagan, 2006). Some archaeological sites have no problems being identified, such as the Pyramid of the Sun in Teotihuacán, the Pyramids of Giza in Egypt, and the burial mounds and earthworks in eastern United States. However, most sites are inconspicuous and well-hidden. Many archaeological sites have been located through accidental discovery. You have probably seen different news stories on some exciting new discoveries during the construction of a parking lot or highway. One of the most famous archaeological finds in North America to happen randomly was discovered by an African American cowboy named George McJunkin (Figure 1). McJunkin was born enslaved close to Midway, Texas. He grew up with horses since his father was a blacksmith. After the Civil War, he moved to New Mexico and lived near Folsom. While searching for a lost cow and repairing fence lines, he noticed some old bones and a spear point (Nash 2017, Peeples 2015). The bones were later determined to be an extinct species of bison…and the spear point? The spear point is now known as a **Folsom Point**. The Folsom point was once the oldest stone tool in North America, dating to about 10,000 years ago, though older lithics have now been found.



Figure 1: A photo of George McJunkin in the public domain. Published before January 1, 1927

However, we cannot always rely on an accidental discovery. One way to locate sites is to research historical documents and maps. Old historical documents often contain descriptions of a former settlements or burial grounds which sometimes include a general location of a site that has long been lost. These documents can give archaeologists a starting point when searching for the site using aerial imagery and newer technologies such as LiDAR. Many times the survey techniques and tools used in assessing the site are the same that are used for finding the site.

Reconnaissance

Sites not uncovered by chance or by reviewing historical documents are usually detected using three types of reconnaissance: aerial reconnaissance, ground reconnaissance, and subsurface detection. Reconnaissance is the preliminary survey of the site. Basically, it is the initial gathering of information that will inform about the presence of archaeological materials, how to proceed, and determine if additional research is needed. Aerial reconnaissance and some subsurface detection methods can be labeled remote sensing. **Remote sensing** is using methods of reconnaissance that detect subsurface features and sites through the use of devices and technology such as aerial photography, LiDAR, and ground-penetrating radar. Today, archaeologists rely heavily on remote sensing technologies to investigate and study a site in a non-intrusive manner.

Aerial Reconnaissance

As the name suggests, **aerial reconnaissance** locates, records, interprets and monitors archaeological sites from above. This is particularly useful when studying large-scale patterns of habitation and the use of a landscape. Photos sometimes reveal buried sites in a surprising way. **Earthworks** (which consist of buried ditches, banks, and stone walls), crop marks, and soil marks, are all evidence of human habitation and cultivation. These signs are often more apparent from above, and trained eyes can identify areas in the images that suggest archaeological remains beneath the surface.

Aerial photography was first used in archaeology in the early twentieth century and its use expanded significantly after World War I. Archaeologists and their pilots would fly over areas they were interested in investigating, looking for signs of archaeological sites and land formations in which sites or artifacts are commonly found and then photographing them from the air (Figure 2). Not a lot of people are aware that Charles Lindbergh and Anne (his wife) both contributed to early aerial photography efforts. Charles first spotted Mayan ruins while flying in 1928/29 over the Yucatán peninsula in Mexico. His interest in archaeology lead him to volunteer, and while his wife piloted a two-seat, open cockpit biplane Charles would lean out and take photographs (Stewart 2017).

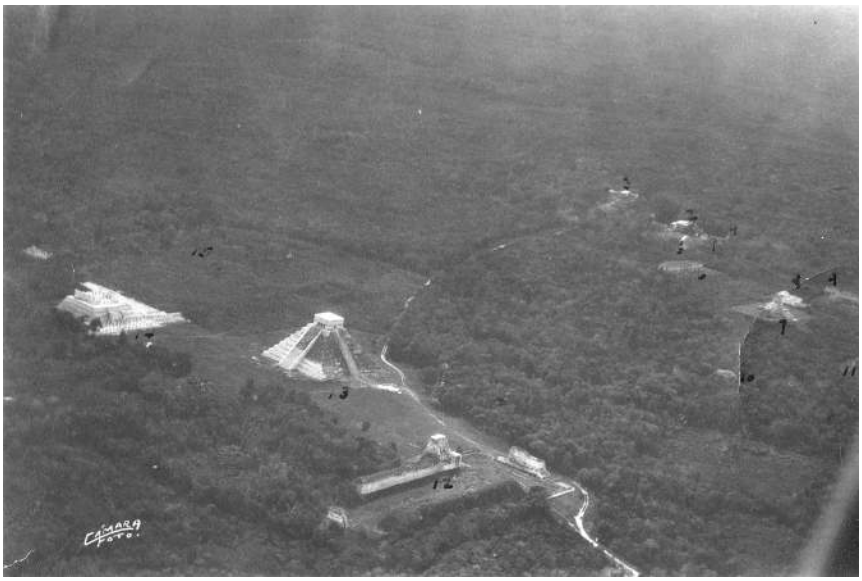


Figure 2: Aerial view of Chichen-Itza. Yucatan, Mexico. 1927. Public Domain photograph from the U.S. Geological Survey

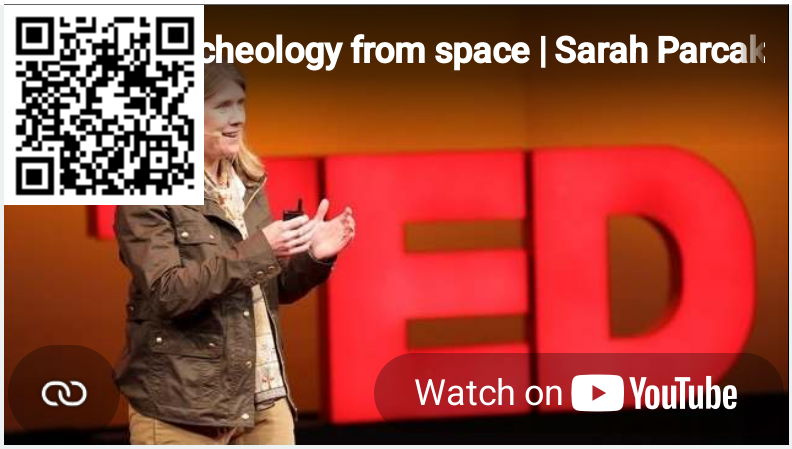
In some aerial images, sites can clearly be seen, such as ceremonial locations like Stonehenge or Native American burial mounds. Others, like crop marks, can appear in vegetated areas when plants are growing over buried walls or ditches that stunt or boost their growth relative to the rest of the plants in the area. Soil marks can be revealed when, for example, a plow uncovers a buried stone feature that is close to the surface, exposing a distinct difference in soil color and texture.

As technologies have developed, new avenues of aerial reconnaissance have opened up. One such technology is Light Detection and Ranging, known as **LiDAR**, which involves lasers scanning landscapes and sites. An aircraft flies over its target sending pulses of light to the surface and measuring the time it takes to reflect back to the receiver. The receiver collects thousands of data points that can be used to create digital elevation models (DEMs). The models are then used to create 3-dimensional topographic maps of the surface. This technology "sees through" dense vegetation and ground cover to reveal the topography below. This allows archaeologists to identify earthworks, overgrown structures, and other features that are hidden in overgrown forests and jungles. Recent applications of LiDAR in Mesoamerica have been incredibly successful, leading to the discovery of 60,000 Mayan structures that include homes, fortifications, and causeways. Thanks to this work, we now know that the Mayan world was much more densely populated and interconnected than previously thought. Archaeologists have revised their estimates of the Mayan population to include millions more people in previously unknown city-states.

Drones, Satellite Imagery

The availability of drones with photographic equipment attached has dramatically increased the accessibility and affordability of aerial reconnaissance efforts. Archaeologists who once needed to hire a pilot can conduct many aerial reconnaissance flights themselves. However, initial reconnaissance flights might not be needed since satellite imagery is freely available, through government databases on the internet and popular tools like Google Earth, and can often provide necessary aerial images. Since these tools are right at a person's fingertips, they can be used as a first pass of preliminary reconnaissance, guiding future, more detailed inquiries with techniques that offer a greater resolution. Google Earth also provides historical data through satellite imagery archived over time, allowing archaeologists to compare views of a location, potentially revealing changes in environmental conditions, water levels, and even a site's condition (before plowing, construction, or some other disturbance).

Archaeology from Space



In this TED talk, archaeologist Sarah Parcak describes some of the new opportunities that satellite remote sensing has opened up for archaeologists.

Since satellite imagery is free and drone technology is increasingly affordable, barriers to conducting reconnaissance have decreased, which is good for archaeologists and has opened up a new field within the discipline, namely **Space Archaeology**. Space archaeologists like Dr. Sarah Parcak look for ancient sites using air or space-based means, like satellite images (Marchant 2019). In addition to finding sites in this way, archaeologists can also monitor the condition of known sites, to identify those at risk from environmental hazards or human activities such as looting or development.

Ground Reconnaissance

Eventually, of course, archaeologists must get out of airplanes and their offices and check out potential sites in person to see what is actually there and confirm the presence of sites. They conduct **ground reconnaissance** to find, record, interpret, and monitor archaeological sites. This type of reconnaissance does not involve excavation. It examines what is visible and accessible directly on the surface of the ground. A primary tool is a surface survey—a systematic search for artifacts by methodically walking the site… that means a lot of walking.

How the survey is conducted depends on one's research question and the specific conditions at a site. Researchers can, for example, consider an area outlined by a trajectory such as a radius or a line extending outward from a central or starting point. The surveyors look for artifact scatter and/or unusual discolorations that suggest prior human behavior. When a possible artifact or feature is identified, the surveyor places a flag in the ground to identify its location and continues surveying. No excavation occurs at this time. Once the survey is complete, the flagged locations are precisely identified by GPS coordinates. Their locations are recorded and artifacts can then be collected, if appropriate, given the research question.

Subsurface Detection

Once a site has been found, archaeologists need to assess what is present at the site and what activities may have taken place there in the past. Since the goal of archaeologists is to preserve the archaeological record, they prefer using methods that are non-intrusive and have minimal impact on the integrity of the site. What happens when the features of a site are hidden underground? Thankfully, today's technology provides the tools for subsurface detection of some classes of material culture and to "see below the ground" without digging. Using non-intrusive equipment, archaeologists can identify walls, buildings, and burials that can not be seen from the surface. However, there are times where some digging may be necessary to verify the findings or to understand what is being shown in the data. That is when archaeologists may use probing or test pits for the initial survey of the site.



Figure 3: “Battle Mound Geophysics Weekend #2” by Farther Along is licensed under CC BY 2.0.

Non-intrusive Tools

Archaeologists also have **subsurface detection tools** that allow them to conduct reconnaissance below the surface of the ground without excavating. One way to do preliminary exploring below the surface is to use a metal detector. However, the most important non-destructive tools are geophysical sensing devices such as **Ground Penetrating Radar** (GPR, see figure 3). These devices actively probe underground by passing various types of energy, laser, or radio waves through the soil and measuring how the waves are reflected back to find out what is below the surface. Passive geophysical sensing devices measure the physical properties of the soil, such as gravity and magnetism. As with LiDAR, these tools capture data that generate a map of what lies below the surface. These highly technical non-destructive subsurface methods require a trained practitioner capable of running the machines over the site and interpreting the resulting data.

Archaeologists can also use probes that physically dig below the surface to learn more about what lies underground. A probe involves using a rod or auger, which looks like a giant drill bit, inserted into the ground to drill down as far as possible into the soil. The auger is then brought back to the surface, carrying with it samples of soil (that may or may not contain artifacts) from various levels below the surface. It is easy to see why this method must be used with caution as it involves plunging a sharp, destructive device into the ground, potentially damaging anything it encounters, including human burials. Another method of physically examining the subsurface is making **shovel test pits** (Figure 4), which are essentially very small excavations, usually smaller than one meter by one meter in size, to see if there is a potential archaeological site under the surface. Typically, several test pits are opened at the same time at a consistent distance from one another. This method is particularly useful for confirming the results of other forms of reconnaissance, and for identifying buried concentrations of artifacts that are not associated with material culture detectable by subsurface detection tools.



Figure 4: Digging the first shovel test pit for Civil War Archeology in Lafayette Square by Baltimore Heritage

Excavation

Excavation is not an easy task. First, it is an expensive proposition in terms of time and financial resources. More importantly, however, it is a destructive technique since the archaeological record is not renewable. If an error is made during the excavation process, the archaeologist cannot undo that work or even redo it—what's been dug up stays dug up. It is critical that nondestructive methods are used whenever possible and that excavation is used only when there is no other way to gather the data needed to accomplish the research goals. With that said, excavation often offers an important opportunity to gather physical evidence (in context!) of past human activities that can address anthropological questions about past societies.

You have probably seen photographs of excavations, in this text and in other texts and publications, in which the "holes" are square rather than round. Why does the shape of the hole matter? By digging a square hole, archaeologists can easily calculate how many artifacts and other items are present per unit—in this case, a measure of volume. Inside this square excavation, **stratigraphy**, the study of layers of soil, is a crucial consideration. Stratigraphic data assist archaeologists in putting the archaeological record into context; the data provide a relative way to date the site and its contents and can provide some contextual clues about cultural and natural formation processes that occurred after the site was abandoned. The next decision is how deep each excavated level will be since the excavation is in three dimensions—length, width, and depth. Some archaeologists elect to tie the depth of each level to the natural strata of the site with each layer representing a level. Other archaeologists select an arbitrary strata depth such as 10 or 20 centimeters regardless of the stratigraphic layers. As excavating proceeds, the material removed is sorted using a screen to recover artifacts, and samples are often collected for laboratory analyses. When excavators reach the bottom of a natural or arbitrary strata level, several things occur. First, the archaeologist typically takes measurements of the depth of excavation across the entire square. The archaeologist then draws sketches of the excavated layer and its stratigraphic profile, and photographs the entire unit, the stratigraphic profile, and important characteristics of the soil to document the stratigraphy. This process continues until the archaeologists have gathered all the information they can from the unit, encounter something unexpected (such as the water table), or come to the end of the project. Before the unit is backfilled, they take high-quality photographs and draw sketches of it.

Spotlight on an Anthropologist: Justin Dunnavant



Justin Dunnavant
Photo by: Susan Urmy

Dr. Justin Dunnavant is an archaeologist and assistant professor at UCLA. He conducts research in the Caribbean, exploring the connection between ecology and enslavement. He helps lead an important example of collaborative community-based archaeology in St. Croix. The project explores the lives of enslaved Africans on Estate Little Princess, am 18th century sugar plantation, and also engages with the local community, providing them space to participate in the interpretation and preservation of the site in their own terms, and also training local students in archaeological methods and more.

Additionally, Dr. Dunnavant is an AAUS Scientific SCUBA Diver who employs underwater archaeology techniques to tackle similar questions about the past. These skills enable him to document heritage sites beneath the ocean surface, including shipwrecks associated with the Middle Passage. Here too Dr. Dunnavant's work involves community outreach and capacity building, through the Junior Scientists in the Sea program, which certified young Crucians as Open Water SCUBA divers and provided training in environmental and heritage documentation.

These exciting projects have drawn attention from shows on Netflix and Hulu, and garnered Dr. Dunnavant numerous awards and honors, including being named a National Geographic Emerging Explorer. He is also co-founder of the Society of Black Archaeologists.

Archaeological Dating Methods

Establishing the age of cultural objects is an important element of archaeological research. Determining the age of both a site and the artifacts found within is key to understanding how human cultures developed and changed over time. Other areas of science,

such as paleontology and geology, also use the same dating techniques to understand animal and plant species in the ancient past and how the earth and animal species evolved over time.

Relative Dating

The earliest dating methods utilized the principles of **relative dating**, developed in geology. This method places objects or events in the order in which they occurred and establishes if something is younger or older than other things at a site. What a relative dating technique will never do, however, is provide an exact dating for an object or event! Geologists developed this technique by observing exposed cliffsides in canyons and noting the layers of different types of stone that they called strata (stratum in the singular). It was hypothesized that the strata at the bottom were older than the strata higher up; this became known as the **law of superposition**. According to the law of superposition, not just geological layers but also the objects found within them can be assigned *relative ages* based on the assumption that objects in deeper layers are older than objects in layers above. The application of the law of superposition to archaeological fieldwork is sometimes called stratigraphic superposition. This method assumes that any cultural or natural artifact that is found within a stratum, or that cuts across two or more strata in a cross-cutting relationship, is younger than the stratum itself, as each layer would have taken a long time to form and, unless disturbed, would have remained stable for a very long time. Examples of forces that might cause disturbances in strata include natural forces such as volcanos or floods and the intervention of humans, animals, or plants. If you have ever seen pictures of, or visited the Grand Canyon (Figure 5) in person the effect of these natural forces and the subsequent stratigraphic layering can be easily seen!



Figure 5: “Grand Canyon layers” by James Downie is licensed under CC BY-NC-ND 2.0

The law of superposition was first proposed in 1669 by the Danish scientist Nicolas Steno. Some of the first applications of this law by scholars provided ages for megafauna (large animals, most commonly mammals) and dinosaur bones based on their positions in the earth. It was determined that the mammalian megafauna and the dinosaur bones had been deposited tens of thousands of years apart, with the dinosaur remains being much older. These first indications of the true age of fossil remains suggested a revolutionary new understanding of the scale of geological time.

It was eventually determined that if a specific set and sequence of strata is noted in several sites and over a large enough area, it can be assumed that the ages will be the same for the same strata at different locations in the area. This insight enabled geologists and archaeologists to use the structures of soils and rocks to date phenomena noted throughout a region based on their relative positions. Archaeologists call this method **archaeological stratification**, and they look for stratified layers of artifacts to determine human cultural contexts. Stratigraphic layers found below cultural layers provide a basis for determining age, with layers above assumed to be more recent than those below (see Figure 6).



Figure 6: “Archaeological stratigraphy at Eland’s Bay Cave, South Africa” by gbaku is licensed under CC BY-SA 2.0.

Another method of relative dating utilized by archaeologists relies on **typological sequences**. Archaeological typologies compare created objects to other objects of similar appearance with the goal of determining how they are related. This method is employed by many subdisciplines of archaeology to understand the relationships between common objects. For example, typological sequencing is often conducted on spearpoints created by Indigenous peoples by comparing the types of points found at different locations and analyzing how they changed over time based on their relative positions in an archaeological site. Typological sequencing can also be done through the process of seriation. **Seriation** is a relative dating method in which artifacts are placed in chronological order once they are determined to be of the same culture. An English Egyptologist, Flinders Petrie introduced seriation in the 19th century. He developed the method to date burials he was uncovering that contained no evidence of their dates and could not be sequenced through stratigraphy. To address the problem, he developed a system of dating based on pottery. This dating technique using seriation is still very much practiced today, as can be seen in the seriation below of Moche Stirrup-Spout bottles (Figure 7).

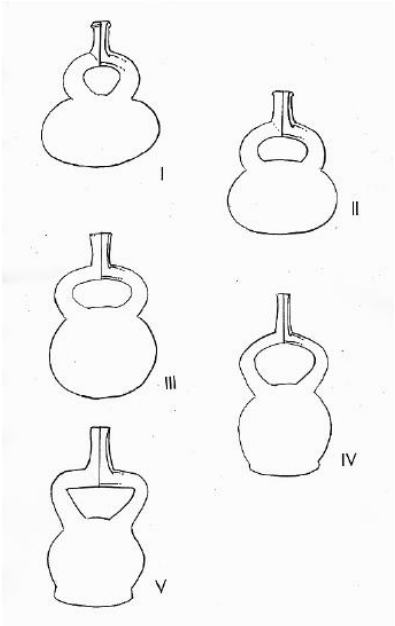


Figure 7: “Five-Phase Seriation of Moche Stirrup-Spout Bottle” by Siyajkak at Japanese Wikipedia is licensed under CC BY-SA 3.0.

Typological sequences of pottery, stone tools, and other objects that survive in archaeological sites are not only used to provide dating estimates. They can also reveal much about changes in culture, social structure, and worldviews over time. For example, there are significant changes in stratigraphy during the agricultural age, or Neolithic period, at around 12,000 BCE. These changes include the appearance of tended soils, pollens that indicate the cultivation of specific plants, evidence of more sedentary living patterns, and the increased use of pottery as the storage of food and grain became increasingly important. Archaeological evidence

also shows a growing population and the development of a more complex cultural and economic system, which involved ownership of cattle and land and the beginning of trade. Trade activities can be determined when pottery types associated with one site appear in other nearby or distant locations. Recognizing the connections between objects used in trade can shed light on possible economic and political interrelationships between neighboring communities and settlements.

Absolute/Chronometric Dating Methods

Chronometric dating methods, also known as **absolute dating methods**, are methods of dating that rely on chemical or physical analysis of the properties of archaeological objects to provide a specific date or date range for the object. Using chronometric methods, archaeologists can date objects to a range that is more precise than can be achieved via relative dating methods. **Radiocarbon dating**, which uses the radioactive isotope carbon-14 (14C), is the most common method used to date organic materials. Once a living organism dies, the carbon within it begins to decay at a known rate. The amount of the remaining residual carbon can be measured to determine, within a margin of error of 50 years, when the organism died. The method is only valid for samples of *organic tissue* between 300 and 50,000 years old.

Other kinds of absolute dating systems can measure the atomic decay of uranium (**Uranium–uranium dating**) or the decay of potassium into argon (**potassium-argon dating**), and can be used to date nonorganic materials such as rocks. The rates of decay of radioactive materials are known and can be measured. The radioactive decay clock begins when the elements are first created, and this decay can be measured to determine when the objects were created and/or used in the past. Volcanic materials are particularly useful for dating sites because volcanoes deposit lava and ash over wide areas, and all the material from an eruption will have a similar chemical signature. Once the ash is dated, cultural materials can also be dated based on their position relative to the ash deposit.

The technique of **dendrochronology** relies on measuring tree rings (Figure 8) to determine the age of ancient structures or dwellings that are made of wood. Tree rings develop annually and vary in width depending on the quantity of nutrients and water available in a specific year. Cross dating is accomplished by matching patterns of wide and narrow rings between core samples taken from similar trees in different locations. This information can then be applied to date archaeological remains that contain wood, such as posts and beams. Dendrochronology has been used at the Pueblo Bonita archaeological site in Chaco Canyon, New Mexico, to help date house structures that were occupied by the Pueblo people between 800 and 1150 CE. The Laboratory of Tree-Ring Research, based in Tucson, is the world's oldest dendrochronology lab. Go on a tree-ring expedition (https://openstax.org/r/tree-ring)!

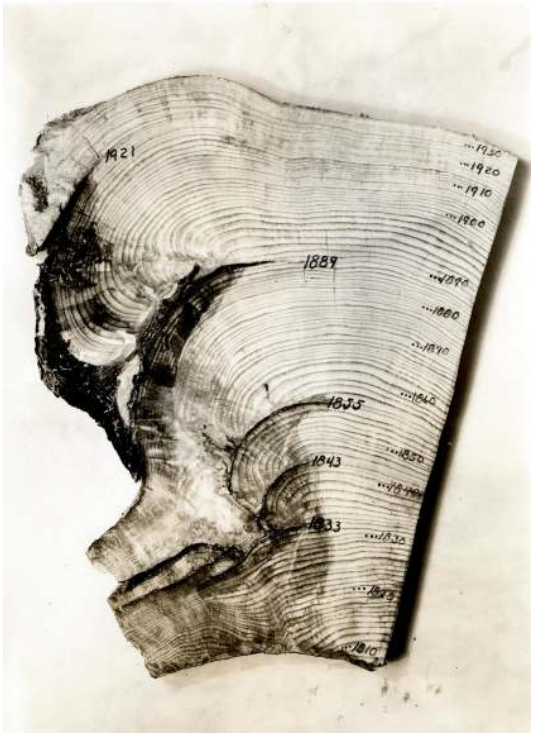


Figure 8: Ponderosa pine stump section showing tree growth rings and fire scars from 1810-1930. Round Lake Unit. Klamath Falls, Oregon." by USDA Forest Service is marked with Public Domain Mark 1.0.

The most effective and ideal approach for dating archaeological objects is to apply a variety of dating techniques, assuming that funding can be found! Applying more than one dating method allows the archaeologist to triangulate or correlate data. Correlating multiple methods of dating provides strong evidence for the specific time period of an archaeological site.

Terms You Should Know

Context

Research Design

Cultural Resource Management

Elements of research design

Implementation Phase

Non-intrusive tools

Artifacts

Geographic information system (GIS)

Folsom point

Aerial reconnaissance

Earthworks

LiDAR

Space Archaeology

Ground reconnaissance

Subsurface detection tools

Remote sensing

Ground Penetrating Radar

Shovel test pits

Stratigraphy

Relative dating

Law of superposition

Archaeological stratification

Typological sequences

Seriation

Absolute dating methods

Radiocarbon dating

Uranium–uranium dating

Potassium-argon dating

Dendrochronology

Study Questions

1. Why are assumptions made about the formation of stratigraphy important for archaeologists?
2. What are the differences between absolute and relative dating techniques?
3. How have technological changes altered the accessibility and affordability of aerial reconnaissance in archaeology?

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3.3: Collections, Ethics and Ownership

Learning Objectives

By the end of this chapter, you will be able to:

- Identify and explain the issues and needs of archival collections.
- Identify and explain the issues and needs of three-dimensional collections.
- Describe current controversies regarding ownership of anthropological artifacts and human remains.
- Recall significant legislation pertaining to questions of ownership.

Not all anthropological research is done in the field. There is much to be learned from the collections of manuscripts and artifacts housed in universities and museums. These collections make it possible for anthropologists to study human cultures within the setting of special research laboratories that have been designed to preserve and organize materials collected and interpreted by scholars of the past.

Archives

Archival collections contain published, re-created, or original manuscripts that are deemed significant enough to be placed in conditions designed to preserve them against damage or loss. Such collections may contain correspondence, maps, drawings, original drafts of books, rare books, or other papers and media that need special care. Photographs are a major resource in many archives, and they need special handling. Preservation policies of archival collections include practices such as keeping resources out of direct sunlight and away from moisture.

While archives offer researchers a great range of valuable resources, they typically impose rather strict policies on those wishing to access these resources. Researchers typically must wear gloves when handling materials to prevent damage from the oils and acidity of human skin. Normally, archival collections do not circulate (i.e., cannot be removed from the host site), and researchers may have to apply for permission to enter the site or use any information. Archives may charge varying rates to make copies of material or to use images of the resources in their collection for publication. To access some archives, researchers must plan ahead by scheduling a time to visit and making previous arrangements to access specific collections. Some sites do not allow researchers to scan materials using flatbed scanners, instead stipulating the use of non-flash photography or overhead scanning. Some archives do not allow the patron to scan, photograph, or copy a manuscript in any way, with all arrangements for copies and reproductions having to go through the archive's staff.

The first step in archival research is typically to review a list or similar finding aid that indexes and describes the resources available in a collection. These descriptive aids can help researchers determine whether a collection contains resources that fit their needs and can make a visit to a selected archive more efficient and worthwhile. Finding aids have become so well constructed that they may provide researchers with enough information to enable the researcher to request copies of specific materials and avoid the effort and expense of traveling to the archive in person. Most archives offer downloadable finding aids of their most important collections on their websites, and there may be additional printed finding aids available on request. Most archives will make requested copies for a moderate fee and will mail or email researchers a packet of the reproduced materials. The cost of procuring such copies is almost always much less than the cost of traveling to an archive site and paying for housing and meals. However, if a collection is potentially full of material important to a research project, it may be better to visit in person.

Three-Dimensional Collections

Three-dimensional collections of objects such as basketry and pottery are normally housed separately from manuscript collections. Such collections may host tens of thousands of individual cultural objects. These collections typically require much more care and management than manuscript materials. Extensive planning goes into determining the best way to contain and store each type of object in order to slow deterioration over time, with special attention paid to both the temperature and the moisture levels in storage areas. Handwoven baskets will be supported so that their fibers are not under stress, and all organic objects will have been previously frozen, perhaps several times, to destroy any insects that may live in the fibers. Collections of animal and human remains utilized by biological anthropologists or archaeologists must be properly stored and controlled against further degradation by reducing temperatures and maintaining moisture controls. Some very ancient organic collections may need to be chemically stabilized so they do not degrade. Objects made from organic materials—such as wooden canoes, basketry, reed sandals, or human remains—are particularly prone to degradation. Organic artifacts that have been sealed away from contact with

the air for centuries, such as the famous wreck of Robert de LaSalle's ship the *La Belle* (Figure 1) in 1686 will degrade fast once exposed to the air, so they may be kept permanently frozen or preserved with an ammonium glycol solution to stabilize decay.



Figure 1: "The ongoing reconstruction of the French ship La Belle at the Bullock Texas State History Museum in Austin, Texas, United States" by Larry D. Moore is licensed under CC BY 4.0, Wikimedia Commons.

All objects in collections storage must be well organized to make them accessible for further research opportunities. Collection materials that have been used to make claims about human experience or evolution must remain accessible to future researchers in case there are challenges or additional questions about their findings. In addition, if an anthropologist who donated and is responsible for overseeing a collection at one institution should die or move to another research institute, there needs to be a plan for the period of retention for the collection, or the time that the collection will remain in the archive. Many biological and cultural collections have been preserved in repositories since the day they were collected, with no plans to ever remove them from an archive. There are collections in the Smithsonian Institution that have been there since the institution was built in the 1850s. These collections continue to grow at museums and universities around the world.

In the early 20th century, many museums adopted the practices of painting objects with lacquer and spraying organic collections with pesticides such as DDT to prevent insect damage. These solutions were proven to ultimately be harmful. Lacquer tends to alter the color and chemical structure of objects and is thus not a good preservation material, and DDT and other pesticides pose health threats to humans. Both museum staff and tribal members who receive repatriated objects and human remains are very concerned about the hazards these chemicals pose to humans—and to the environment, if they should be reburied. Efforts to clean many collections are underway.

Ethics and Ownership

A question being asked by both anthropologists and subjects of research today is who owns the objects housed in material collections. In the past, anthropologists or their host institutions assumed ownership of anything they collected, along with the right to publish images of materials and sign over ownership of the objects to collections repositories. In recent decades, Indigenous communities and other subjects of research have begun asking questions about whether such objects really should be considered the property of these repositories. Many of these artifacts were not even collected by scientists but rather donated or sold by collectors, some of whom removed the artifacts from burial sites. Artifact hunting is a common cultural practice in many countries and laws to address this problem vary from one place to another.

Questions of ownership become particularly pressing when the objects in question are human remains. Until the 1960s, Native Americans in the United States had little or no power to repatriate their ancestors. **Repatriation** is the process of restoring human remains and/or objects of religious or cultural importance to the peoples from whom they originated. In the United States, repatriation is executed under the **Native American Graves Protection and Repatriation Act** (NAGPRA), passed into law in 1990. Prior to 1990, Indigenous peoples in the United States had no legal means to claim return of any of the millions of human remains that had been collected and placed in museums and archaeological collections since the 19th century. With this legislation institutions that receive Federal funds and Federal agencies must repatriate human remains and certain other cultural artifacts to lineal descendants, Indian Tribes, and Native Hawaiian organizations.

In 2017, after two years of planning and coordination, the U.S. Army Garrison Presidio of Monterey and the Army National Military Cemeteries hosted a ceremony with four Native American tribal nations in attendance (Figure 2). Directly a result of

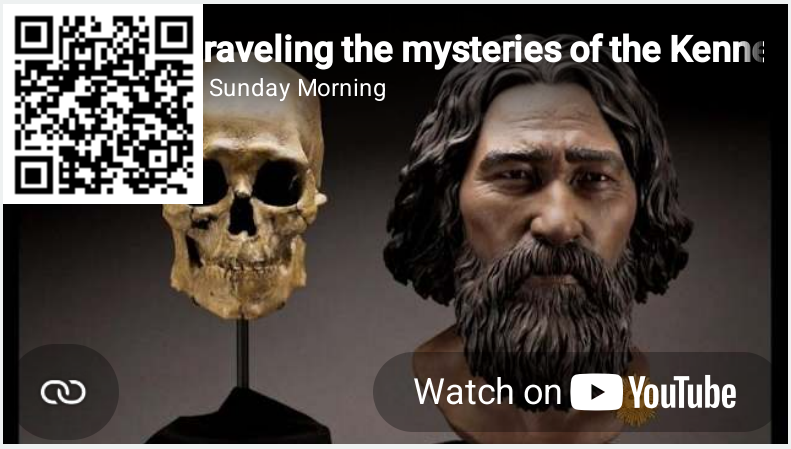
NAGPRA legislation, 17 Native American remains and around 300 funerary objects were returned for reburial. These peoples and cultural artifacts had been collected for several decades, between 1910 and 1985. This represented the first instance in Army history where repatriation and burial of Native American remains occurred within a military post cemetery (Quimby 2018).



Figure 2: "Native American Repatriation & Burial at Presidio of Monterey 2" by Presidio of Monterey: DLIFLC & USAG is marked with Public Domain Mark 1.0.

From the start, however, NAGPRA had many problems that arose, including the requirement to "prove" affiliation with living Indigenous tribes for these human remains to be returned. One of the most famous examples of this was the around 8,500 year old remains of a skeleton found in Kennewick, Washington in the summer of 1996 which came to be known by scientists as "Kennewick Man" and Native tribes as "The Ancient One." For several decades who should have access to and rights over the skeleton under NAGPRA regulations was adjudicated in courts with some scientists saying the remains were not closely related to living Native American tribes, thus ensuring that NAGPRA did not apply. In 2015 DNA evidence was shown to support the conclusion that the remains were linked to modern day Native people's such as the Confederated Tribes of the Colville Reservation. Ultimately The Ancient One (Kennewick Man) was returned and buried on February 18, 2017 (Ghose 2017). Attempts to revise the NAGPRA law are ongoing, including announcement of an attempt by the Department of the Interior to consult with Tribal and Native Hawaiian community leaders during the revision process in July of 2021 (U.S. Department of the Interior 2022).

Kennewick Man



One of the best known recent instances of the repatriation of human remains is that of 'Kennewick Man,' an almost 9000-year-old skeleton discovered in Washington State. This video provides some background to the discovery and the ensuing legal

> battle and controversy surrounding the skeleton's repatriation and reburial, which took place in 2017.

Another important piece of legislature is the **National Historic Preservation Act** (NHPA), passed in 1966. The act was passed to ensure that federal agencies would identify and take actions to protect and preserve the nation's historic sites and locations. It especially impacted Indigenous communities and their cultural and historical resources. Section 106 of the NHPA requires that federal agencies follow a formal review process before undertaking any type of development project (36 CFR 800). This process includes identifying what the actual undertaking is, such as the development of a road or other major capital project. Once this is established, the agency must make a good-faith effort to identify any historic resources (50+ years of age) in the area and determine if they are eligible for protection under the NHPA. After this identification measure is completed, the agency must initiate consultation with the **state historic preservation officer** (**SHPO**) or **tribal historic preservation officer** (**THPO**) and other interested groups and individuals. This step can include a variety of meetings or activities and a period of notification that a project is going to commence, during which feedback is requested by the lead federal agency. Public meetings might be held, with speakers selected to introduce and describe the project. During the consultation period, correspondence and feedback is welcomed from concerned tribes, institutions, or individuals. Tribes and other community groups with an interest in any cultural objects likely to be found on the site are required to be consulted. Successful consultation often takes place during the earliest planning stages of a project. Lack of early consultation can lead to a failure to identify historic resources of cultural and religious importance. The process places the burden of determining the potential effects of the project on the federal agency, according to three established categories: no potential to effect, no adverse effect, and adverse effect. The agency must then seek concurrence from appropriate SHPOs and THPOs and potentially other consulting parties. If there is an adverse effect, the agency, the SHPO and/or THPO, and other consulting parties will negotiate mitigation terms and solidify them into a memorandum of agreement to ensure completion of the agreed-upon mitigation measures. In most cases, Native groups do not believe that archaeological excavations alone are an appropriate mitigation measure, but each community has its own interpretation of what is appropriate.

Generally, anytime a road is built or a building is constructed, there needs to be a section 106 review of the project because of the likelihood of encountering Native American cultural sites in almost all locations in the United States. Through the consultation process and cooperation between SHPOs and THPOs, decisions are made as to the status and disposition of any cultural objects recovered from cultural sites. Tribes typically advocate for the non-disturbance of human remains and the return of cultural objects to the concerned tribes. The NHPA is not perfect, as it does not completely halt construction that will destroy a cultural site and does not apply to collections placed in repositories before 1966.

In the early 20th century, the United States made it illegal for non-scientists to remove artifacts from archaeological sites on federal lands under a law called the American Antiquities Act (1906). More recently, NAGPRA made it possible for tribes to repatriate objects covered under the act, such as human remains and funerary objects. Under this law, more than 20,000 sets of remains had been repatriated as of 2010, but millions of artifacts and sets of additional remains are still in repositories. In addition, there are human remains and funerary objects of US origin in collections worldwide that are not subject to NAGPRA repatriation.

One problem surrounding repatriation is that many artifacts and remains lack clear **provenance**, or detailed information about where they were found. Lack of clear provenance also limits an object's usefulness to researchers. In many cases, wide regions are provided as the origin of an artifact, making it unclear which specific culture it relates to. Objects that, for example, are labeled as coming from "New York" may have been created by members of dozens of tribes or groups of tribes. In general, the more specific a provenance is, the better. Narrowing an object down to Buffalo, New York, reduces its possible tribal sources to just a few. Objects that have too broad of a context are nearly impossible to repatriate because repatriation is supposed to return an object or human remains to the original tribe. In 2010, NAGPRA was expanded to allow for groups of tribes to repatriate objects of wide regional association back to a previously agreed-upon reburial or repatriation location. Under this expanded version of the law, a greater number of objects and human remains will be able to be returned to their communities.

Concerns about ownership have also been raised regarding the ethnological and ethnographic research collected in millions of documents in hundreds of research collections around the world. Some Indigenous communities have raised concerns that this material represents their ancestral intellectual knowledge and that it was taken from them without full disclosure of how it would be used. Many anthropologists published books and/or made tenure at their universities based on such research. Meanwhile, little was done with the information to help the peoples it described, who were struggling under political and legal pressures to assimilate. In some cases, Indigenous groups have implemented research projects utilizing these manuscript collections that have the explicit goal of helping their people with cultural recovery efforts.

One example of Indigenous peoples utilizing archive materials to their advantage is offered by Oregon's Coquille Indian Tribe, which made use of archival documents to successfully restore their tribe to federal recognition in 1989 after the tribe was declared "terminated" by the federal government in 1954. Their restoration bid was made difficult by the fact that the records of their culture were collected in faraway archives. Essential to the tribe's success was George Wasson Jr., who was aided by Leonard Frachtenberg. Wasson Jr. designed and implemented an effort to collect copies of anthropological manuscripts pertinent to the Coquille tribe from the Smithsonian Institution.

In 1995, 1997, and 2006, the Southwest Oregon Research Project—a project initiated by the Coquille Indian Tribe, University of Oregon anthropologists, and students from western Oregon tribes—collected 150,000 pages of documents about the tribes of western Oregon from the Smithsonian Institution and the National Archives. These materials have since become a major collection at the University of Oregon's Knight Library Archives, special collections division, and additional copies have been given to 17 regional tribes.

These projects are examples of the repatriation of intellectual knowledge to the tribes that the information was collected from. Many libraries now have policies that allow Indigenous groups to repatriate their intellectual knowledge in the form of copies of collection materials for little or no cost. Recordings of songs represent a particularly sensitive and special type of cultural artifact. Archives have historically not been very attentive to the concerns of Indigenous people regarding their collections. For more information, consult the Protocols for Native American Archival Materials.

Terms You Should Know

Archival collections

Three-dimensional collections

Repatriation

Native American Graves Protection and Repatriation Act

National Historic Preservation Act of 1966

State historic preservation officer

Tribal historic preservation officer

Provenance

Study Questions

1. What is NAGRA? Can you explain it's importance to Native peoples in the United States.
2. What are some limitations with implementing NAGPRA legislation?
3. Who was Kennewick Man and what was the final outcome of this case?

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CHAPTER OVERVIEW

4: Linguistic Anthropology

4.1: The Mechanics of Human Language

4.2: Language and Culture, Language and Context, Language and Thought

4.3: Sociolinguistics- Language and Social Status

4.4: Language Change, Language Death, Language Reclamation

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4.1: The Mechanics of Human Language

Learning Objectives

By the end of this chapter you should be able to:

- Describe the components of language studied by linguistic anthropologists
- Discuss some of the characteristics of human language, and how they compare to the characteristics of culture
- List some design features of language and describe how they distinguish human language from the communication of other primates

Linguistics is the scientific study of human language. That definition is short, but it's not exactly simple, is it? How do we study language scientifically? And what even is language?

Imagine you're an alien, you've just arrived on Earth, and you need to figure out how to understand the language used in the particular earthling community that you've landed in. What kinds of things do you need to figure out? One of the first things you'll need to know about that language is what counts as talking. Is this language signed or vocalized? In other words, what is the **language modality**? Many human languages are vocalized (or "spoken"). In this modality, language users make sounds with their larynx, tongue, teeth and lips, and receive sounds with their ears. Other human languages are signed. Language users make signs with their fingers, hands, wrists and forearms, and receive signs by sight or by touch. Even though they have very different modalities, sign and vocal languages share many properties in their grammars. In this section, we'll try to reserve the words *speaking* and *speech* for vocal languages, and refer to language users when we're talking about languages of any modality. In other places you might also see *languaging* used as a verb to mean "using language in any modality".



Figure 1. Cookies

Once you've figured out the modality, what next? You probably need to segment the stream of auditory or visual information into meaningful units. By observing carefully, you might be able to figure out that a particular sequence of sounds or gestures recurs in this language, and that some consistent meaning is associated with that sequence. For example, maybe you've noticed that the language users you've encountered make the sounds "cookie" as they're offering you a round, sweet, delicious baked good. Or maybe you've noticed that when that word has a *z* sound at the end of it, *cookies*, you're being offered more than one of them!

The part of the grammar that links up these forms with meanings is the mental lexicon. It's a bit like a dictionary in your mind. Knowing a word in a language involves recognizing its form – the combination of signs or sounds or written symbols, and its meaning.

> For the majority of words in the world's languages, the link between form and meaning is arbitrary.

For example, the English word for this thing is *pumpkin* and the Nishnaabemwin word is *kosmaan*. There's nothing inherently orange or round or vegetabley about either of those word forms: the pairing of that meaning to that form is arbitrary in each language. (But there are words whose form has an iconic, less arbitrary relationship their meaning; for instance onomatopoeias like 'buzz')



Figure 2. Pumpkin

Suppose you've figured out that cookies are delicious and you want to ask your earthling hosts for more of them. To do that, you need to figure out how to control the muscles of your mouth, tongue, and lips to speak the word for cookie, or how to use your hands, fingers, wrists and forearms to sign the word. In other words, you need to know something about the articulatory phonetics of the language. This brings up an important point about grammar: when we know a language fluently, a lot of our grammatical knowledge is unconscious, or implicit. For the languages that you know, your knowledge of the lexicon is probably fairly conscious or explicit, and probably also some of your knowledge about your language's morphology: that's the combinations of meaningful pieces inside words (like how if you want more than one cookie you say *cookies* with a *z*). But you're probably not as conscious of things like how you use your articulators to make the sounds *k* or *z*.

Our implicit knowledge of language also includes phonology, rules about the sounds or signs of the language (e.g. which ones are meaningful, how they can be combined, how they change in different contexts). Syntax is the part of your **mental grammar** that knows how words can or can't be combined to make phrases and sentences, much of which is implicit. Syntax works hand in hand with semantics to allow the grammar to calculate the meanings of these phrases. And the pragmatics part of the mental grammar can help you to know what meanings arise in different contexts. For example, "I have some news," could be interpreted as good news or bad news depending on the context.

All of these things are parts of the grammar: the things we know when we know a language. But a lot of this knowledge is implicit, and the thing about implicit knowledge is that it's hard to observe. One of the most important jobs we're doing in this section is trying to be explicit about what mental grammar is like, and about what kinds of evidence we can use to figure that out.

The Language Data Available for Study (phonology, morphology, syntax, semantics, pragmatics)

Phonology

Phonology is the use of sounds (or signs! the study of phonology has been extended to cover all of the ways language is produced) to encode messages within a spoken human language. Babies are born with the capacity to speak any language because they can make sounds and hear differences in sounds that adults would not be able to do. This is what parents hear as baby talk. The infant is trying out all of the different sounds they can produce. As the infant begins to learn the language from their parents, they begin to narrow the range of sounds they produce to ones common to the language they are learning, and by the age of 5, they no longer have the vocal range they had previously. For example, a common sound that is used in Indian language is /dh/. To any native Indian there is a huge difference between /dh/ and /d/, but for people like me who cannot speak Hindi, not only can we not hear the difference, but it is very difficult to even attempt to produce this sound.



Fig 3. Babies are linguisitic geniuses, able to learn any language and produce it's phonology. But as we grow and become accustomed to the patterns of our native language, this capacity goes away! "baby talk" by keitamiyoshi is licensed under CC BY 2.0.

A phoneme is the smallest phonetic unit in a language that is capable of conveying a distinction in meaning. For example, in English we can tell that pail and tail are different words, so /p/ and /t/ are phonemes. Two words differing in only one sound, like pail and tail, are called a **minimal pair**. The International Phonetic Association created the International Phonetic Alphabet (IPA), a collection of standardized representations of the sounds of spoken language.

Morphology

In linguistics, **morphology** is the study of how words are put together. For example, the word cats is put together from two parts: cat, which refers to a particular type of furry four-legged animal, and -s, which indicates that there's more than one such animal.

Most words in English have only one or two pieces in them, but some technical words can have many more, like non-renewability, which has at least five (non-, re-, new, -abil, and -ity). In many languages, however, words are often made up of many parts, and a single word can express a meaning that would require a whole sentence in English. For example, in the Harvaqtuurmiutut variety of Inuktitut, the word *iglujjualiulauqtuq* has 5 pieces, and expresses a meaning that could be translated by the full English sentence "They (sg) made a big house." (iglu = house, –jjua = big, –liu = make, –lauq = distant past, –tuq = declarative; this example is from a 2010 paper by Compton and Pittman).

Not all combinations of pieces are possible, however. To go back to the simple example of cat and -s, in English we can't put those two pieces in the opposite order and still get the same meeting—scat is a word in English, but it doesn't mean "more than one cat", and it doesn't have the pieces cat and -s in it, instead it's an entirely different word. One of the things we know when we know a language is how to create new words out of existing pieces, and how to understand new words that other people use as long as the new words are made of pieces we've encountered before. We also know what combinations of pieces are not possible.

Syntax

Syntax is the study of rules and principles for constructing sentences in natural languages. It works by demonstrating the relationship between the words. For example, the order of words in the English sentence "The cat chased the dog" cannot be changed around or its meaning would change: "The dog chased the cat" (something entirely different) or "Dog cat the chased the" (something meaningless). English relies on word order much more than many other languages do because it has so few morphemes that can do the same type of work. For example, in our sentence above, the phrase "the cat" must go first in the sentence, because that is how English indicates the subject of the sentence, the one that does the action of the verb. The phrase "the dog" must go after the verb, indicating that it is the dog that received the action of the verb, or is its object. Other syntactic rules tell us that we must put "the" before its noun, and "-ed" at the end of the verb to indicate past tense. In Russian, the same sentence has fewer restrictions on word order because it has bound morphemes that are attached to the nouns to indicate which one is the subject and which is the object of the verb. So the sentence *koshka* [chased] *sobaku*, which means "the cat chased the dog," has the same meaning no matter how we order the words, because the -a on the end of *koshka* means the cat is the subject, and the -u on the end of *sobaku* means the dog is the object.

Semantics

Semantics is the study of meaning. The whole purpose of language is to communicate meaning about the world around us so the study of meaning is of great interest to linguists and anthropologists alike. The field of semantics focuses on the study of the meanings of words and other morphemes as well as how the meanings of phrases and sentences derive from them.

For example, the words *ode'imin* and *strawberry* **mean** the same thing. *ode'imin* is an Ojibwe (Anishinaabemowin) word, and strawberry is an English word. But what does it mean for them to "mean the same thing"? What we want to figure out is something like this: what is the knowledge about the word *ode'imin* that an Ojibwe speaker stores in their head, such that when they utter the word, they know it points to that juicy red fruit with small seeds on the surface (Figure 4)? Similarly, what is the knowledge about the word *strawberry* that English speakers have in their head, such that they know that this word in English points to this same fruit? Both the word *ode'imin* and the word *strawberry* carry some sort of content, and this information allows for Ojibwe and English language users to say "Yes, that is an ode'imin/strawberry" or "No, that is not an ode'imin/strawberry" for any given object. In this way, the two words "mean the same thing".

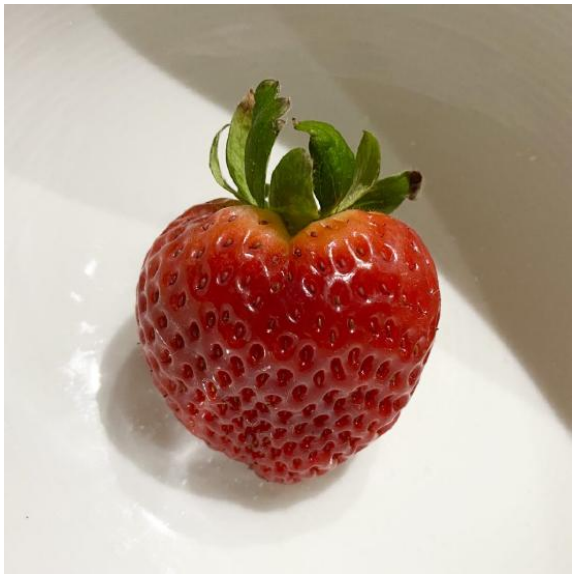


Figure 4. A Strawberry/ode'imin

Pragmatics

The study of **pragmatics** looks at the social and cultural aspects of meaning and how the context of an interaction affects it. One aspect of pragmatics is the speech act. Any time we speak we are performing an act, but what we are actually trying to accomplish with that utterance may not be interpretable through the dictionary meanings of the words themselves. For example, if you are at the dinner table and say, "Can you pass the salt?" you are probably not asking if the other person is capable of giving you the salt. Often the more polite an utterance, the less direct it will be syntactically. For example, rather than using the imperative syntactic form and saying "Give me a cup of coffee," it is considered more polite to use the question form and say "Would you please give me a cup of coffee?"

Language and Cultural Relativism: There's no such thing as bad language!

The previous section was a very quick tour of some of the parts of the mental grammar. We'll be discovering a lot more about grammar throughout this section. Notice that we're using the term *grammar* a little differently from how you might have encountered it before. Maybe your experience of grammar is as a textbook or style guide with a set of rules in it, rules that lead to consequences if you break them — you'll lose points on your essay or get corrected with a red pen. What we're most interested in is the mental grammar: the system in your mind that allows you to understand and be understood by others who know your language. Every human language has a grammar: that's how the users of each language understand each other, but the mental grammar of any two speakers, even if they are both fluent, will not be exactly the same.

This is a really important idea. One way that people sometimes express racist, colonialist, and ableist ideas is to deny the validity of a language by claiming that it "has no grammar". But the truth is that **all languages have grammar**. All languages have a system for forming words, a way of organizing words into sentences, a systematic way of assigning meanings. Even languages that don't have alphabets or dictionaries or published books of rules have users who understand each other; that means they have a shared system, a shared grammar. Using linguists' techniques for making scientific observations about language, we can study these grammars.

The other important thing to keep in mind is that no grammar is better than any others. Maybe you've heard someone say, "Oh, I don't speak real Italian, just a dialect," implying that the dialect is not as good as so-called "real Italian." Or maybe you've heard someone say that Québec French is just sloppy; it's not as good as the French they speak in France. Or maybe you've heard someone say that nobody in Newfoundland can speak proper English, or nobody in Texas speaks proper English, or maybe even nobody in North America speaks proper English and the only good English is the Queen's English that they speak in England.

> From a linguist's point of view, **all languages and dialects are equally valid**!

There's no linguistic way to say that one grammar is better or worse than another. This is part of what it means to study grammar from a scientific approach: scientists don't rate or rank the things they study. Ichthyologists don't rank fish to say which species is more correct at being a fish, and astronomers don't argue over which galaxy is more posh. In the same way, doing linguistics does not involve assigning a value to any language or variety or dialect. We need to acknowledge, though, that many people, including linguists, do attribute value to particular dialects or varieties, and use social judgments about language to create and reinforce hierarchies of power, privilege and status.

One of the most fundamental properties of grammar is creativity. One obvious sense of the word *creative* has to do with artistic creativity, and it's true that we can use language to create beautiful works of literature. But that's not the only way that human language is creative. The sense of creativity that we're most interested in in this book is better known as **productivity**. Every language can create an infinite number of possible new words and sentences. Every language has a finite set of words in its vocabulary – maybe a very large set, but still finite. And every language has a small, finite set of principles for combining those words. But every language can use that finite vocabulary and that finite set of principles to produce an infinite number of sentences, new sentences every single day.

A consequence of the fact that grammar is productive is that **languages are always changing**. Have you heard your teachers or your parents say something like, "Kids these days are ruining English! They should learn to speak properly!" Or if you grew up speaking Mandarin, maybe you heard the same thing, "Those teenagers are ruining Mandarin! They should learn to speak properly!" For as long as there has been language, older people have complained that younger people are ruining it. Some countries, like France and Germany, even have official institutes that make rules about what words and sentence structures are allowed in the language and which ones are forbidden. But the truth is every language changes over time. Languages are used by humans, and as humans grow and change, and as our society changes, our language changes along with it. Some language change

is easy to observe in the lexicon: we need to introduce new words for new concepts and new inventions. For example, the verb *google* didn't exist when I was an undergraduate student, and now googling is something I do nearly every day. Languages also change in their phonetics and phonology, and in their syntax, morphology and semantics.

The Design Features of Language (and comparison with communication of other primates)

All animals communicate and many animals make meaningful sounds. Others use visual signs, such as facial expressions, color changes, body postures and movements, light (fireflies), or electricity (some eels). Many use the sense of smell and the sense of touch. Most animals use a combination of two or more of these systems in their communication. But their systems are closed systems in that they cannot create new meanings or messages. Human communication is an open system that can easily create new meanings and messages. Most animal communication systems are basically innate; they do not have to learn them, but some species' systems entail a certain amount of learning. For example, songbirds have the innate ability to produce the typical songs of their species, but most of them must be taught how to do it by older birds. Great apes and other primates have relatively complex systems of communication that use varying combinations of sound, body language, scent, facial expression, and touch. Their systems have therefore been referred to as a **gesture-call system**. Humans share a number of forms of this gesture-call, or non-verbal system with the great apes. Spoken language undoubtedly evolved embedded within it. All human cultures have not only verbal languages, but also non-verbal systems that are consistent with their verbal languages and cultures and vary from one culture to another.

Human language is qualitatively and quantitatively different from the communication systems of all other species of animals. Linguists have long tried to create a working definition that distinguishes it from non-human communication systems. Linguist Charles Hockett's (1963) solution was to create a hierarchical list of what he called design features, or descriptive characteristics, of the communication systems of all species, including that of humans. Human language differs from non-human communication in that it possesses all of the design features. A number of great apes, including gorillas, chimpanzees, bonobos and orangutans, have been taught human sign languages with all of the human design features. In each case, the apes have been able to communicate as humans do to an extent, but their linguistic abilities (e.g. what they communicate about) are reduced by the limited cognitive abilities that accompany their smaller brains.



Figure 5. Recent studies have shown that orangutans in the wild can produce vocalizations to communicate about the past and the future, a trait once thought to be uniquely human. Many apes have communication systems that exhibit several of the design features, but not all. “Bukit Lawang, orangutans” by Arian Zwegers is licensed under CC BY 2.0.

Hockett’s Design Features

1. A mode of communication by which messages are transmitted through a system of signs, using one or more sensory systems to transmit and interpret, such as vocal-auditory, visual, tactile, or kinesic;
2. Semanticity: the signs carry meaning for the users
3. Pragmatic function: all signs serve a useful purpose in the life of the users, from survival functions to influencing others’ behavior.
4. Interchangeability: the ability of individuals within a species to both send and receive messages. One species that lacks this feature is the honeybee. Only a female “worker bee” can perform the dance that conveys to her hive-mates the location of a newly discovered food source. Another example is the mockingbird whose songs are performed only by the males to attract a mate and mark his territory.
5. Cultural transmission: the need for some aspects of the system to be learned through interaction with others, rather than being 100 percent innate or genetically programmed.
6. Arbitrariness: the form of a sign is not inherently or logically related to its meaning; signs are symbols.
7. Discreteness: every human language is made up of a small number of meaningless discrete sounds. That is, the sounds can be isolated from each other, for purposes of study by linguists, or to be represented in a writing system.
8. Duality of patterning (two levels of combination): at the first level of patterning, these meaningless discrete sounds, called phonemes, are combined to form words and parts of words that carry meaning, or morphemes. In the second level of patterning, morphemes are recombined to form an infinite possible number of longer messages such as phrases and sentences according to a set of rules called syntax.
9. Displacement: the ability to communicate about things that are outside of the here and now made possible by the features of discreteness and duality of patterning. While other species are limited to communicating about their immediate time and place, we can talk about any time in the future or past, about any place in the universe, or even fictional places.

10. Productivity/creativity: the ability to produce and understand messages that have never been expressed before or to express new ideas. People do not speak according to prepared scripts, as if they were in a movie or a play; they create their utterances spontaneously, according to the rules of their language. It also makes possible the creation of new words and even the ability to lie.

Terms You Should Know

Gesture-call System

Linguistics

Language Modality

Mental Grammar

Minimal Pair

Morphology

Phonology

Pragmatics

Productivity

Semantics

Syntax

Study Questions

1. What are the different kinds of language data available for study? How do they connect to one another?
2. We know some characteristics that describe human language (i.e. it is always changing!). How do those characteristics compare with what we know about culture, and what do they mean for how linguistic anthropologists should study language?
3. How does human language compare to the communication systems of other primates? What does that suggest about studying the origins of human language?
4. What would language be like without any of the design features? How would it cease to work as we are used to language working?

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4.2: Language and Culture, Language and Context, Language and Thought

Learning Objectives

By the end of this chapter you should be able to:

- Discuss the cultural significance of lexical differences between languages and identify focal vocabularies you know
- Describe the concept of linguistic relativity and provide examples of how it works
- Explain how context and the cooperative principle help show how conversations work

The Importance of Human Language to Human Culture

Human language can be considered a culture's most important feature since complex human culture could not exist without language and language could not exist without culture. They are inseparable because language encodes culture and provides the means through which culture is shared and passed from one generation to the next. Humans think in language and do cultural activities using language. It surrounds our every waking and sleeping moments, although we do not usually think about its importance. For that matter, humans do not think about their immersion in culture either, much as fish, if they were endowed with intelligence, would not think much about the water that surrounds them. Without language and culture, humans would be just another great ape. Anthropologists must have skills in **linguistics** so they can learn the languages and cultures of the people they study.

All human languages are symbolic systems that make use of symbols to convey meaning. A symbol is anything that serves to refer to something else, but has a meaning that cannot be guessed because there is no obvious connection between the symbol and its referent. This feature of human language is called **arbitrariness**. For example, many cultures assign meanings to certain colors, but the meaning for a particular color may be completely different from one culture to another. Western cultures like the United States use the color black to represent death, but in China it is the color white that symbolizes death. White in the United States symbolizes purity and is used for brides' dresses, but no Chinese woman would ever wear white to her wedding. Instead, she usually wears red, the color of good luck. Words in languages are symbolic in the same way. The word *key* in English is pronounced exactly the same as the word *qui* in French, meaning "who," and *ki* in Japanese, meaning "tree." One must learn the language in order to know what any word means.

Lexical Differences among Languages

Language has endowed humans with an amazing capacity, one that to date has only been found among human beings. Ove generations, they can invent a very large store of labels for individuals and categories of things in the world (and even categories of things not in the world). Equally important, they can pass on this store of labels to their children. The **lexicon**, or vocabulary, of a language is an inventory of the items a culture talks about and has categorized in order to make sense of the world and deal with it effectively. For example, modern life is dictated for many by the need to travel by some kind of vehicle—cars, trucks, SUVs, trains, buses, etc. We therefore have thousands of words to talk about them, including types of vehicles, models, brands, or parts.

Now let's think about various groups of humans living in different parts of the world with little to no contact with each other. Each group will experience a different environment, containing its own potentially unique set of animals and plants and its own climate and geology. Each group will invent words for the things in its environment that matter to it, and we will naturally expect to find words for different things in each group. Modern languages also differ from each other in this way. Amharic has a word for hippopotamus because hippopotamuses are found in Ethiopia, but Inuktitut does not because hippopotamuses are not found (normally) in northern Canada.



Figure 1. Hippopotamus (photo by David Stanley)

We can also expect the cultures of the different groups to differ. This will result in several differences in their store of words. First, certain naturally occurring things will become more important. A group that makes pots out of clay will want a word for clay. Second, as culture develops, there will be more and more cultural artifacts, that is, objects produced by the members of the culture. Naturally the group will want words for these as well, and if they are not producing them, they will not have such words. Finally, culture results in abstractions, concepts that do not represent (physical) things in the world at all: political units, social relationships, rituals, laws, and unseen forces. These will vary a great deal in their details from group to group, and we can expect these differences to be reflected in the words that each group comes up with. Modern languages differ from each other in all of these ways. Amharic has the word *agelgil* meaning a leather-covered basket that Ethiopians traditionally used to carry prepared food when they traveled. Other languages don't have a word for this concept, nor the basket itself. Similarly, English now has the word *nerd* to refer to a particular kind of person who is fascinated with technology and lacking in social skills. This is a relatively new concept, specific to certain cultures, and there is no word for it in most languages.

The most important aspects of each culture are reflected in the lexicon of its language. Sets of words that are connected with important aspects of culture are known as **focal vocabularies**. Among the societies living in the islands of Oceania in the Pacific, fish have great economic and cultural importance. This is reflected in the rich vocabulary that describes all aspects of the fish and the environments that islanders depend on for survival. For example, in Palau there are about 1,000 fish species and Palauan fishermen knew, long before biologists existed, details about the anatomy, behavior, growth patterns and habitat of most of them—in many cases far more than modern biologists know even today. Much of fish behavior is related to the tides and the phases of the moon. Throughout Oceania, the names given to certain days of the lunar months reflect the likelihood of successful fishing. For example, in the Caroline Islands, the name for the night before the new moon is *otolol*, which means "to swarm." The name indicates that the best fishing days cluster around the new moon. In Hawai`i and Tahiti two sets of days have names containing the particle *`ole* or *`ore*; one occurs in the first quarter of the moon and the other in the third quarter. The same name is given to the prevailing wind during those phases. The words mean "nothing," because those days were considered bad for fishing as well as planting.

Finally, we can also expect the store of words to vary among the individuals *within* each group and each language. As culture develops, experts emerge, people who specialize in agriculture or pottery or music or religion. Each of these specialist groups will invent words that are not known to everyone speaking the language. Modern languages have this property. A carpenter knows what a hasp is; you might have no idea. I know what a morpheme is because I've studied linguistics, but I don't expect most English speakers to know this.

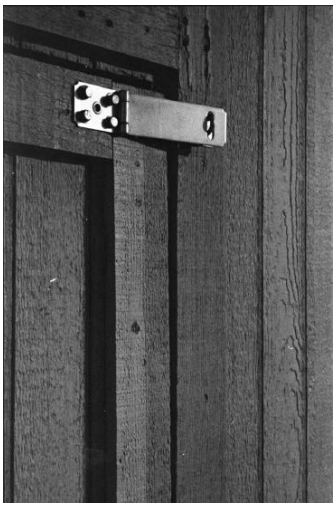


Figure 2. A hasp (photo by r.nial.bradshaw)

This brings up an important distinction, that between the words that a language has and the words that an individual speaker of the language knows. Because some speakers of languages such as Mandarin Chinese, English, Spanish, and Japanese have traveled all over the world and studied the physical environments as well as the cultures they have found, these languages have words for concepts such as hippopotamus and polygamy, concepts that are not part of the everyday life of speakers of these languages. Thus, it is almost certainly true that Mandarin Chinese, English, Spanish, and Japanese have more words than Amharic, Tzeltal, Lingala, and Inuktitut. But this fact is of little interest to linguistic anthropologists and other language scientists, who are concerned with what individual people know about their language (and sometimes other languages) and how they *use* this knowledge. There is no evidence that individual speakers of English or Japanese know any more words than individual speakers of Amharic or Tzeltal.

Furthermore, if a language is lacking a word for a particular concept, it is a simple matter for the speakers of the language to add a new word when they become familiar with the concept. One way for this to happen is through semantic extension of an existing word. Another way is to create a new word out of combinations of old words or pieces of old words. A third, very common, way is to simply borrow the word from another language. Thus English speakers borrowed the word *algebra* from Arabic; Japanese speakers borrowed their word for "bread," *pan*, from Portuguese; Amharic speakers borrowed their word for "automobile," *mekina*, from Italian; and Lingala speakers borrowed their word for "chair," *kiti*, from Swahili.

Linguistic Relativity

Anthropologists need to learn the language of the culture they are studying in order to understand the worldview of its speakers. A linguistic anthropologist from the first half of the 20th century, Bejamin Whorf, believed that a language affects culture as well, by actually influencing how its speakers think. His hypothesis proposed that the words and the structures of a language influence how its speakers think about the world, how they behave, and ultimately the culture itself, an idea known as **linguistic relativity**. Simply stated, Whorf believed that human beings see the world the way they do because the specific languages they speak influence them to do so. He developed this idea through both his work with Native American Languages and his work as a chemical engineer for the Hartford Insurance Company investigating the causes of fires.

One of his cases while working for the insurance company was a fire at a business where there were a number of gasoline drums. Those that contained gasoline were surrounded by signs warning employees to be cautious around them and to avoid smoking near them. The workers were always careful around those drums. On the other hand, empty gasoline drums were stored in another area, but employees were more careless there. Someone tossed a cigarette or lighted match into one of the "empty" drums, it went up in flames, and started a fire that burned the business to the ground. Whorf theorized that the meaning of the word "empty" implied to the worker that "nothing" was there to be cautious about so the worker behaved accordingly. Unfortunately, an "empty" gasoline drum may still contain fumes, which are more flammable than the liquid itself.

Whorf's (1944) linguistic anthropology studies involved working with speakers of Native American languages, including Hopi. The Hopi language is quite different from English in many ways. For example, let's look at how the Hopi language deals with time. Western languages (and cultures) view time as a flowing river in which we are being carried continuously away from a past, through the present, and into a future. Our verb systems reflect that concept with specific tenses for past, present, and future. We often think of this concept of time as universal, that all humans see it the same way, but that isn't true. A Hopi speaker has very

different ideas and the structure of their language both reflects and shapes the way they think about time. The Hopi language has no present, past, or future tense. Instead, it divides the world into what Whorf called the manifested and unmanifest domains. The manifested domain deals with the physical universe, including the present, the immediate past and near future; the verb system uses the same basic structure for all of them. The unmanifest domain involves the remote past and the distant future, as well as the world of desires, thought, and life forces. The set of verb forms dealing with this domain are consistent for all of these areas, and are different from the manifested ones. Also, there are no words for hours, minutes, or days of the week. It is not that Hopi-speakers had no conception of time, just that their conception was very different from the typical English-speaking American version.

Parts of Whorf's hypothesis were controversial from the beginning, and still are among some linguists. Since he suggested it, linguistic relativity has also been balanced by work identifying **linguistic universals**, aspects of human language common to all languages based upon our biological and cognitive capacities for language. Universalism draws especially on the linguistic work of Noam Chomsky. Still, in the past several decades a number of studies have been done that support Whorf's ideas. They have shown that language can predispose (but not determine!) a speaker's world view, attitudes, and patterns of thought on a variety of human experiences.

For more on linguistic relativity, you can check out this talk by Lera Boroditsky:



Pragmatics: Meaning in Context

Recall that **pragmatics** in linguistic anthropology captures the idea that the meaning of sentence is often connected with the context in which it is uttered. Those contextual meanings are often linked to culture. It is for this reason that most linguistic anthropologists focus on language *use*.

Consider the following phrase:

> What do you **mean**, Mounissa bought 10lbs of strawberries?

Here, it's not very likely that the speaker is asking about the literal meaning of this sentence when they say, "What do you mean?" — the compositional sense of the sentence is pretty clear: an individual named Mounissa exchanged some amount of money for strawberries, and these strawberries weighed 10lbs total. Instead, a natural understanding of what is meant by *meaning* here is about the implicature the sentence carries. An **implicature** is a meaning that is suggested by a sentence, based on the context. So if you know that Mounissa loves jam, *Mounissa bought 10lbs of strawberries* might imply that Mounissa is making strawberry jam — lots of it. Importantly, an implicature is not an entailment, the "literal", "surface" meaning of a sentence, so the implicature of any particular sentence can change depending on the context. So in another world, maybe Mounissa isn't making strawberry jam; maybe she's making a bunch of strawberry lemonade at a farmer's market, or throwing a strawberry-based food fight.

There is often a conversational logic behind why certain implicatures arise in discourse. Let's start with the following example:

> Aya: Did Raj feed the cat and clean the litterbox?
>
> Bo: He fed the cat.
>
> Aya: (Infers: 'He didn't clean the litterbox.')

Here, Bo creates an **implicature** or they imply that content. Aya makes an inference or they infer that content. The basic idea of why we get this implicature in this context is that if Raj had fed the cat and cleaned the litterbox, Bo would've said so. He didn't in this case, so Aya can infer that only Raj fed the cat is true, and that Raj cleaned the litterbox is false.

The Cooperative Principle

The way of analyzing how implicatures arise in discourse is called the **Cooperative Principle**, proposed by philosopher Paul Grice. He proposed that one way of explaining how we get implicatures in a conversation is to think that there are implicit conversational principles that discourse participants follow. According to the Cooperative Principle, the major underlying assumption that we make in a conversation is that all discourse participants are acting in a way to accomplish conversational goals. For example, let's say that the topic of discussion was "How much money should we spend on our cat's birthday party?". *If* everyone in the conversation agrees that the goal is to figure out a reasonable cost for the party, then all discourse participants assume that everyone in the conversation is acting in a reasonable way and uttering things in order to accomplish this goal. This is what is meant by "cooperation" in the Cooperative Principle. Specifically, Grice described four maxims (or general rules of conduct) that might be the basis of many conversations: the Maxim of Quality, Maxim of Quantity, Maxim of Relation, and Maxim of Manner. The idea is that if these are the conversational rules that people follow (and if people assume that other people follow these rules too), then there is an explanation of why certain implicatures arise in discourse.

You will notice that the maxims are stated as imperatives (e.g., "do this!", "don't do that!"). These are *not* meant to be prescriptive "do's" and "don't's". They should be taken as a way to describe someone's pragmatic knowledge in a language. It's similar to how phonological rules can be stated like "turn voiceless consonants into voiced consonants!" or "don't voice the consonant if you already have a voiced obstruent in the morpheme!". Grice at one point describes the Cooperative Principle as something that is "REASONABLE for us to follow" and something that "we SHOULD NOT abandon" (Grice 1975, p.48; emphasis his). Sometimes this is misinterpreted to mean that the Cooperative Principle is a set of prescriptive rules, something along the lines of "if you don't follow these rules, you are not a good language user". However, that is not what he meant. A better interpretation of the Cooperative Principle goes something like this: IF discourse participants have a common immediate goal in the conversation, THEN it is in their best interest to follow something like the Cooperative Principle. Grice pondered that this type of assumption may be an extension of cooperative transactions in general, not limited to language: if you and I agreed to get a car fixed together, it would be in our best interest to act in a cooperative way to accomplish this goal.

Of course, what counts as "cooperative" in a conversation might be different depending on what kind of conversation it is (Grice 1975): what if you are fighting? Or writing a letter? Or making a witness statement in court? For the sake of exemplifying how the Cooperative Principle works, our examples in this chapter will be "ordinary" conversations (e.g., casual conversations between friends, family, or roommates). But after you are done reading this chapter, you are encouraged to think further about how the Cooperative Principle might work differently in other types of discourse!

Speaking of variation, we have seen already that conversational rules can vary from community to community, meaning that what counts as "cooperative" might vary depending on who the interlocutors are (not just the discourse genre). Anthropologists study the Cooperative Principle as applied to various linguistic communities, and you are also encouraged to think about how conversational rules might differ in your own culture(s)! The linguistic way of thinking about the Cooperative Principle is that it is subject to variation within and across language communities.

The Maxims

Grice observed that discourse participants seem to follow a conversational rule about being honest. He stated this rule as the **Maxim of Quality**: in a conversation, you say what you believe to be true, and only say what you have sufficient evidence for. Still, what is considered a maxim violation can vary from language to language and culture to culture. In English and many languages, failure to *try* is what is considered a maxim violation. That is, if you were not *trying* to follow Quality at all, knew the statement was false but uttered it anyway, that is what is considered a violation. Let's assume for a moment that Raj actually didn't feed the cat from the conversation in the last section. If Bo *truly* thought that Raj fed the cat, saying "He fed the cat" would technically not be a violation under the Cooperative Principle for American English speakers. But in Mopan (an indigenous language of the Mayan family in Central America, spoken by Mopan people), falsehoods are characterised as *tus*, 'lying,' regardless of whether the speaker was aware of the falsehood at the time of utterance or not.

Grice also observed that discourse participants seem to follow a conversational rule about how much information they should give when trying to meet conversational goals. He stated this as the **Maxim of Quantity**: in a conversation, don't be more informative

than is needed by the purpose of the conversation, and don't be less informative than is needed by the purpose of the conversation, either. To understand how this maxim works, imagine above that Bo knew that Raj actually fed the cat AND cleaned the litterbox, and still said what he said ("He fed the cat."). This would be a violation of the Maxim of Quantity, because the statement *He fed the cat* is underinformative: the more informative thing to say in this situation would be *Raj fed the cat and cleaned the litterbox*. If Aya found out after the conversation that Raj actually cleaned the litterbox too, Aya would likely feel that Bo was being uncooperative in the conversation they had ("Why didn't you tell me he cleaned the litterbox too, if you knew?!"). Bo didn't make a false statement, but the true statement that he did make wasn't the most informative one.

Another one of Grice's observations was that discourse participants seem to expect each other to stay on topic during a conversation. He described this as the **Maxim of Relation**: make your contributions to the conversation relevant to what is being discussed.

Grice's fourth and final observation was that discourse participants seem to have an expectation about *how* they say things in a conversation too, not just *what* they say. He described this as the **Maxim of Manner**: be as clear, brief, and as orderly as possible when you make your contributions in a conversation. Consider the following conversation:

> Aya: How do I properly wash my hands?
>
> Bo: Dry your hands using a clean towel or air dry them. Scrub your hands for at least 20 seconds. Lather the backs of your hands, between your fingers, and under your nails. Rinse your hands well under clean, running water. Lather your hands by rubbing them together with the soap. Wet your hands with clean, running water. Turn off the tap, and apply soap.

Bo's instructions are truthful, in that each step he listed indeed are things you do when you wash your hands. His contribution is also appropriately informative, and relevant to the question that was asked by Aya. However, Bo said the instructions in a funny way: he didn't list the steps in order. So the oddness of Bo's utterance mainly comes from a violation of the Maxim of Manner. The Maxim of Manner sees quite a bit of cultural variation. For example, what is considered to be an appropriate "manner" of speaking may depend on things like cultural expectations about expressions of emotion and different values attached to veiled speech. For example, in some African cultures it is not necessarily considered "uncooperative" to make one's utterance obscure, long-winded, and vague (Ameka & Terkourafi 2019).

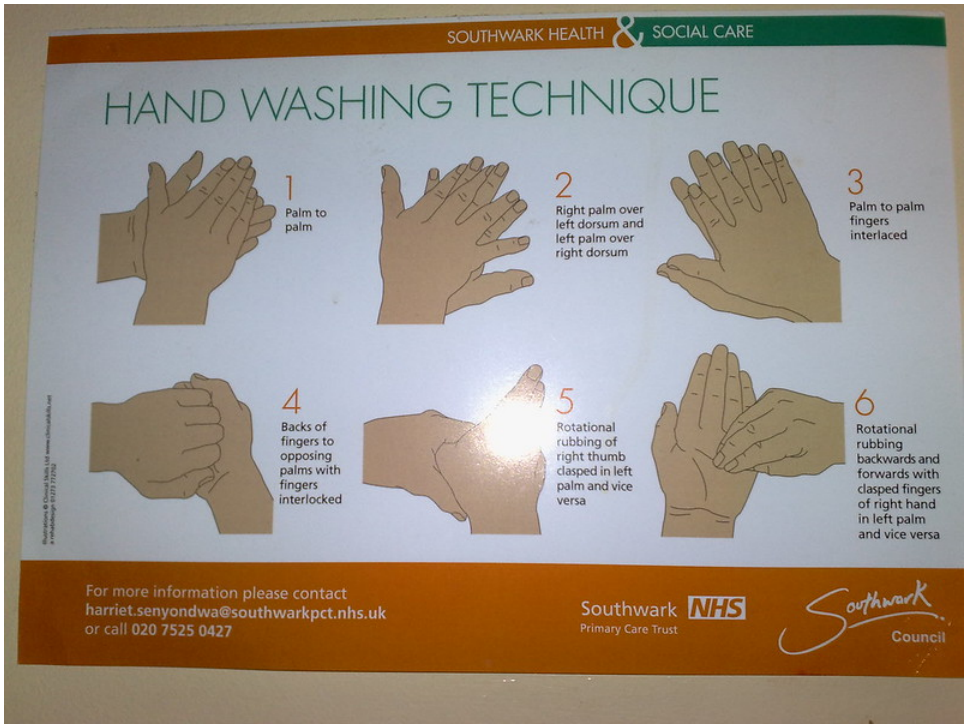


Figure 3. Hand-washing technique poster from Southwark Council, UK. Such posters became more widely distributed amid the Covid-19 pandemic in 2020. Image by secretlondon123 is licensed under CC BY-SA 2.0.

Terms You Should Know

Linguistics

Arbitrariness

Lexicon

Focal Vocabulary

Linguistic Relativity

Language Universals

Pragmatics

Implicature

Cooperative Principle

Maxim of Quality

Maxim of Quantity

Maxim of Relation

Maxim of Manner

Study Questions

1. What is the cultural significance of the differences in the lexicon between languages? What are some focal vocabularies you know?
2. What is the idea of linguistic relativity, and what are some examples of it in practice?
3. What do the maxims of the Cooperative Principle tell us about how conversations work? How do they operate cross-culturally?

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4.3: Sociolinguistics- Language and Social Status

Learning Objectives

By the end of this chapter you should be able to:

- Describe the concept of prestige or standard varieties of language, and list some prestige varieties you are familiar with
- Discuss the relationship between language and social difference, especially as it relates to gender, race and ethnicity, and class

Why do some Canadian English speakers say *eh* at the end of their sentences while others opt for *right*? In American English, why do some people say *you*, others *y'all*, some *you guys*, or even *youse* or *yinz*? In what contexts is one person more likely to say one of those or the other? What kinds of information about someone can we glean if we hear them say *eh*? Or *right*? Or even *innit*? Have these patterns changed over time? These are sociolinguistic questions. **Sociolinguistics** is a methodological and analytical approach to understanding the relationship between language and the broader social and cultural context of use. We call it sociolinguistics because both linguistic (e.g., grammatical, structural, articulatory) and social factors are equally important; sociolinguistics, unlike many formal approaches to language, does not focus on an idealized grammar (sometimes called 'competence') but rather analyzes language in use (sometimes called 'performance'). In this chapter we will see how sociolinguistics has analyzed the interplay between language variation and the social meaning of language, such that language both reflects social differences (in gender, race and ethnicity, class, and more) and also helps to produce and reinforce those differences.

Languages Versus Dialects and Language Variation

The number of languages spoken around the world is somewhat difficult to pin down, but we usually see a figure between 6,000 and 7,000. Why are they so hard to count? The term **language** is commonly used to refer to the idealized "standard" of a variety of speech with a name, such as English, Turkish, Swedish, Swahili, or Urdu. One language is usually considered to be incomprehensible to speakers of another one. The word **dialect** is often applied to a subordinate variety of a language and the common assumption is that we can understand someone who speaks another dialect of our own language.

These terms are not really very useful to describe actual language variation, however. For example, many of the hundreds of "dialects" spoken in China are very different from each other and are not mutually comprehensible to speakers of other Chinese "dialects." The Chinese government promotes the idea that all of them are simply variants of the "Chinese language" because it helps to promote national solidarity and loyalty among Chinese people to their country and reduce regional factionalism. In contrast, the languages of Sweden, Denmark, and Norway are considered separate languages, but actually if a Swede, a Dane, and a Norwegian were to have a conversation together, each could use their own language and understand most of what the others say. Does this make them dialects or languages? The Serbian and Croatian languages are considered by their speakers to be separate languages due to distinct political and religious cultural identities. They even employ different writing systems to emphasize difference, but they are essentially the same and easily understandable to each other.

So in the words of linguist John McWhorter (2001), actually "dialects is all there is." What he means by this is that a continuum of language variation is geographically distributed across populations in much the same way that human physical variation is, with the degree of difference between any two varieties increasing across increasing distances. This is the case even across national boundaries. Catalan, the language of northeastern Spain, is closer to the languages of southern France, Provençal and Occitan, than any of the three is to its associated national language, Spanish or French. One language variety blends with the next geographically like the colors of the rainbow. However, the historical influence of colonizing states has affected that natural distribution. Thus, there is no natural "language" with variations called "dialects." Usually one variety of a language is considered the "standard," but this choice is based on the social and political prestige of the group that speaks that variety; it has no inherent superiority over the other variants called its "dialects." The way people speak is an indicator of who they are, where they come from, and what social groups they identify with, as well as what particular situation they find themselves in, and what they want to accomplish with a specific interaction.



Figure 1. In addition to highlighting some of the difficulties of sorting language variation into 'languages' and 'dialects,' Catalan also shows how language variation can become entangled with ethnic and regional identity. "Països Catalans Mural Vilassar" by 1997 is licensed under CC BY-SA 3.0.

What Is a "Standard" Variety of a Language?

The **standard dialect** of any language (also known as the "prestige dialect") is simply one of many variants that has been given special status in the community because it is spoken by the people who have the greatest amount of prestige, power, and (usually) wealth. In the case of English, its development has been in part the result of the invention of the printing press in the sixteenth-century and the subsequent increase in printed versions of the language. This then stimulated more than a hundred years of deliberate efforts by grammarians to standardize spelling and grammatical rules. Their decisions invariably favored the dialect spoken by the aristocracy.

Non-standard varieties of a language, also known as **vernacular dialects**, are usually distinguished from the standard by their inclusion of stigmatized grammatical forms. For English, such stigmatized forms in vernacular dialects include multiple negatives, the use of the verb form *ain't* (which was originally the normal contraction of am not, as in "I ain't," comparable to "you aren't," or "she isn't"); pronunciation of words like 'this' and 'that' as 'dis' and 'dat'; pronunciation of final –ing as "–in;" as well as any other feature that grammarians have decreed as "improper" English. However, we should remember that from the perspective of anthropology, there is no such thing as "improper" language.

The standard of any language is an artificial, idealized form of language, and usually is the same as the language of education. One must learn its rules in school because it is not anyone's true first language. Everyone speaks a dialect, although some dialects are closer to the standard than others. Vernacular dialects that are regarded with the least prestige and respect in society are associated with the groups of people who have the least amount of social prestige. People with the highest levels of education have greater access to the standard, but even they usually revert to their first dialect in the context of an informal situation with friends and family. No language variety is inherently better or worse than any other one. It is due to social attitudes that people label some varieties as "better" or "proper," and others as "incorrect" or "bad."

It is important to note that almost everyone has access to a number of different language varieties or **registers**. They know that one variety is appropriate to use with some people in some situations, and others should be used with other people or in other situations. The use of several language varieties in conversation by one person is known as **code-switching**.

Language and Gender

Our gender is a social acquisition that comes about through socialization over our lifetime (and sometimes even prior to our start of life… I'm looking at you 'gender reveal' parties). Sex on the other hand is something that is assigned to us based on aspects of our (usually external) biology at birth. You've probably heard that "gender is the socially-constructed counterpart of biological sex" (Cheshire 2002: 427). That's only half true though: binary sex is also a social construct (see Chapter 19). Although sex is colloquially spoken about as a biological binary, its anatomical, endocrinal, and chromosomal criteria all exist on continua; the two discrete categories of 'male' and 'female' are split at a socially-constructed and fuzzy boundary. For cisgender people, their gender identity (i.e., as a man, as a woman, as masculine, as feminine) is (largely) consistent with the sex that they were assigned at birth (i.e., male, female). For transgender people, their gender identity differs from the sex they were assigned at birth and often differs from the gender identity they were socialized into earlier in life. For nonbinary and genderqueer people, their gender identity does not (always) map to the spectra of masculinities and femininities. In cultures across the world, gender is not restricted to a binary (e.g., two-spirit people in some Indigenous communities in North America and hijras in India).

Understanding the distinction between gender and sex is important because past sociolinguistic research often collapsed the difference. As Eckert (1989: 246–7) observed over 30 years ago: "Although differences in patterns of [linguistic] variation between men and women are a function of gender and only indirectly a function of sex …, we have been examining the interaction between gender and variation by correlating variables with sex rather than gender differences." Eckert's main point here is that although sociolinguists frequently talk about two groups based on 'sex differences', the linguistic difference between men and women is not a biological fact but a social one: men do not use certain variants in a certain way because of their particular anatomy, hormones, and chromosomes, but because they have been socialized into using language 'like a man'.

> **Gender and vocal pitch.** One aspect of spoken languages that seems to have a clear link to our anatomy is vocal pitch. People with larger, heavier vocal folds have lower pitched voices because their vocal folds require more energy to vibrate and thus, vibrate less quickly than smaller, lighter vocal folds (which on average produce higher pitched voices). However, even this seemingly biologically-based difference is also socially-sustained. Prior to puberty, when endocrinal changes trigger the larynx to grow differentially depending on a person's biological sex and their specific combinations of hormones, all children's vocal folds are anatomically roughly similar. And yet, as early as age four, boys and girls (consciously and unconsciously) conform to the norms of masculine and feminine speech: boys manipulate their vocal tract to produce more masculine-sounding voices and girls manipulate their vocal tract to produce more feminine-sounding voices (Sachs et al. 1973).

The complexity of gender helps to explain some well-observed gendered-patterns of variation. These patterns have been found over and over again in many studies (see Labov 2001).

First, women use more of the overtly prestigious variants of language. What is feminine about prestige language? For one, as we saw above, people in higher social classes use more standard variants, and wealth refinement is a central aspect of canonical femininity. Moreover, Deuchar (1989) suggests that standard language can protect "the face of a relatively powerless speaker without attacking that of the addressee". In the context of patriarchal male dominance, standard speech functions, in some ways, as a survival strategy. At the same time, further expectations are put on women's language. In one of the most influential papers on the sociocultural study of language and gender, Robin Lakoff defined ***the double bind***: women are socialized not just to use standard language but powerless and tentative language… to talk 'like a lady'. But, in Lakoff's (1972: 48) words, "a girl is damned if she does, damned if she doesn't." Her tentative, powerless language will be seen as a reflection on her (in)ability to participate in serious discussion but if she resists and subverts this expectation, she runs the risk of being deemed unfeminine. There are real-world consequences of our beliefs about gendered language!

Second, women deviate from the standard (i.e., they innovate away from the current norm) more than men when no one is looking! Labov (2001: 293) calls this the *gender paradox*: "women conform more closely than men to sociolinguistic norms that are overtly prescribed, but conform less than men when they are not." And here's the solution to the gender paradox: 'women' (and 'men') are not a cohesive, homogenous group! It's the subset of "non-conformist" women who are the leaders of changes from below. Frequently these "non-conformists" are young women, who often innovate with new ways of speaking that others of all genders eventually follow, even if those others usually critique the young women for it first. The complexity of gender again offers explanation. The gender paradox is true only in the aggregate: only when we collapse all men and all women together does the pattern emerge. But it is not categorically true: there are women who deviate more from the standard than some men, and vice versa.

There is one, pretty big, caveat here though: the vast majority of the studies where these patterns have been found represent languages embedded in Euro-American culture. Studies of language and gender are not as widespread cross culturally, but they have found that ideas about language and gender (for instance, what is expected of "women's speech") vary substantially across place and time. For instance, among the Malagasy of Madagascar women's speech is thought to be more direct and confrontational than men's speech. Notably, those stereotypes help keep women out of political leadership, where consensus building is highly valued, there too.

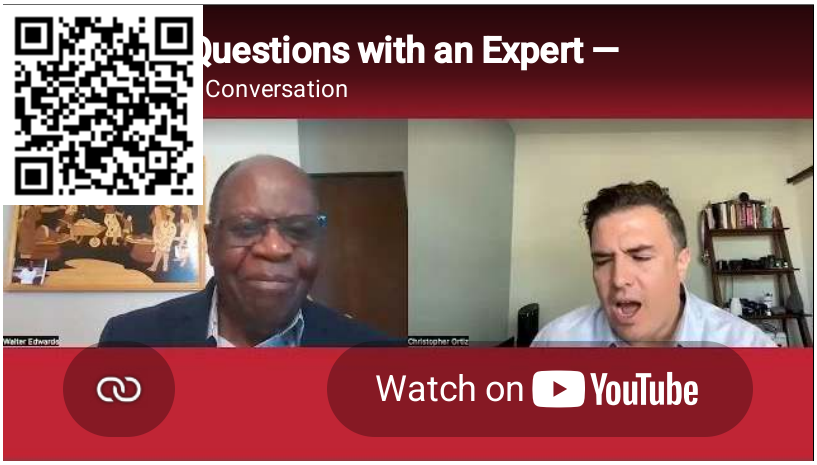
Further, for decades the linguistic practices of transgender, nonbinary, and gender diverse people were largely ignored. However, more recently, transgender and nonbinary linguists have begun to study language within their own communities and from a far more affirming perspective (Zimman 2020). Some of this work has shown how linguistic variation can be used as a means of constructing a nonbinary identity. Gratton (2016) looks at the the use of variable *-ing* by two Canadian English speaking nonbinary people in two different contexts: one, a safe queer space and the other, an unfamiliar, non-queer space. Gratton finds that in the safe, queer context both speakers use each of the two variants around 50% of the time. However, in the non-queer spaces where they express legitimate fear of being misgendered, the two speakers diverge sharply from each other. One speaker, in reacting to the threat of being misgendered as a woman, used a very high rate of the masculine-associated [ɪn] variant, while the other speaker, reacting to the threat of being misgendered as a man, used a very high rate of the feminine-associated [ɪŋ]. Gratton (2016: 56) argues that it's not the case that these two speakers are attempting to align with cis-masculinity or cis-femininity respectively – they are both non-binary! – but rather, they "utilize resources that they associate with cis-normative masculinity [and femininity] … in order to distance [themselves] enough from cis-normative femininity [or masculinity respectively] that they [are] not misgendered as such." In this way, both linguistic variation provides both speakers a means of "perform a non-binary identity" (Gratton 2016: 57).

Language, Race and Ethnicity

Linguisitic differences have been associated with racial and ethnic groups. Indeed, language and ethnicity are intricately linked and often co-constitutive. That is to say, each is often circularly defined; divisions between languages are often defined with reference to divisions between cohesive cultural groups that use those languages and ethnic groups are often defined with respect to the language that the group uses (e.g., think about how Swedish and Norwegian are mutually intelligible but understood as distinct languages, spoken by distinct ethnic groups). Around the world, people often live in close proximity to other members of their racial or ethnic group. This is true both in places where that ethnic group is Indigenous or in contexts of colonialism and diasporic migrations. The linguistic consequence of this is that, because we tend to use language in the same way as the people we interact with most, dialects of many languages have emerged that are associated with particular racial or ethnic groups. Of course, not all members of a given group will speak that dialect natively, nor will all native speakers of the dialect be members of the group.

A well-studied example of a group with a distinctive dialect is African-Americans. They have a unique history among minorities in the United States, with their centuries-long experience as captive enslaved people and subsequent decades under Jim Crow laws. Over that history, African Americans developed a way of speaking known as **African American Vernacular English** (AAVE). As with any language variety, AAVE is a complex, rule-driven, grammatically consistent way of speaking. It just has rules that are different from those of so-called "Standard English."

Still, because of its association with African Americans, AAVE has been subject to negative stereotypes. There is a persistent misconception that AAVE represents "broken English" and that those who speak it are unable or unwilling to learn "proper" English, though this is not true, as Walter Edwards discusses below. Some of these negative stereotypes are developed through portrayals of African Americans in media (see Martin 2022). Ultimately, while it is no longer "politically correct" to openly express racism, it is much less frowned upon to express negative attitudes about African-American Vernacular English (AAVE). Typically, it is not the language itself that these attitudes are targeting; it is the people who speak it. These negative beliefs about AAVE speakers have real consequences, as linguist John Baugh (2003) has shown. Baugh coined the term **linguistic profiling** to describe the discrimination people face based upon how they speak. Over several studies Baugh employed matched guise tests, responding to housing listings, job ads, and other service offers himself using different dialects and finding that he was much less likely to receive a positive response when speaking AAVE.



Not all African-Americans speak AAVE, and people other than African-Americans also speak it. Anyone who grows up in an area where their friends speak it may become a speaker of AAVE too, like the rapper Eminem, a white man who grew up in an African-American neighborhood in Detroit. Present-day AAVE is not homogeneous either; there are many regional and class varieties, though most varieties have several features in common. Because of the stereotypes about the dialect, the African-American community itself is divided about the acceptability of AAVE.

Of course, African American English is not the only racially or ethnically associated dialect, even among dialects of American English. Linguists have also described a variety of Native American dialects of English, such as Lumbee English and Navajo English. They have also studied Chicano English, spoken by many Mexican-Americans, and many other ethnically associated dialects. As with AAVE, studies have shown that speakers of these dialects are also often subject to discrimination.

Language and Class

In many places, language varieties are associated with social class — and there are elements of that with the ideas about African American Vernacular English from the last section too! In perhaps the best known study showing this, sociolinguist William Labov (1964) looked at the pronunciation of the sound /r/ in the speech of New Yorkers in different department stores. Many people from that area drop the /r/ sound in words like fourth and floor (fawth, floah), but this pronunciation is primarily associated with lower social classes and is not a feature of the approved “standard” for English, even in New York City. In three different contexts, an upscale store, a middle-class store, and a discount store, Labov asked customers what floor a certain item could be found on, already knowing it was the fourth floor. He then asked them to repeat their answer, as though he hadn’t heard it correctly. He compared the first with the second answers by the same person, and he compared the answers in the expensive store versus the cheaper store. He found that 1) the responders in the stores differed overall in their pronunciation of this sound, and 2) the same person may differ between situations of less and more self-consciousness (first versus second answer). That is, people in the upscale store tended to pronounce the /r/, and responders in both stores tended to “correct themselves” and produce the standard pronunciation more in their second answers in an effort to sound “higher class.” These results showed that the pronunciation or deletion of /r/ in New York correlated with both social status and context.



Figure 2. Saks Fifth Avenue was the “high class” department store for Labov’s experiment. Can you identify any ways of speaking that you associate with higher status groups? Image by Phillip Pessar is licensed under CC BY 2.0.

Of course, there is nothing inherently better or worse, or higher or lower class, in either pronunciation; it depends entirely on the social norms of the community. The same /r/ deletion that is stigmatized in New York City is the prestigious, standard form in England, used by the upper class and announcers for the BBC. The pronunciation of the /r/ sound in England is stigmatized because it is used by lower-status people in some industrial cities. But in each place, there are real world consequences for how you might be treated, what jobs you might be seen as a good fit for, and which social circles you’ll be invited into based upon how you speak.

Key Terms

Sociolinguistics

Language

Dialect

Standard Dialect

Vernacular Dialect

Register

Code-Switch

The Double Bind

African American Vernacular English

Linguistic Profiling

Study Questions

1. What are some examples of standard or prestige dialects that you are aware of? What gives them their prestige?
2. What are some of the real-effects of the association of particular patterns of speech with gender, race and ethnicity, or class?

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4.4: Language Change, Language Death, Language Reclamation

Matthew Pawlowicz

By the end of this chapter you should be able to:

- Describe some common language changes and discuss what they can tell us about the culture of the speakers
- Discuss the major reasons why languages change
- List some of the things that are lost when a language is lost, and compare language revitalization and language reclamation approaches to language endangerment

Language is constantly changing. Speakers of English today do not speak like the authors of *Beowulf* (c. 700 CE) or *The Canterbury Tales* (c. 1400 CE) or *Hamlet* (c. 1600 CE) just in the same way that speakers of Japanese today do not speak like the authors of the *Kojiki* (c. 700 CE) or the *Genji Monogatari* (c. 1000 CE). In some ways, English and Japanese speakers today do not even speak the same way that people spoke English or Japanese a century ago or even just a few decades ago. English, Japanese, and really **all languages** have changed and continue to evolve.



Figure 1. 'The Jewled Chaplet' from Genji Monogatari

In this respect, it is useful to think of languages as living things. Just as living things are never static, but continuously changing, so languages are always changing. Sometimes the changes are dramatic, but they occur so gradually that it takes several generations for them to be noticed. For example, if you compare your speech patterns with those of your parents and grandparents, you will recognize that the way you speak is different from the way your parents speak, which in turn is different from the way their parents speak. Usually, the most obvious difference is in vocabulary. Your grandparents probably did not use words like *cell phone*, *internet* or *meme* in their youth, because these words hadn't yet been created (or at least not in their contemporary meanings!). Equally, some of the words in use today may become extinct, as they fall into disuse, and are replaced by new words corresponding to new meanings that we wish to express. But it's not just vocabulary that changes. Other aspects of language, like sound and sentence patterns, can also change.

Some Examples of Common Changes

The study of how languages change is known as **historical linguistics**. The processes, both historical and linguistic, that cause language change can affect all of its systems: phonological, morphological, syntactic, etc. Historical linguists typically focus on three broad kinds of language changes: sound change, analogical change, and borrowing (Campbell 2013). Knowing how a language has changed lets them better understand what was going on culturally when that change was taking place

Sound Change

Sound changes describe changes in the pronunciation of a given language. There are several well-known kinds of sound change that have been encountered in many languages, but here the characteristics of sound change are more important. Sound change is *regular*. This means that when sound change happens, it happens across the entire language, rather than being restricted to a particular word. For instance, today in the Northern Great Lakes regional dialect of the United States there is a vowel shift going on! As a result *bus* is pronounced by many around the Great Lakes like other US dialects say "boss." But it isn't just *bus*! The same pronunciation shift happens with the vowel in *fuss*, *cuss*, *but*, *bub*, etc. Sound changes are also *limited in time.* This means that once sound changes are over, new words in a language are not retrofitted to go through sound changes that have already completed. For instance, Germanic languages, like English, went through a sound change known as Grimm's Law that changes voiceless stops into voiceless fricatives, which other Indo-European languages don't go through (hence the initial sounds of English *father* vs. Spanish *padre* and French *père*). But once that sound change has happened, and it completed for English long ago, English speakers don't take new words (like *pizza*) and force them through it.

Because of these characteristics of sound change, historical linguistics can use the data of sound change to practice **language reconstruction,** determining the features of an older language, even a language without writing! The best method for doing so, known as the **comparative method**, charts systematic sound correspondences across contemporary related languages, identifying the regular sound changes of each, in order to reconstruct the sounds, structures, and lexicon of their shared ancestor.

Analogical Change

Another major kind of language change is **analogical change**, where changes take place that are modeled on patterns from elsewhere in the language. Unlike sound change, analogical change is not limited to one kind of language data (i.e. phonology), but occurs across all of them. It is not regular, as analogical changes do effect particular cases and not the whole language, but it often makes the overall language more systematic, by causing irregular forms to follow more widespread patterns.

One example of an analogical change in English is the shift in the past tense of the verb '*to climb*.' The past tense of this word used to be *clumb*. However, by making analogy with the more widespread morphological pattern of relying on affixation to create the past by adding '-ed,' English speakers shifted to using *climbed* instead, and *clumb*, to the extent it is recognized at all, is regarded as archaic.



Figure 2. Wes Green, a mountain climber, would no longer be said to have clumb a mountain by most English speakers. Image by Blue Mountains Library, Local Studies is licensed under CC BY-SA 2.0.

Borrowing

The third major kind of language change is **borrowing**, where languages in contact take linguistic material from one another. All borrowings require multilingualism, where at least some speakers are competent enough in both languages to transfer material between them. The best known kind of borrowing are **loanwords**, where a language takes a word from another language and makes it part of its own vocabulary. English is notable for having tens of thousands of loanwords, including an especially large set from French following the Norman Conquest, but it is far from alone. There are similarly thousands of loanwords in the Bantu language Swahili, spoken on the East African coast, especially from Arabic, but also from Hindi, German, and English. Speakers borrow words from another because they need to describe things they don't have words for, which is a common occurrence when cultures come into contact with one another, and because of prestige reasons, where the foreign term is highly valued for social reasons.

While loanwords are the best known kinds of borrowings, languages can also borrow a variety of other things from one another. These include sounds and phonological features, morphology, syntactic constructions and more, and are broadly referred to as **structural borrowings.** Structural borrowings often require more intense and long-term contact between languages and greater command of each of them than loanwords. One example of this has been the borrowing of clicks from San languages into neighboring South African Bantu languages like Xhosa, Zulu, and Sotho.

What Drives Language Changes

What are the factors underlying language change? One major factor is internal self-renewal, as languages change to accommodate the needs of new generations of speakers and language variants interact. The other major factor is external change, through contact with other languages.

Internal Change

Languages change internally because variation is always present during language change. It's not like one day in the early sixteenth century all English speakers woke up and went "hey, you know what? I think I'll start putting my negative marker BEFORE my verbs instead of after!" Rather, the linguistic change from '*move not*' to '*do not move*' happened gradually. Over time people began

using the new *do not VERB* option more and more and using the old *VERB not* option less and less. During this period both options were possible – the two options were variants of a linguistic variable. Similarly, if we think of the creation of new words, like *cell phone* or *internet*, it isn't the case that everyone knows what that new word means at the same time. Instead, some people who needed words to describe the new inventions they were interacting with came up with them, and the words spread out along with the awareness of the new technologies.

Sometimes we have **stable variation** where two or more variants are present but one isn't replacing the other. So not all examples of linguistic variation involve language change in progress. But all examples of language change in progress involve a period of sociolinguistic variation, and social reasons often determine which variant wins out. So linguistic change is interesting in its own right because language change is also intimately linked with social factors and with social change.

Sociolinguists distinguish two kinds of internal language change. *Changes from above* are linguistic changes that take place above the level of social awareness (i.e., language users are aware of them). A change from above typically takes the form of the adoption of a prestigious or standardized variant from outside of the community. A classic example of a change from above is the importation of '*r*-fulness' to New York City English. From the 18th century into the early 20th century, NYC English was generally *r*-less. Words like *cart* and *star* would have standardly been pronounced something like [kʰɒət] and [stɒə]. However, by the middle of the 20th century, as we saw in Labov's study from the last chapter, the norms of General American English, including its *r*-fullness, began to influence New Yorkers' speech. The new, prestigious *r*-full variant (like [kʰɒɹt] and [stɒɹ]) began to compete with the older (and increasingly stigmatized) *r*-less variant, slowly spreading and advancing through the community. On the other hand, *changes from below* are changes that represent the operation of articulatory or grammatical pressures within a linguistic system that people are generally not aware of. For example, in Canadian English the vowel in the word *goose*, which would be transcribed as the high, back, rounded vowel [u], has been gradually moving toward the front of the vowel space to something more like [ʉ] or even [y]. Chances are, any given speaker of Canadian English would be unaware that their *goose* vowel is more front than older Canadians' *goose* vowel! Similarly, research by linguist Dennis Preston has shown that speakers of the Northern Great Lakes dialect mostly don't perceive their own dialect or the vowel shift that it is going through.

External Change

Given the ease and speed of global travel today, most communities around the world have some experience of dealing with speakers of other languages. But contact between speakers of different languages is not unique to our century, as it has been going on for millennia. Over the last few centuries alone, because of the colonizing enterprises of European nations, a whole host of languages including English, French, Dutch, Spanish and Portuguese came into contact with the languages of Africa, Asia, and the Pacific. The trade in enslaved Africans in America and the Caribbean, for example, not only forced Europeans and non-Europeans together, but also speakers of different African languages, who had to live and work side by side. When speakers of different languages come into contact with one another, several changes can take place.

Multilingualism refers to the use of more than one language among members of a community. Children in multilingual communities typically grow up speaking several languages – each one to which they are exposed. Often, each language is used in different contexts, e.g. one language at home and another in school or at work. The different social meanings associated with each language also make such situations ripe for **code-switching**. Ultimately, multilingualism is such a natural response to the phenomenon of language contact that societies in which multilingualism is not widespread tend to be the exception rather than the norm.

In addition, instances of multilingualism constitute strong factors of language change, in that the users, having access to more than one language, are at greater freedom to explore the creativity of language itself. As noted above, multilingualism is also a prerequisite for borrowing of any variety!

Another outcome of intense episodes of language contact are the creation of pidgins and creoles. **Pidgins** are contact languages that develop among speakers who have no language in common. Given urgent needs to communicate, these speakers create a mixed language, which incorporates features of their various languages and initially serves a restricted range of purposes, such as trade, though it may extend its purview as more people become competent with it and want to speak about more things. Many of the pidgins spoken around the world today, e.g. in the Pacific, West Africa, and the Caribbean, arose in the context of colonization, and are based on the languages of the colonizers and the colonized.

Creoles are former pidgins that have acquired native speakers. This process begins when a pidgin starts to be used in a wider range of communicative contexts, fulfilling a wider range of purposes. For example, instead of using the pidgin only to communicate with traders or colonizers, speakers may begin to use the pidgin at home. Such a situation typically arises in linguistically

diversified populations, where members of the community find it convenient to adopt the pidgin as a means to communicate across language boundaries. Small children in such households grow up acquiring this fast expanding language, and become the first native speakers of the new language. As the language fulfils more and more communicative roles, its grammar becomes more complex, in order to meet the greater demands being placed on it. This process of creolization eventually leads to the development of a language that is structurally as complex as any other language. Non-linguists tend to conflate creoles with pidgins, and consider both to be improper, inferior versions of the languages they are based on. In reality, however, creoles have their own structure, or grammar. You could not pretend to speak an English-based pidgin or creole, for example, by speaking "broken English". In some areas of the world, creoles have become national languages, used in government, education and the media. In Papua New Guinea, Tok Pisin (from "talk pidgin") is one of three national languages (along with English and Kiri Motu, another creole), and an important symbol of national identity. Similarly, in West Africa, creole languages have been used to create significant works of literature.

Language Death and Cultural Loss

Of the approximately 6,000 languages still surviving today, about half the world's more than seven billion people speak only ten: Mandarin Chinese, English, Hindi, Spanish, French, Arabic, Bengali, Portuguese, Russian, Urdu, and Indonesian. Many of the rest of the world's languages are spoken by a few thousand people, or even just a few hundred, and most of them are threatened with extinction, called **language death**. The disappearance of languages is of great concern to linguists and anthropologists alike. When a language is lost, its associated culture and unique set of knowledge and worldview are lost with it forever. Remember Whorf's **linguistic relativity**.

Some minority languages are not threatened with extinction, even those that are spoken by a relatively small number of people. Others, spoken by many thousands, may be doomed. What determines which survive and which do not? Smaller languages that are associated with a specific country are likely to survive. Others that are spoken across many national boundaries are also less threatened, such as Quechua, an Indigenous language spoken throughout much of South America, including Colombia, Ecuador, Peru, Chile, Bolivia, and Argentina. But the great majority of the world's languages are spoken by people with minority status in their countries. After all, there are only about 193 countries in the world, and over 6,000 languages are spoken in them. You can do the math. The survival of the language of a given speech community is ultimately based on the accumulation of individual decisions by its speakers to continue using it or to abandon it. The abandonment of a language in favor of a new one is called **language shift**. These decisions are usually influenced by the society's prevailing attitudes. But language shift is the primary cause of language death.

Sometimes language shift is forced upon a community. Regulating the use of language within national boundaries continues to be an effective means of controlling ideological dissent or access to power, on the well-founded premise that a language encapsulates the culture and values of its speakers. As the Portuguese poet Fernando Pessoa once said, "My motherland is my language". Policies of linguistic subjugation (or "unification", or "planning", depending on one's point of view) are what banned the use of Catalan and Basque in General Franco's Spain, and what lies behind debates that regularly flare up in multilingual countries like Canada and Belgium. Minority languages, or otherwise non-standard languages, are the usual targets of such policies. Banning the use of a minority language in schools (as occurred with Native American languages in the United States and Canada) effectively results in forcing its speakers to adopt the mainstream language. Monolingual speakers of the minority language are thereby barred from positions of power, for which official educational credentials are required. In practice, continued enforcement of such policies may result in the eradication of the targeted language from the country in question. If that language is not spoken elsewhere and, therefore, no new generation acquires it, the language effectively dies.

Other times language shift might be chosen by the community. Speakers may voluntarily decide to stop using a language that they view as a hindrance to participation in a national or global community that uses another language. For instance, linguistic anthropologists have documented Papua New Guinean communities shifting their language to Tok Pisin, itself a creole language but now one of the national languages, as they encouraged its use among their children in pursuit of better opportunities (Kulick 1992). Linguistic globalization therefore raises the parallel issue of **language endangerment.**

Language Endangerment, Language Revitalization, and Language Reclamation

From *BBC News*, the *Guardian*, and the *New York Times* to Vodafone promotional materials, endangered languages are an increasingly pervasive topic in the media. The rhetorical strategies deployed are intended to raise public awareness about language endangerment. The world was listening. It responded through the creation of new policies and in some cases an ideological shift away from shaming and devaluing language diversity to a valorisation of those same languages. As linguistic anthropologist Sarah

Shulist (2016:94) notes, 'if the prediction of widespread language "extinction" … evokes a view of one possible future, then efforts aimed at fighting against this prediction involve imagining, and working to create, an alternative one'. But what does imagining alternative futures look like?

One widespread approach is **language revitalization**, efforts to reverse declining numbers of speakers of endangered languages or to revive "extinct" languages. These efforts are often closely tied to language documentation, which aims to provide the source material for subsequent language learning. While there are some well-known revitalization success stories, such as Hebrew or Hawaiian, the lesson from those and other less successful efforts is that you need community participation. As a result, revitalization is increasingly done in collaboration with Indigenous and descendant communities. A fascinating example of such collaborative language revitalization is that of the Wampanoag tribe in Massachusetts. The Wampanoag were the Native Americans who met the Puritans when they landed at Plymouth Rock, helped them survive the first winter, and were with them at Thanksgiving. The contemporary descendants of that historic tribe still live in Massachusetts, but bringing back their language was not something Wampanoag people had ever thought possible because no one had spoken it for more than a century. A young Wampanoag woman named Jessie Little Doe Baird was inspired by a series of dreams in which her ancestors spoke to her in their language, which she of course did not understand. She eventually earned a master's degree in Algonquian linguistics at Massachusetts Institute of Technology in Boston and launched a project to bring her language back from the dead. This process was made possible by the existence of a large collection of documents, including copies of the King James Bible, written phonetically in Wampanoag during the seventeenth and eighteenth-centuries. She also worked with speakers of languages related to the Algonquian family to help in the reconstruction of the language. The community has established a school to teach the language to the children and promote its use among the entire community. Her daughter Mae is among the first new native speakers of Wampanoag.

Community-based efforts offer counter-strategies to the rhetoric of endangerment, which assumes an inevitable 'count-down' and end to endangered and Indigenous language speakers (Muehlmann 2012) and limited definitions of both 'speaker' and the contexts of language use. Instead of endangerment and revitalization, many Indigenous linguists speak of **language reclamation**, and focus on the agency (and frequent success) of communities in preserving and reintegrating their languages into their cultural practices. They also emphasize that languages that are deemed "dead," need not remain so forever. From Wendat (Lukaniec 2015) to Miami (Leonard 2008) to Wampanoag (baird 2013), researchers and Indigenous communities demonstrate that languages can 'awaken' – even after periods of dormancy. We are increasingly offered evidence that endangered language communities can, and do, pull together maintained community knowledge with language documentation resources and comparative linguistic analysis of related languages to create new generations of speakers and new contexts of language use. This includes genres – old and new – within Indigenous and endangered language communities often erased by dominant rhetorics of language endangerment focused exclusively on quantifications of 'speakers' and 'languages'. The contributors to Kroskrity (2012), for example, each highlight the role of narrative and lesser-discussed genres like poetry in the language maintenance and reclamation efforts of Indigenous communities.

Spotlight on an Anthropologist: Wesley Leonard



Dr. Wesley Leonard. Image by is courtesy of Dr. Leonard.

Wesley Leonard is a citizen of the Miami Tribe of Oklahoma. He has a Ph.D. in Linguistics from the University of California, Berkeley. His early work focused on linguistic reclamation projects relating to the Miami language, *Myaamia*. That language went out of widespread use by the 1960s, but it was well-documented and programs to teach and re-learn the language from the 1990s have proved successful, such that it is used in certain official contexts and taught to some children at home. The language in the present is used by Miami people, both in Oklahoma and further afield, to develop a positive cultural identity.

> Building from this experience, Dr. Leonard researches Native American language reclamation and language capacity building in ways that support tribal sovereignty. He co-chairs the collaborative project Natives4Linguistics, which promote Indigenous contributions to linguistics, making the field more relevant to those communities.

In these and other contexts, ethnographic examinations of language reclamation efforts have demonstrated that community language dynamics should include all participants: speakers, as well as the people actively learning, those supportive of language reclamation efforts, and even those directly connected to speakers and learners – a group Jenny Davis calls 'language affiliates' (Davis 2016). Hermes & Engman (2017) found positive effects from a broad grouping of critical participants in their five-year Anishinaabemowin documentation and description project, which included the (sometimes overlapping) categories of community members, researchers, a non-Indigenous linguist, and Indigenous and non-Indigenous second language learners. Equally important in this context is the demonstration that the identity categories of community members and language learners may, through experiences in language reclamation projects, become language transcribers, analysts, and stronger language experts over the course of months and years. In these contexts, language reclamation is being done by groups of people, sometimes by entire communities, rather than solely by the individual monolingual or fluent speakers represented in most speaker counts.

Key Terms

Historical Linguistics

Sound Change

Language Reconstruction

Comparative Method

Analogical Change

Borrowing

Loanword

Structural Borrowing

Stable Variation

Multilingualism

Pidgin

Creole (language)

Language Death

Language Shift

Language Revitalization

Language Reclamation

Study Questions

1. How often does language change? What are some of the major kinds of changes studied by linguistic anthropologists and what do they tell us about culture?
2. What are the main causes of language change? What are common outcomes of such changes?
3. What is lost when a language is lost? What might anthropologists do in such situations?
4. What is the significance of language reclamation?

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CHAPTER OVERVIEW

5: Cultural Anthropology

5.1: Method and Theory in Cultural Anthropology
5.2: Subsistence and Political Systems
5.3: Ethnicity and Race
5.4: Religion in Anthropology
5.5: Gender and Marriage in Anthropology
5.6: Globalization, Colonialism, and World Systems

Thumbnail: Three men in traditional tribal costumes with face paint. (Unsplash License; Fabrizio Frigeni via Unsplash)

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5.1: Method and Theory in Cultural Anthropology

Learning Objectives

By the end of this chapter, you will be able to:

- Discuss what is unique about ethnographic fieldwork in anthropology.
- Identify historical approaches to conducting ethnographic fieldwork.
- Explain contemporary approaches to ethnographic fieldwork techniques and perspectives.
- Discuss some of the ethical considerations in doing anthropological fieldwork.

When we began this anthropological journey, we learned that various cultures around the globe have similarities and differences that cultural anthropologists seek to better understand. They suspend their own sense of what is "normal" and conduct participant-observation fieldwork: a method that involves living with, observing, and learning from the people that one studies. The central way that this is done is through ethnography, interviewing informants and using a variety of mostly qualitative techniques. **Qualitative research** in anthropology aims to comprehensively describe human behavior and the contexts in which it occurs, while **quantitative research** seeks patterns in numerical data that can explain aspects of human behavior.

What is Ethnography?

The word ethnography can be sometimes confusing when used in anthropological contexts. This is because someone can be an ethnographer, writing an ethnography, after they have conducted ethnographic fieldwork. In cultural anthropology, our fieldwork is referred to as ethnography, which is both the active process of conducting fieldwork and also the end result of cultural anthropological research. The word **ethnography** itself comes from two Greek words: "Ethnos", meaning people & "Graphein", meaning writing. Ethnographers write about what they have learned from the people that they have been working with often use a research method known as participant-observation. **Participant Observation** is a technique of field research used in anthropology by which an anthropologist studies the life of a group by sharing in its activities. Once fieldwork is completed, the ethnographic information can be shared in a number of ways and take many different forms. Articles, journals, podcasts, ethnographic films and documentaries are just a few of the many forms that ethnographic information can be conveyed. A very common form is an ethnographic book written by the ethnographer which provides descriptive accounts of culture that weave detailed observations with anthropological theory.

What is Ethnology?

Sometimes research questions arise which cannot be answered by examining a single culture or peoples. When a cultural anthropologist studies more than one culture then they are said to be conducting **ethnology**, which is the comparative study of two or more cultures. Ethnology often utilizes the data taken from ethnographic research and applies it to a single cross cultural topic, often comparing and contrasting various cultures. Anthropologists who focus on one culture are called ethnographers while those who focus on several cultures are called ethnologists.

Ethnology can be used to identify and attempt to explain cross cultural variation in a number of topics or cultural elements such as: marriage, religion, subsistence practices, political organization, and parenting, just to name a few. An example of this can be seen in Munroe *et. al.* (1983) when the amount of time spent performing universal activities such as food preparation, child rearing and hygiene are compared between the Canchinos (a Quechua-speaking people in Peru), the Kikuyu (a Bantu-speaking people in Kenya), the Logoli (also a Bantu-speaking people in Kenya) and suburban upper-middle class Americans who lived in Los Angeles County.

What is the "field"?

In contrast to work in a laboratory environment, **fieldwork** is done in real-world settings. Originally cultural anthropologists conducted fieldwork within small-scale, relatively isolated cultural groups. Typically, those groups had somewhat simple agrarian or foraging economies and limited access to larger, more industrialized societies (more on these differences in chapter 16). Early cultural anthropologists (ethnographers) sought to understand the entirety of a particular culture (e.g. holism). They spent months to years living in the community, and in that time, they documented in great detail every dimension of people's lives, including their language, subsistence strategies, political systems, formation of families and marriages, and religious beliefs. This was important because it helped researchers appreciate the interconnectedness of all dimensions of social life. The key to the success of this ethnographic approach was not only to spend considerable time observing people in their home settings engaged in day-to-day

activities but also to participate in those activities. It was hoped that this firsthand participation helped build an emic, or insiders, perspective of the culture, something that had been missing in early 20th century social-science research.

Over the years, the goals and focus of anthropological research have changed and cultural anthropologists now study people wherever they are and however they interact with others. Think of the many ways you ordinarily interact with your friends, family, professors, and boss. Is it all face-to-face communication or do you sometimes use text messages to chat with your friends? Do you also sometimes email your professor to ask for clarification on an assignment and then call your boss to discuss your schedule? Do you share funny videos with others on TikTok and then later have a class over Zoom or use Facetime to call a relative? These new technological "sites" of human interaction are fascinating to many ethnographers and have expanded the definition and locations of fieldwork. Issues that affect cultural anthropologists in the field today can be heard on the AnthoPod episode on conducting fieldwork in the United States (Figure: 1).



Figure 1: Conducting Fieldwork in the United States, By Marie Melody Vidal

Field sites are no longer exclusively located in far-flung, isolated, non-industrialized societies. Increasingly research is conducted in urban environments around the globe and digitally online. In addition to the type of field site changing, the numbers of sites able to be explored in an ethnography have also expanded. If an anthropologist studies migration, diasporas, and people in motion, they must now conduct research in multiple locations, this is known as **multi-sited ethnography**.

An Overview of Methodologies

After narrowing down their research interests by selecting a research question or series of questions, the ethnographer heading out into the field will rely a great deal on qualitative research methods such as: participant observation, interviews, gathering life-histories, studying genealogy/kinship, working with, photographing, and filming informants. In addition to these qualitative methods, increasingly, cultural anthropologists sometimes use quantitative research methods to complement their qualitative approaches. Quantitative patterns can be gleaned from statistical analyses, maps, charts, graphs, and textual descriptions.

Anthropological nutritional analysis is an area of research that commonly relies on collecting quantitative data. Nutritional anthropologists explore how factors such as culture, the environment, and economic and political systems interplay to impact human health and nutrition. They may count the calories people consume and expend, document patterns of food consumption, measure body weight and body mass, and test for the presence of parasite infections or nutritional deficiencies. In her ethnography *Dancing Skeletons: Life and Death in West Africa* (2013), Katherine Dettwyler described how she conducted nutritional research in

Mali, which involved weighing, measuring, and testing her research subjects to collect a variety of quantitative data to help her understand the causes and consequences of child malnutrition.

Observation and Participant Observation

Of the various techniques and tools used to conduct ethnographic research, observation in general and participant observation are among the most important. Ethnographers are trained to pay attention to everything happening around them when in the field—from routine daily activities such as cooking dinner to major events such as an annual religious celebration. They observe how people interact with each other, how the environment affects people, and how people affect the environment. These experiences are rigorously documented in their field notes and personal journals.

As previously mentioned, participant observation involves ethnographers observing while they participate in activities with their informants. This technique is important because it allows the researcher to better understand why people do what they do from an emic perspective. Famously, Malinowski (1922: 25) noted that participant observation is an important tool by which "to grasp the native's point of view, his relation to life, to realize his vision of his world." To conduct participant observation, ethnographers must live with or spend considerable time with their informants to establish a strong rapport with them. **Rapport** is a sense of trust and a comfortable working relationship in which the informant and the ethnographer are at ease with each other and agreeable to working together.

The Hawthorne Effect



Figure 4: Hawthorne Works factory of the Western Electric Company, 1925.

In the 1920s, leaders of a Chicago factory called Hawthorne Works (Figure 4) commissioned a study to determine whether or not changing certain aspects of working conditions could increase or decrease worker productivity. Sociologists were surprised when the productivity of a test group increased when the lighting of their workspace was improved. They were even more surprised when productivity improved when the lighting of the workspace was dimmed. In fact almost every change of independent variable — lighting, breaks, work hours — resulted in an improvement of productivity. But when the study was over, productivity dropped again.

Why did this happen? In 1953, Henry A. Landsberger analyzed the study results to answer this question. He realized that employees' productivity increased because sociologists were paying attention to them. The sociologists' presence influenced the study results. Worker behaviors were altered not by the lighting but by the study itself. From this, researchers learned the importance of carefully planning their roles as part of their research design (Franke & Kaul, 1978). Landsberger called the workers' response the **Hawthorne effect** — people changing their behavior because they know they are being watched as part of a study. The Hawthorne effect may be unavoidable in some research.

Conversations and Interviews

Another primary technique for gathering ethnographic data is simply talking with people and interviewing them. This can be a casual, **unstructured interview** or conversation about ordinary topics or it can be a **semi-structured interview** where questions are prepared ahead of time but also left open going in new and unexpected directions. An ethnographer may even conduct **formal interviews** where all questions are prepared in advance and strictly adhered to. As we have seen, an important element for successful fieldwork is rapport. Sometimes, engaging in conversation with informants is part of establishing that rapport. Ethnographers frequently use multiple forms of conversation and interviewing for a single research project based on their particular needs. They can record these conversations and interviews with an audio recording device or simply engage in the conversation and then later write down everything they recall about it. Conversations and interviews are an essential part of most ethnographic research designs because spoken communication is central to humans' experiences.

Gathering Life Histories

Collecting a personal narrative of someone's life, their **life history**, is a valuable ethnographic technique and is often combined with other techniques. Life histories provide the context in which culture is experienced and created by individuals and describe how individuals have reacted, responded, and contributed to changes that occurred during their lives. They also help anthropologists be more aware of what makes life meaningful to an individual and to focus on the particulars of individual lives, on

the tenor of their experiences and the patterns that are important to them. Researchers often include life histories in their ethnographic texts as a way of intimately connecting the reader to the lives of the informants.

The Genealogical (kinship) Method

The **genealogical (kinship) method** has a long tradition in ethnography. Developed in the early years of anthropological research to document the family systems of tribal groups, it is still used today to discover connections of kinship, descent, marriage, and the overall social system. Because kinship and genealogy are so important in many nonindustrial societies, the technique is used to collect data on important relationships that form the foundation of the society and to trace social relationships more broadly in communities.

Key Informants

Within any culture or microculture, there are always particular individuals, the **key informants** who are more knowledgeable about the culture than others and who may have more-detailed or privileged knowledge. Anthropologists conducting ethnographic research in the field often seek out such cultural specialists to gain a greater understanding of certain issues and to answer questions they otherwise could not answer. When an anthropologist establishes a rapport with these individuals and begins to rely more on them for information than on others, the cultural specialists are referred to as key informants or key cultural consultants.

Key informants can be exceptional assets in the field, allowing the ethnographer to uncover the meanings of behaviors and practices the researcher cannot otherwise understand. Key informants can also help researchers by directly observing others and reporting those observations to the researchers, especially in situations in which the researcher is not allowed to be present or when the researcher's presence could alter the participants' behavior. In addition, ethnographers can check information they obtained from other informants, contextualize it, and review it for accuracy. Having a key informant in the field is like having a research ally. The relationship can grow and become enormously fruitful.

A famous example of the central role that key informants can play in an ethnographer's research is a man named Doc in William Foote Whyte's *Street Corner Society* (1943). In the late 1930s, Whyte studied social relations between street gangs and "corner boys" in a Boston urban slum inhabited by first- and second-generation Italian immigrants. A social worker introduced Whyte to Doc and the two hit it off. Doc proved instrumental to the success of Whyte's research. He introduced Whyte to his family and social group and vouched for him in the tight-knit community, providing access that Whyte could not have gained otherwise.

Problem-Oriented Research

In the early years, ethnographers were interested in exploring the entirety (or whole) of a culture. Taking an **inductive approach**, they generally attempted to collect evidence without trying to definitively prove or disprove a hypothesis. Instead, the goal was to explore the people, their culture, and their homelands and compare that to what had previously been written about them. The focus of the study was allowed to emerge gradually during their time in the field. Often, this approach to ethnography resulted in rather lengthy, general ethnographic descriptions. Today, anthropologists are increasingly taking a more deductive approach to ethnographic research. In a **deductive approach**, the researcher creates a hypothesis and then designs a study to prove or disprove the hypothesis. Rather than arriving at the field site with only general ideas about the goals of the study, they tend to select a particular problem before arriving and then let that problem guide their research.

Anthropological Theory

In addition to coming into their fieldwork with a distinct research question in mind the anthropologist will also be influenced by and use certain theoretical perspectives. But what is a **theory**? "Theories are analytical tools for understanding, explaining, and making predictions about a given subject matter" (Regna 2013). Theories help to direct our thinking and provide a common framework from which people can work. Oftentimes through the process of using a theoretical framework, we discover that it lacks explanatory abilities. When that happens, it is modified or even abandoned.

There are a number of theoretical approaches used in cultural anthropology. Not all theories once popular in anthropology are used any more. Social evolutionism, for example, was abandoned early on in cultural anthropology. Others, like Culture and Personality, Cultural Ecology, and Cultural Materialism have become jumping off points for more modern theoretical perspectives.

Early Armchair Anthropology

Before ethnography was a fully developed research method, anthropologists in the nineteenth and early twentieth centuries used techniques that were much less reliable to gather data about people throughout the world. From the comfort of their homes and library armchairs, early scholars collected others' travel accounts and used them to come to conclusions about far-flung cultures

and peoples. The reports typically came from missionaries, colonists, adventurers, and business travelers and were often incomplete, inaccurate, and/or misleading, exaggerated or omitted important information, and romanticized the culture.

Early scholars such as Wilhelm Schmidt and E. B. Tylor sifted through artifacts and stories brought back by travelers or missionaries and selected the ones that best fit their frequently pre-conceived ideas about the peoples involved. By relying on this flawed data, they often drew inaccurate or even racist conclusions. They had no way of knowing how accurate the information was and no way to understand the full context in which it was gathered.

The work of James Frazer (1854–1941) provides a good example of the problems associated with such anthropological endeavors. Frazer was a Scottish social anthropologist who was interested in myths and religions around the world. He read historical documents and religious texts found in libraries and book collections. He also sent questionnaires to missionaries and colonists in various parts of the world asking them about the people with whom they were in contact. He then used the information to draw sweeping conclusions about human belief systems. His most famous book, The Golden Bough: A Study of Magic and Religion (2015) has been published and republished in multiple versions and editions since it's first printing in 1890. In it he described similarities and differences in magical and religious practices around the world and concluded that human beliefs progressed through three stages: from primitive magic to religion and from religion to science. This theory implied that some people were less evolved and more primitive than others. Of course, contemporary anthropologists do not view any people as less evolved than another. Instead, anthropologists today seek to uncover the historical, political, and cultural reasons behind peoples' behaviors rather than assuming that one culture or society is more advanced than another.

The main problem with Frazer's conclusion can be traced back to the fact that he did not do any research himself and none of the information he relied on was collected by an anthropologist. He never spent time with the people he was researching. He never observed the religious ceremonies he wrote about and certainly never participated in them. Had he done so, he might have been able to appreciate that all human groups at the time (and now) were equally pragmatic, thoughtful, intelligent, logical, and "evolved." He might also have appreciated the fact that how and why the information is gathered affects the quality of the information. For instance, if a colonial administrator offered to pay people for their stories, some of the storytellers might have exaggerated or even made-up stories for financial gain. If a Christian missionary asked recently converted parishioners to describe their religious practices, they likely would have omitted non-Christian practices and beliefs to avoid disapproval and maintain their positions in the church. A male traveler who attempted to document rite-of-passage traditions in a culture that prohibited men from asking such questions of women would generate data that could erroneously suggest that women did not participate in such activities. All of these examples illustrate the pitfalls of armchair anthropology.

Off the Veranda

Fortunately, the reign of armchair anthropology was brief. Around the turn of the twentieth century, anthropologists trained in the natural sciences began to reimagine what a science of humanity should look like and how social scientists ought to go about studying cultural groups. Some of those anthropologists insisted that one should at least spend significant time actually observing and talking to the people studied. Early ethnographers such as Franz Boas and Alfred Cort Haddon typically traveled to the remote locations where the people in question lived and spent a few weeks to a few months there. They sought out a local Western host who was familiar with the people and the area (such as a colonial official, missionary, or businessman) and found accommodations through them. Although they did at times venture into the community without a guide, they generally did not spend significant time with the local people. Thus, their observations were primarily conducted from the relative comfort and safety of a porch—from their verandas.

Polish anthropologist Bronislaw Malinowski's (1884–1942) pioneering method of **participant observation** fundamentally changed the relationship between ethnographers and the people under study (Figure 2). In 1914, he traveled to the Trobriand Islands and ended up spending nearly four years conducting fieldwork among the people there. In the process, he developed a rigorous set of ethnographic techniques he viewed as best-suited to gathering accurate and comprehensive ethnographic data. One of the hallmarks of his method was that it required the researcher to get off the veranda to interact with and even live among the natives. In a well-known book about his research, Argonauts of the Western Pacific (1922), Malinowski described his research techniques and the role they played in his analysis of the Kula ceremony, an exchange of armbands and necklaces among members of the social elite. He concluded that the ceremonies were at the center of Trobriand life and represented the culmination of an elaborate multi-year venture called the Kula Ring that involved dangerous expeditions and careful planning. Ultimately, the key to his discovering the importance of the ceremony was that he not only observed the Kula Ring but also participated in it. This technique of participant observation is central to anthropological research today. Malinowski did more than just observe people from afar; he actively interacted with them and participated in their daily activities. And unlike early anthropologists who worked through translators,

Malinowski learned the native language, which allowed him to immerse himself in the culture. He carefully documented all of his observations and thoughts. Malinowski's techniques are now central components of ethnographic fieldwork.

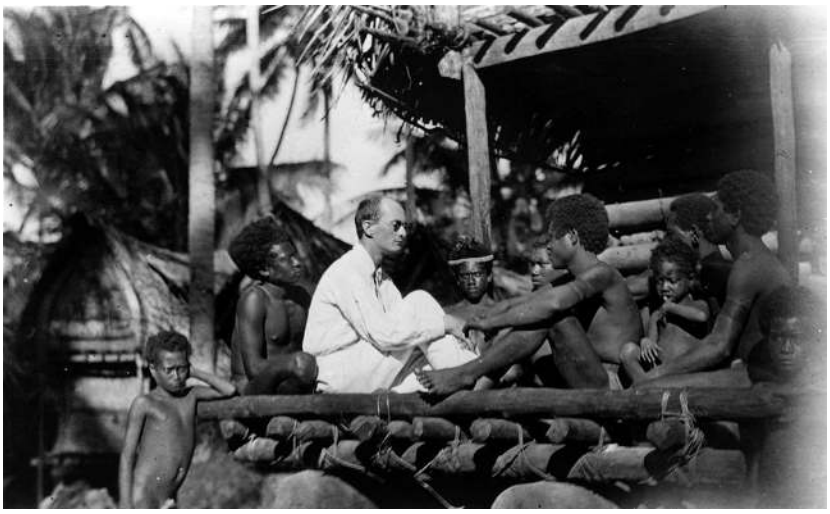


Figure 2: Picture of Bronislaw Malinowski with natives on Trobriand Islands. 1917-1918. This image is in the public domain.

Salvage Ethnography

Despite Malinowski's tremendous contributions to ethnography and anthropology generally, he was nevertheless a man of his time. A common view in the first half of the twentieth century was that many "primitive" cultures were quickly disappearing, and features of those cultures needed to be recorded (salvaged) before they were lost. Anthropologists such as Malinowski, Franz Boas, and many of their students sought to document, photograph, and otherwise preserve cultural traditions in "dying" cultures in groups such as Native Americans and other traditional societies experiencing rapid change due to modernization, dislocation, and contact with outside groups. They also collected cultural artifacts, removing property from the communities and placing it in museums and private collections.

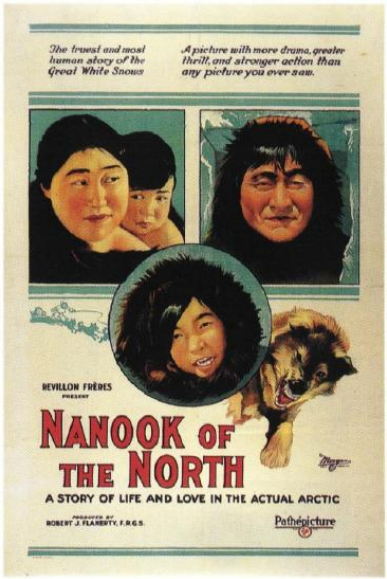


Figure 3: Promotional poster for the 1922 documentary Nanook of the North.

Others who were not formally trained in the sciences or in anthropology also participated in salvage activities. For instance, in his "documentary" film Nanook of the North(1922) (Figure 3), Robert Flaherty filmed the life of an Inuit man named Nanook and his family in the Canadian Arctic. In an effort to preserve on film what many believed was a traditional way of life soon to be lost, Flaherty took considerable artistic license to represent the culture as he imagined it was in the past, including staging certain scenes and asking the Inuit men to use spears instead of rifles to make the film seem more "authentic."

Today, anthropologists recognize that human cultures constantly change as people respond to social, political, economic, and other external and internal influences—that there is no moment when a culture is more authentic or more primitive. They acknowledge that culture is fluid and cannot be treated as isolated in time and space. Just as we should not portray people as primitive vestiges of an earlier stage of human development, we also should not romanticize a culture or idealize another's suffering as more authentic or natural.

Cultural Relativism and Objectivity

The guiding philosophy of modern anthropology is **cultural relativism**—the idea that we should seek to understand another person's beliefs and behaviors from the perspective of their culture rather than our own. Anthropologists do not judge other cultures based on their values nor view other cultural ways of doing things as inferior. Instead, anthropologists seek to understand people's beliefs within the system they have for explaining things.

Cultural relativism is an important methodological consideration when conducting research. In the field, anthropologists must temporarily suspend their own value, moral, and esthetic judgments and seek to understand and respect the values, morals, and esthetics of the other culture on their terms. This can be a challenging task, particularly when a culture is significantly different from the one in which they were raised. Despite the importance of cultural relativism, it is not always possible and at times is inappropriate to maintain complete objectivity in the field. Researchers may encounter cultural practices that are an affront to strongly held moral values or that violate the human rights of a segment of a population. In other cases, they may be conducting research in part to advocate for the rights of a marginalized group.

Take, for example, the practice of female genital cutting (FGC), also known as female genital mutilation (FGM), a practice that is common in various regions of the world, especially in parts of Africa and the Middle East. Such practices involving modification of female genitals for non-medical and cultural reasons range from clitoridectomy (partial or full removal of the clitoris) to infibulation, which involves removal of the clitoris and the inner and outer labia and suturing to narrow the vaginal opening, leaving only a small hole for the passage of urine and menstrual fluid Anthropologists working in regions where such practices are common often understandably have a strong negative opinion, viewing the practice as unnecessary medically and posing a risk of serious infection, infertility, and complications from childbirth. They may also be opposed to it because they feel that it violates the right of women to experience sexual pleasure, something they likely view as a fundamental human right. Should the anthropologist intervene to prevent girls and women from being subjected to this practice?

Anthropologist Janice Boddy (2007) studied FGC/FGM in rural northern Sudan and sought to explain it from a culturally relativistic perspective. She found that the practice persists, in part, because it is believed to preserve a woman's chastity and curb her sexual desire, making her less likely to have affairs once she is married. Boddy's research showed how the practice makes sense in the context of a culture in which a woman's sexual conduct is a symbol of her family's honor, which is important culturally. Boddy's relativistic explanation helps make the practice comprehensible and allows cultural outsiders to understand how it is internally culturally coherent. But the question remains. Once anthropologists understand why people practice FGC/FGM, should they accept it? Because they uncover the cultural meaning of a practice, must they maintain a neutral stance or should they fight a practice viewed as an injustice? How does an anthropologist know what is right? Unfortunately, answers to these questions are rarely simple, and anthropologists as a group do not always agree on an appropriate professional stance and responsibility.

Field Notes

Field notes are indispensable when conducting ethnographic research. Although making such notes is time-consuming, they form the primary record of one's observations. Generally speaking, ethnographers write two kinds of notes: field notes and personal reflections. **Field notes** are detailed descriptions of everything the ethnographer observes and experiences. They include specific details about what happened at the field site, the ethnographer's sensory impressions, and specific words and phrases used by the people observed. They also frequently include the content of conversations the ethnographer had and things the ethnographer overheard others say. Ethnographers also sometimes include their personal reflections on the experience of writing field notes. Often, brief notes are jotted down in a notebook while the anthropologist is observing and participating in activities. Later, they expand on those quick notes to make more formal field notes, which may be organized and typed into a report. It is common for ethnographers to spend several hours a day writing and organizing field notes.

Ethnographers often also keep a personal journal or diary that may include information about their emotions and personal experiences while conducting research. These personal reflections can be as important as the field notes. Ethnography is not an objective science. Everything researchers do and experience in the field is filtered through their personal life experiences. Two ethnographers may experience a situation in the field in different ways and understand the experience differently. For this reason, it

is important for researchers to be aware of their reactions to situations and be mindful of how their life experiences affect their perceptions. In fact, this sort of reflexive insight can turn out to be a useful data source and analytical tool that improves the researcher's understanding.

The work of anthropologist Renato Rosaldo provides a useful example of how anthropologists can use their emotional responses to fieldwork situations to advance their research. In 1981, Rosaldo and his wife, Michelle, were conducting research among the Ilongot of Northern Luzon in the Philippines. Rosaldo was studying men in the community who engaged in emotional rampages in which they violently murdered others by cutting off their heads. Although the practice had been banned by the time Rosaldo arrived, a longing to continue headhunting remained in the cultural psyche of the community.

Whenever Rosaldo asked a man why he engaged in headhunting, the answer was that rage and grief caused him to kill others. At the beginning of his fieldwork, Rosaldo felt that the response was overly simplistic and assumed that there had to be more to it than that. He was frustrated because he could not uncover a deeper understanding of the phenomenon. Then, on October 11, 1981, Rosaldo's wife was walking along a ravine when she tripped, lost her footing, and fell 65 feet to her death, leaving Rosaldo a grieving single father. In his essay "Grief and a Headhunter's Rage," Rosaldo (2004) later wrote that it was his own struggle with rage as he grieved for his wife that helped him truly grasp what the Ilongot men meant when they described their grief and rage:

> *Only a week before completing the initial draft of an earlier version of this introduction, I rediscovered my journal entry, written some six weeks after Michelle's death, in which I made a vow to myself about how I would return to writing anthropology, if I ever did so, "by writing Grief and a Headhunter's Rage . . ." My journal went on to reflect more broadly on death, rage, and headhunting by speaking of "my wish for the Ilongot solution; they are much more in touch with reality than Christians. So, I need a place to carry my anger – and can we say a solution of the imagination is better than theirs? And can we condemn them when we napalm villages? Is our rationale so much sounder than theirs?" All this was written in despair and rage (2004, 171).*

Only through the very personal and emotionally devastating experience of losing his wife was Rosaldo able to understand the emic perspective of the headhunters. The result was an influential and insightful ethnographic account.

Ethical Guidelines

From the earliest days of anthropology as a discipline, concern about the ethical treatment of people who take part in studies has been an important consideration. Ethical matters are central to any research project and anthropologists take their ethical responsibilities seriously. As discussed throughout this chapter, anthropologists are oriented toward developing empathy for their informants and understanding their cultures and experiences from an emic perspective. Many also have a sense of personal responsibility for the well-being of the local people with whom they work in the field.

The American Anthropological Association has developed a Code of Ethics that all anthropologists should follow in their work. Among the many ethical responsibilities outlined in the code, doing no harm, obtaining informed consent, maintaining subjects' anonymity, and making the results of the research accessible are especially important responsibilities.

American Anthropological Association is committed to helping all anthropologists have access to quality information regarding methodological and ethical best practices. The Association's Principles of Professional Responsibility include:

- Do No Harm
- Be Open and Honest Regarding Your Work
- Obtain Informed Consent and Necessary Permissions
- Weigh Competing Ethical Obligations Due Collaborators and Affected Parties
- Make Your Results Accessible
- Protect and Preserve Your Records
- Maintain Respectful and Ethical Professional Relationships

Do No Harm

First and foremost, anthropologists must ensure that their involvement with a community does not harm or embarrass their informants. Researchers must carefully consider any potential harm associated with the research, including legal, emotional, political, economic, social, and cultural dimensions, and take steps to insulate their informants from such harm. Since it is not always possible to anticipate every potential repercussion at the outset, anthropologists also must continually monitor their work to ensure that their research design and methods minimize any risk.

Today, Do No Harm is a central ethical value in anthropology. However, it can be difficult to predict every challenge one may encounter in the field or after the work is published. Anthropologists must continually reevaluate their research and writing to ensure that it does not harm the informants or their communities. Before fieldwork begins, researchers from universities, colleges, and institutions usually must submit their research agendas to an **institutional review board** (IRB). IRBs review research plans to ensure that the proposed studies will not harm human subjects. In many cases, the IRB is aware of the unique challenges and promise of anthropological research and can guide the researcher in eliminating or mitigating potential ethical problems.

Informed Consent

In addition to taking care to do no harm, anthropologists must obtain informed consent from all their informants before conducting any research. **Informed consent** is the informant's agreement to take part in the study. Originally developed in the context of medical and psychological research, this ethical guideline is also relevant to anthropology. Informants must be aware of who the anthropologist is and the research topic, who is financially and otherwise supporting the research, how the research will be used, and who will have access to it. Finally, their participation must be optional and not coerced. They should be able to stop participating at any time and be aware of and comfortable with any risks associated with their participation.

In medical and psychological research settings in the United States, researchers typically obtain informed consent by asking prospective participants to sign a document that outlines the research and the risks involved in their participation, acknowledging that they agree to take part. In some anthropological contexts, however, this type of informed consent may not be appropriate. People may not trust the state, bureaucratic processes, or authority, for example. Asking them to sign a formal legal-looking document may intimidate them. Likewise, informed consent cannot be obtained with a signed document if many in the community cannot read. The anthropologist must determine the most appropriate way to obtain informed consent in the context of the particular research setting.

Maintain Anonymity and Privacy

Another important ethical consideration for anthropologists in the field is ensuring the anonymity and privacy of informants who need such protection. Sometimes an informant's legal status can put them at considerable physical or legal risk and in cases such as this it may be appropriate to sue pseudonyms, even when writing field notes. Informants' names, their relatives, friends, schools, and work places are changed to protect them from being identified. Maintaining privacy and anonymity is an important way for anthropologists to ensure that their involvement does no harm.

Make Results Accessible

Finally, anthropologists must always make their final research results accessible to their informants and to other researchers. For informants, a written report in the researcher's native language may not be the best way to convey the results. Reports can be translated or the results can be converted into a more accessible format. Examples of creative ways in which anthropologists have made their results available include establishing accessible databases for their research data, contributing to existing databases, producing films that portray the results, and developing texts or recommendations that provide tangible assistance to the informants' communities. Though it is not always easy to make research results accessible in culturally appropriate ways, it is essential that others have the opportunity to review and benefit from the research, especially those who participated in its creation.

Terms You Should Know

Qualitative research

Quantitative research

Ethnography

Participant Observation

Ethnology

Fieldwork

Multi-sited ethnography

Inductive approach

Deductive approach

Theory

Armchair anthropology

Salvage ethnography

cultural relativism

field notes

rapport

Hawthorne effect

Unstructured interview

Semi-structured interview

Formal interviews

Life-history

genealogical (kinship) method

Key Informants

Institutional Review Board

Informed consent

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5.2: Subsistence and Political Systems

Learning Objectives

By the end of this chapter, you will be able to:

- Identify the four modes of subsistence and describe the major activities associated with obtaining food in each system.
- Assess the ways in which subsistence systems are linked to expectations about gender roles.
- Categorize the social and economic characteristics associated with agriculture and describe the benefits and drawbacks of the agricultural subsistence system.
- Identify the four levels of socio-cultural integration (band, tribe, chiefdom, and state) and describe their characteristics.
- Compare systems of leadership in egalitarian and non-egalitarian societies.

Where does your food come from?

Think about the last meal you ate. Where did the ingredients come from? If it was a cheeseburger, where did the cow live and die? Now think about all the food you consume in a normal week. Can you identify the geographic origin of all the ingredients? In other words, how much do you know about the trip your food took to arrive at your plate? How much you know about where your food comes from would tell an anthropologist something about the subsistence system used in your community. A **subsistence system** is the set of practices used by members of a society to acquire food. If you are like me and you cannot say much about where your food comes from, then you are part of a society that separates food production from consumption, a recent development in the history of humans. People who come from nonagricultural societies have a more direct connection to their food and are likely to know where 100 percent of their food comes from.

Finding food each day is a necessity for every person no matter where that person lives, but food is not just a matter of basic survival. Humans assign symbolic meaning to food, observing cultural norms about what is considered “good” to eat and applying taboos against the consumption of other foods. Catholics may avoid meat during Lent, for instance, while Jewish and Islamic communities forbid the consumption of certain foods such as pork. In addition to these attitudes and preferences, every society has preferred methods for preparing food and for consuming it with others. The cultural norms and attitudes surrounding food and eating are known as **foodways**. By studying both the subsistence system used by a society to acquire food and the foodway associated with consuming it, anthropologists gain insight into the most important daily tasks in every society.

Studying Subsistence Systems

Modern anthropological studies of subsistence systems draw on insights and perspectives from several different fields, including biology, chemistry, and ecology, as well as a range of ethnographic techniques. This interdisciplinary perspective allows for cross-cultural comparison of human diets. In several decades of anthropological research on subsistence systems, anthropologists have observed that the quest for food affects almost every aspect of daily life. For instance, every person plays a role in society as a producer, distributor, or consumer of food (or all three!). In the journey of a fish from the sea to the plate, for instance, we can see that in some societies, the same person can fill more than one of those roles, while in other societies there is more specialization. In a small fishing village, the same person might catch the fish, distribute some extra to friends and family, and then consume the bounty that same day. In a city, the consumer of the fish at a fancy restaurant is not the same person who caught the fish. In fact, that person almost certainly has no knowledge of who caught, cleaned, distributed, and prepared the fish he or she is consuming. The web of social connections that we can trace through subsistence provide a very particular kind of anthropological insight into how societies function at their most basic level.

Modes of Subsistence

When anthropologists first began to examine subsistence systems, they started like scientists often do, with classification. Early on, anthropologists saw the benefit of grouping similar societies into types, or categories, based on the range of practices they used in the quest for food. These groupings allowed for comparisons between cultures. At a basic level, societies can be divided into those that have an **immediate return system** for finding food and those that have a **delayed return system**. The residents of a small fishing village who eat the fish they catch each day have an immediate return on their labor. Farmers who must wait several months between the time they plant seeds and the time they harvest have a delayed return system.

Beyond this basic division, anthropologists recognize four general types of food system known as **modes of subsistence**. The four modes of subsistence are foraging, pastoralism, horticulture, and agriculture. Each mode is defined by the tasks involved in

obtaining food as well as the way members of the society are organized socially to accomplish these tasks. Because each mode of subsistence is tailored to particular ecological conditions, we can think of each culture's subsistence system as an adaptation, or a set of survival strategies uniquely developed to suit a particular environment. Because culture shapes the way we view and interact with the environment, different societies can adapt to similar environments in different ways.

Can all societies be categorized neatly into one of these modes? No! In fact, almost every society combines one or more of these strategies into their subsistence practices. For example, in the United States there are individuals who participate in all of these subsistence modes, including foraging. When anthropologists analyze a subsistence system, they look for the dominant mode of subsistence, or the most typical way that members of a society procure food. So, while some people in the United States grow their own food or hunt wild animals, the dominant mode of subsistence is agriculture, and people obtain food primarily by purchasing it.

Socio-Political Systems

Like all human systems, a society's subsistence system is intricately linked to other aspects of culture such as kinship, politics, and religion. For this reason this chapter will discuss the ways in which cultures around the world have organized both their subsistence strategies and also methods of socio-political organization. Although we can study these systems in isolation, it is important to remember that in the real world all aspects of culture overlap in complex ways. Consider harvest rituals, for example, which are religious ceremonies focused on improving the food supply. These rituals are shaped by religious beliefs as well as the demands and challenges of obtaining food. Likewise, subsistence systems are the economic base of every society. Working to put food on the table is the essential task of every family or household, and this work is the basis of a domestic economy that interacts with the **modes of production** and **modes of exchange**.

In 1975 Elman Service developed an influential scheme for categorizing the political character of societies that recognized four levels of socio-cultural integration: band, tribe, chiefdom, and state. A **band** is the smallest unit of political organization, consisting of only a few families and no formal leadership positions. **Tribes** have larger populations but are organized around family ties and have fluid or shifting systems of temporary leadership. **Chiefdoms** are large political units in which the chief, who usually is determined by heredity, holds a formal position of power. **States** are the most complex form of political organization and are characterized by a central government that has a monopoly over legitimate uses of physical force, a sizeable bureaucracy, a system of formal laws, and a standing military force.

Each of these forms of political integration can be further categorized as egalitarian, ranked, or stratified. Band societies (like foragers) and tribal societies generally are often "**egalitarian**"—there is no great difference in status or power between individuals and there are as many valued status positions in the societies as there are persons able to fill them. Chiefdoms are ranked societies; there are substantial differences in the wealth and social status of individuals based on how closely related they are to the chief. In **ranked societies**, there are a limited number of positions of power or status, and only a few can occupy them. State societies are **stratified**. There are large differences in the wealth, status, and power of individuals based on unequal access to resources and positions of power. Socio-economic classes, for instance, are forms of stratification in many state societies (Morton 1967).

A Closer Look at Foraging

"Why should we plant, when there are so many mongongos in the world?"—/Xashe, !Kung forager. Lee (1968)

Foraging is a mode of subsistence defined by its reliance on wild plant and animal food resources already available in the environment rather than on domesticated species that have been altered by human intervention. Foragers use a remarkable variety of practices to procure meals. Hunting for animal protein is central to the foraging lifestyle and **pedestrian foragers** collect their food on foot by capturing and consuming a wide variety of animals, from squirrels caught with a bow and arrow or blow dart to buffalo once killed by the dozens in communal hunts. Fishing is common in foraging societies closer to marine resources and can form the basis for acquiring protein in these communities. **Aquatic foragers** are known to exploit coastal shellfish and crab, to harvesting offshore resources such as deep sea fish and marine mammals such as whales and seals. The Kwakwaka'wakw fished, hunted and gathered according to the seasons, allowing them to accumulate preservable food and return to their winter villages for several months. The gathering part of the "hunting and gathering" lifestyle required expert knowledge of where plant resources can be found, when they will be best to harvest, and how to prepare them for consumption. Foraging is the only immediate return subsistence system.

Foraging societies also tend to have what is called a broad spectrum diet: a diet based on a wide range of resources. Many of the foods regularly eaten by foragers, such as insects and worms, would not necessarily be considered edible by many people in the United States. For example, many people do not know that earthworms are a good source of iron and high-quality protein, roughly

equivalent to eggs. Foragers are scientists of their own ecosystems, having acquired extensive knowledge of the natural world through experience that allows them to exploit many kinds of food resources.

How to Eat Fried Earthworms By Thomas Rockwell



Figure 1: "Bamboo Worms on Plate" by Takoradee, CC BY-SA 3.0 <http://creativecommons.org/licenses/by-sa/3.0/>, via Wikimedia Commons

Culture plays a large role in influencing people's subsistence practices. In many western cultures there is almost a taboo against eating varieties of insects, including earthworms. Famously in the 1973 Thomas Rockwell wrote a children's book titled *How to Eat Fried Earthworms* about a group of boys who bet their friend that he could not eat 15 earthworms in 15 days for $50. The book played on both children's and adults fears in the United States of eating something that different cultures around the world would have no problem consuming.

Rule-Breaking Foragers

Nomadic lifestyles are the norm for most foragers, but there have been some societies that have broken this rule and developed large-scale sedentary societies. This was possible in areas with abundant natural resources, most often fish. Historically, fishing formed the foundation of large-scale foraging societies in Peru, the Pacific Northwest (the Kwakwaka'wakw), and Florida (the Calusa). These societies all developed advanced fishing technologies that provided enough food surplus that some people could stop participating in food procurement activities.

Socio-Political Systems and Foragers

Foraging societies are usually described as "**egalitarian**" societies and in terms of political organization, and most often are organized into bands. Societies organized as a **band** consist of foragers who rely on hunting and gathering and are therefore nomadic, are few in number (rarely exceeding 100 persons), and form small groups consisting of a few families and a shifting population. Bands are said to lack formal leadership positions. What leadership there is in band societies tends to be transient and subject to shifting circumstances. For example, among the Paiute in North America, "rabbit bosses" coordinated rabbit drives during the hunting season but played no leadership role otherwise. Some "leaders" are excellent mediators who are called on when individuals are involved in disputes while others are perceived as skilled shamans or future-seers who are consulted periodically. There are no formal offices or rules of succession (Steward 1955).

In larger scale societies, it may seem that social classes—differences in wealth and status—are, like death and taxes, inevitable: that one is born into wealth, poverty, or somewhere in between and has no say in the matter, at least at the start of life, and that social class is an involuntary position in society. However, the idea of social classes is not universal and in foraging societies the basic ingredients for social class do not exist. Among foragers, there is no advantage to hoarding food; in most climates, it will rot before one's eyes. Nor is there much personal property or leadership. Because foraging societies tend to move their camps frequently to exploit various resources, holding on to a lot of personal possessions or "wealth" is impractical. The !Kung, Inuit, and aboriginal Australians all represent egalitarian societies in which there are few differences between members in wealth, status, and power. Highly skilled and less skilled hunters do not belong to different strata in the way that the "captains of industry" do from you and me. The less skilled hunters in egalitarian societies receive a share of the meat and have the right to be heard on important decisions. Egalitarian societies also lack a government or centralized leadership.

Foragers also place a high cultural value on generosity. Sharing of food and other resources is a social norm and a measure of a person's goodness. Those who resist sharing what they have with others might be ridiculed, or could even become social outcasts. Over the long term, daily habits of giving and receiving reinforce social equality. This practice is also an important survival strategy that helps groups get through times of food scarcity.

Though foragers have high levels of social equality, and are ranked as "egalitarian", not everyone is treated exactly the same. **Gender inequality** exists in many communities and develops from the fact that work among foragers is often divided along gender lines. Some jobs, such as hunting large animals, belong to men whose success in hunting gives them high levels of respect and prestige. While women do hunt in many communities and often contribute the majority of the group's food through gathering, their work tends not to be as socially prestigious. Likewise, elders in foraging communities tend to command respect and enjoy a higher social status, particularly if they have skills in healing or ritual activities.

Assessing the Foraging Lifestyle

Contemporary studies of foraging also recognize that foragers have rarely lived in isolation. Throughout the world, foragers have lived near farming populations for hundreds or even thousands of years. Conflicts and competition for resources with non-foraging societies have characterized the foraging experience and foragers, with their relatively small population size and limited technology, have often been on the losing end of these confrontations. Government policies containing foragers to small "reservation" areas or forcing them to settle in towns have had catastrophic effects on foragers, as has the destruction through agricultural and industrial development of the ecosystems on which many groups once depended. A sad worldwide pattern of exploitation and marginalization is the reason that many foragers today live in dwindling communities in marginal ecological zones. Examples of these struggles with government agencies can be seen with the San in Botswana (Figure 3).



Figure 2: Why the native people of the Kalahari are struggling to stay by PBS Newshour, circa 2018

A Closer Look at Pastoralism

> *"To us, a co-wife is something very good, because there is much work to do. When it rains . . . the village gets mucky. And it's you who clears it out. It's you who . . . looks after the cows. You do the milking . . . and your husband may have very many cows. That's a lot of work. . . . So Maasai aren't jealous because of all this work."*
>
> *—Maiyani, Maasai woman. Wallace and Low (1980)*

Pastoralism is a subsistence system that relies on herds of domesticated livestock. Over half of the world's pastoralists reside in Africa, but there are also large pastoralist populations in Central Asia, Tibet, and arctic Scandinavia and Siberia. The need to supply grazing fields and water for the livestock requires moving several times a year. For that reason, this subsistence system is sometimes referred to as **nomadic pastoralism**. In Africa, for instance, a nomadic lifestyle is an adaptation to the frequent periods of drought that characterize the region and put stress on the grazing pastures. Pastoralists may also follow a nomadic lifestyle for other reasons such as avoiding competition and conflict with neighbors or avoiding government restrictions.

Pastoralists can raise a range of different animals, although most often they raise herd animals such as cows, goats, sheep, and pigs. In some parts of South America, alpaca and llama have been domesticated for centuries to act as beasts of burden, much like camels, horses, and donkeys are used in Asia and Africa. Pastoralists who raise alpacas, donkeys, or camels, animals not typically considered food, demonstrate an important point about the pastoralist subsistence system. The goal of many pastoralists is not to produce animals to slaughter for meat, but instead to use other resources such as milk, which can be transformed into butter, yogurt, and cheese, or products like fur or wool, which can be sold. Even animal dung is useful as an alternate source of fuel and can be

used as an architectural product to seal the roofs of houses. In some pastoral societies, milk and milk products comprise between 60 and 65 percent of the total caloric intake. However, very few, if any, pastoralist groups survive by eating only animal products. Often they will engage in other subsistence practices as well, and trade with neighboring farming communities helps pastoralists obtain a more balanced diet and gives them access to grain and other items they do not produce on their own.

A community of animal herders has different labor requirements compared to a foraging community. Caring for large numbers of animals and processing their products requires a tremendous amount of work, chores that are nonexistent in foraging societies. For pastoralists, daily chores related to caring for livestock translate into a social world structured as much around the lives of animals as around the lives of people.



Figure 3: Maasai cows by Matt Biddulph. Attribution-ShareAlike (CC BY-SA 2.0). Although women do most of the work of tending the herd, only men are allowed to own cattle.

The Maasai, a society of east African pastoralists whose livelihood depends on cows, have been studied extensively by anthropologists (Figure 4). Among the Maasai, domestic life is focused almost entirely around tasks and challenges associated with managing the cattle herds. Like many pastoralist communities, the Maasai measure wealth and social status according to the number of animals a person owns. However, raising cattle requires so much work that no one has the ability to do these jobs entirely on his or her own. For the Maasai, the solution is to work together in family units organized around polygynous marriages. A household with multiple wives and large numbers of children will have more labor power available for raising animals.

Pastoralism and Gender Dynamics

The example of the Maasai demonstrates the extent to which a subsistence system can structure gender roles and the division of labor between the sexes. In Maasai society, women do almost all of the work with the cows, from milking several times each day to clearing the muck the cows produce. Despite doing much of the daily work with cattle, Maasai women are not permitted to own cattle. Instead, the cattle belong to the men, and women are given only “milking rights” that allow them to use the products of the female animals and to assign these animals to their sons. Men make all decisions about slaughtering, selling, and raising the cattle. Lack of cattle ownership means that women do not have the same opportunities as men to build wealth or gain social status and the woman’s role in Maasai society is subordinate to man’s. This same pattern is repeated in many pastoralist societies, with women valued primarily for the daily labor they can provide and for their role as mothers.

While women lack the political and economic power enjoyed by Maasai men, they do exercise some forms of power within their own households and among other women. They support each other in the daily hard work of managing both cattle and domestic responsibilities, for instance sharing in childcare, a practice based on the belief that “men care about cattle while women care about children” (Llewellyn-Davies 1979: 208). Because most marriages are arranged by elders, it is common for women to engage in love affairs with other men, but women keep each other’s secrets; telling anyone about another woman’s adultery would be considered an absolute betrayal of solidarity. Women who resist their husband’s authority by having love affairs are also resisting larger claims of male authority and ownership over them (Llewellyn-Davies 1979).

A Closer Look at Horticulture

> *“Yams are persons with ears. If we charm they hear.”*
>
> *—Alo, Trobriand Island farmer (Fortune 1932)*

Have you ever grown a garden in your backyard? How much time did you put into your garden? How much of your diet did the garden yield? People whose gardens supply the majority of their food are known as horticulturalists. Horticulture differs in three ways from other kinds of farming. First, horticulturalists move their farm fields periodically to use locations with the best growing conditions. For this reason, horticulture is sometimes known as **shifting cultivation**. Second, horticultural societies use limited mechanical technologies to farm, relying on physical labor from people and animals, like oxen that may be used to pull a plow, instead of mechanical farm equipment. Finally, horticulture differs from other kinds of farming in its scale and purpose. Most farmers in the United States sell their crops as a source of income, but in horticultural societies crops are consumed by those who grow them or are exchanged with others in the community rather than sold for profit.

Horticultural societies are common around the world; this subsistence system feeds hundreds of thousands of people, primarily in tropical areas of south and central America, Southeast Asia, and Oceania. A vast array of horticultural crops may be grown by horticulturalists, and farmers use their specialized knowledge to select crops that have high yield compared to the amount of labor that must be invested to grow them. A good example is **manioc**, also known as cassava. Manioc can grow in a variety of tropical environments and has the distinct advantage of being able to remain in the ground for long periods without rotting. Compared to corn or wheat, which must be harvested within a particular window of time to avoid spoiling, manioc is flexible and easier to grow as well as to store or distribute to others. Bananas, plantains, rice, and yams are additional examples of popular horticultural crops. One thing all these plants have in common, though, is that they lack protein and other important nutrients. Horticultural societies must supplement their diets by raising animals such as pigs and chickens or by hunting and fishing.

Growing crops in the same location for several seasons leads to depletion of the nutrients in the soil as well as a concentration of insects and other pests and plant diseases. In agricultural systems like the one used in the United States, these problems are addressed through the use of fertilizers, pesticides, irrigation, and other technologies that can increase crop yields even in bad conditions. Horticulturalists respond to these problems by moving their farm fields to new locations. Often this means clearing a section of the forest to make room for a new garden, a task many horticulturalists accomplish by cutting down trees and setting controlled fires to burn away the undergrowth. This approach, sometimes referred to as "**slash-and-burn**," sounds destructive and has often been criticized, but the ecological impact is complex. Once abandoned, farm fields immediately begin to return to a forested state; over time, the quality of the soil is renewed. Farmers often return after several years to reuse a former field, and this recycling of farmland reduces the amount of forest that is disturbed. While they may relocate their farm fields with regularity, horticulturalists tend not to move their residences, so they rotate through gardens located within walking distance of their homes.

Horticulturalists also practice multi-cropping, growing a variety of different plants in gardens that are biodiverse. Growing several different crops reduces the risk of relying on one kind of food and allows for intercropping, mixing plants in ways that are advantageous. A well-known and ingenious example of intercropping is the practice of growing beans, corns, and squash together. Native American farmers in the pre-colonial period knew that together these plants, sometimes called "the three sisters," were healthier than they were if grown separately. Rather than completely clearing farmland, horticulturalists often maintain some trees and even weeds around the garden as a habitat for predators that prey on garden pests. These practices, in addition to skillful rotation of the farmland itself, make horticultural gardens particularly resilient.

Socio-Political Organization in Pastoral and Horticultural Societies

Any group without an official leader is **acephalous** and band societies (which have no formal political structure) are one kind of acephalous society. A second type, the "tribe", relies on extended family structures and/or councils to organize leadership, decision-making, and conflict resolution. Elman Service (1962) referred to these as **tribal societies**. Service's "tribal" form of social organization is associated with modes of subsistence such as pastoralism and horticulture, in which extended families control certain resources such as animals or land. Such communities are typically larger than bands, living in groups ranging from a few hundred to several thousand people.

A cautionary note about the words tribe and tribal. Too often, the adjective tribal is used to describe seemingly irrational group loyalties and conflicts, particularly in non-Western societies. Western journalists sometimes attempt to explain civil wars and guerrilla resistance in non-Western parts of the world in terms of "ancient tribal hatred" among various groups. The word tribe carries connotations of "primitive" lifeways and collective groupthink. In fact, many contemporary conflicts that are attributed to "tribal" animosity occur between groups that got along just fine before the colonial period of European domination. In Rwanda, for instance, the horticultural Hutu and pastoral Tutsi were engaged in cooperative relations and symbiotic forms of trade in precolonial times. Under a divide-and-rule strategy of colonial domination, the Belgians privileged the Tutsi with educational opportunities and jobs in colonial administration, which created resentment among the mostly agrarian Hutu. In this competitive

context, group identities became fixed and rigid. The 1994 genocide in Rwanda is largely a result of these colonial processes fostering division, bias, and competition among these two groups.

Because the word has been so often misused, some anthropologists have replaced the term tribe with the term **ethnic group** to describe large collectivities based on a sense of common ancestry and shared culture. Many anthropology texts do continue to use the term tribal to refer to a specific form of sociopolitical organization based on extended family groups. Many Indigenous groups also use the term to refer to their social group. It's one thing for people in a group to use the term tribe to refer to their own social group and quite another to use the word to describe a whole category of social organization. Service's term tribal was never a unified category anyway, as it refers to communities with a great diversity of forms of political organization. Some rely primarily on extended family structures to provide authority and processes of decision-making, while others rely on special groups or councils and still others use both.

A Closer Look at Agriculture

> *"The adoption of agriculture, supposedly our most decisive step toward a better life, was in many ways a catastrophe from which we have never recovered."*
>
> *—Jared Diamond 21*

Agriculture is defined as the cultivation of domesticated plants and animals using technologies such as irrigation, draft animals, mechanization, and inputs such as fertilizers and pesticides that allow for intensive and continuous use of land resources. About 10,000 years ago, human societies entered a period of rapid innovation in subsistence technologies that paved the way for the emergence of agriculture. The transition from foraging to farming has been described as the **Neolithic Revolution**. Neolithic means "new stone age," a name referring to the very different looking stone tools produced during this time period. The Neolithic was characterized by an explosion of new technologies, not all of them made from stone, which were geared toward agricultural tasks, rather than hunting or processing gathered plant foods. These new tools included scythes for harvesting plants, and adzes or hoes for tilling the soil. These technological developments began to dramatically improve yields and allow human communities to support larger and larger numbers of people on food produced in less space. It is important to remember that the invention of agriculture was not necessarily an advance in efficiency, because more work had to go in to producing more food. Instead, it was an intensification of pastoral and horticultural strategies. As a subsistence system, agriculture is quite different from other ways of making a living, and the invention of agriculture had far-ranging effects on the development of human communities. In analyzing agriculture and its impacts, anthropologists focus on four important characteristics shared by agricultural communities.

The first characteristic of agriculture is reliance on a few **staple crops**, foods that form the backbone of the subsistence system. An example of a staple crop would be rice in China, or potatoes in Ireland. In agricultural societies, farmers generally grow a surplus of these staple crops, more than they need for their own tables, which are then sold for profit. The reliance on a single plant species, or mono-cropping, can lead to decreased dietary diversity and carries the risk of malnutrition compared to a more diverse diet. Other risks include crop failure associated with bad weather conditions or blight, leading to famine and malnutrition, conditions that are common in agricultural communities.

A second hallmark of agriculture is the link between intensive farming and a rapid increase in human population density. The archaeological record shows that human communities grew quickly around the time agriculture was developing, but this raises an interesting question. Did the availability of more food lead to increases in human population? Or, did pressure to provide for a growing population spur humans to develop better farming techniques? This question has been debated for many years. However, the improved productive capabilities of agriculture came at a cost. People were able to produce more food with agriculture, but only by working harder and investing more in the maintenance of the land. The life of a farmer involved more daily hours of work compared to the lifestyle of a forager, so agricultural communities had an incentive to have larger families so that children could help with farm labor. However, the presence of more children also meant more mouths to feed, increasing the pressure to further expand agricultural production. In this way, agriculture and population growth became a cycle.

A third characteristic of agriculture is the development of a **division of labor**, a system in which individuals in a society begin to specialize in certain roles or tasks. Building houses, for instance, becomes a full-time job separate from farming. The division of labor was possible because higher yields from agriculture meant that the quest for food no longer required everyone's participation. This feature of agriculture is what has allowed nonagricultural occupations such as scientists, religious specialists, politicians, lawyers, and academics to emerge and flourish.

The emergence of specialized occupations and an agricultural system geared toward producing surplus rather than subsistence changed the economics of human communities. The final characteristic of agriculture is its tendency to create wealth differences. For anthropologists, agriculture is a critical factor explaining the origins of social class and wealth inequality. The more complex an economic system becomes, the more opportunities individuals or factions within the society have to manipulate the economy for their own benefit. Who do you suppose provided the bulk of the labor power needed in early agricultural communities? Elites found ways to pass this burden to others. Agricultural societies were among the first to utilize enslaved and indentured labor.

Although the development of agriculture is generally regarded as a significant technological achievement that made our contemporary way of life possible, agriculture can also be viewed as a more ominous development that forced us to invest more time and labor in our food supply while yielding a lower quality of life (Sahlins 1972). Agriculture created conditions that led to the expansion of social inequality, violent conflict between communities, and environmental degradation. For these reasons, some scientists like Jared Diamond have argued that the invention of agriculture was humanity's worst mistake.

Agriculture and Chiefdoms

If conditions are favorable, some societies may intensify their farming methods with the development of irrigation systems, terracing, or use of the plow. The organization of labor and resources necessary to develop terracing and systems of irrigation fosters stronger forms of community authority. These intensive methods generate agricultural surplus, which allows some members of the community to specialize in craft production as well as in forms of religious and political leadership. Agricultural surplus can also be traded with other communities in regional networks. These factors promote the local accumulation of wealth. This process of agricultural intensification often results in the centralization of power. **Big men** or lineage elders acquire the authority to command the labor of others and control the storage and distribution of agricultural surplus. They take on the role of organizing regional trade. They oversee the construction of infrastructure such as roads and irrigation systems. They organize groups of local young people to protect the community. They perform important community rituals to ensure agricultural productivity and community prosperity. Over time, such leaders may seek to hand down their leadership roles to their own kin in subsequent generations. As leadership becomes inherited, one lineage in a community may emerge as a royal lineage.

Anthropologists refer to those with formal, inherited positions of community leadership as **chiefs**. Over time, a chief can expand their dominion to incorporate several towns and villages into a small chiefdom. Chiefs may form political alliances with other regional chiefs in large pyramidal systems consisting of various levels of village chiefs and regional chiefs, with one very powerful chief at the top. When a chiefdom expands to encompass multiple ethnic groups in a regional empire, the leader is referred to as a king.

Chiefdoms are a very common form of political organization, found in historical and contemporary societies all over the world. Archaeologists and cultural anthropologists have discovered chiefdoms in Africa, Oceania, the Middle East, Europe, East and Southeast Asia, and North, Central, and South America. While there is considerable diversity in the way these various systems of chieftaincy operate, anthropologists have identified a set of elements common to many of them. The fusing of multiple forms of power is the defining feature of chiefdoms, common to all of them. Economic, political, religious, and military power are all concentrated in the position of the chief.

Central to the power of a chief is control over economic resources such as land, agricultural surplus, and trade. Chiefs often hold land in public trust, determining who may farm where and also allocating farmland to newcomers. They have their own farming plots, commanding regular public labor to work on them. Farmers are obliged to channel a portion of their surplus to the chief, who holds it in storage facilities for public feasts or distribution to those in need. Chiefs regulate local trade and negotiate regional trade networks to benefit their own communities. They control the production and distribution of certain prestige goods, such as royal textiles and ornaments made of jade, gold, copper, or shell. Militarism is another common feature of chiefdoms throughout the world. While the power of leaders in acephalous societies depends on their ability to persuade others to do what they say, chiefs have coercive power to force people to carry out their commands.

Agriculture and States

Starting around 5,000 years ago, a new form of political organization emerged independently in many parts of the world, including Mesopotamia, China, Egypt, India, Mesoamerica, and South America. As some societies in these areas became more populous and hierarchical, their leaders developed modes of governance that combined forms of economic extraction such as taxation and tribute with mechanisms of social control such as law and policing. These governments used public revenues to build infrastructure and monuments. They developed extensive bureaucracies to interpret and enforce laws and maintain social order. Large military forces defended and expanded control over territory, resulting in multiethnic empires. The government asserted a monopoly on the use of

violence, meaning that only the government was allowed to use extreme forms of violence to control or punish anyone. Societies with this form of political organization are called states (Brumfiel 2001).

Many of the features of states mentioned above are shared with the political organization of chiefdoms, and indeed states have generally emerged from the increasing centralization of political power in large chiefdoms. This concentration of power happens gradually over time, stimulated by a variety of pressures, some very general and universal and others more particular to the context of specific societies. Population growth and increasing social stratification are among the more general pressures, while the militaristic threats of specific neighboring societies and the particular opportunities of regional trade affect societies in different ways. Attempting to explain the rise of the state, theorists emphasize two sets of forces that propel the process: integrative pressures and conflict pressures.

Integrative pressures arise from the need for greater coordination in order to satisfy the needs of a growing population. As the population increases, agricultural production must also be increased to meet subsistence needs and for trade. Leaders are compelled to organize more complex **irrigation** systems and forms of landscape management, such as **terracing**(Figure 6) and **raised fields**. These complex systems are built and maintained using public resources and labor. Increasing trade also exerts an integrative force, as leaders strive to maximize the wealth of their societies by stimulating production of agricultural and craft goods and establishing local markets and regional trade opportunities. As agriculture and trade become more complex, power becomes more centralized in order to manage the necessary conditions and infrastructure for economic growth.



Figure 4: Terrace farming on the way to Ransi village, Garhwal, Uttarakhand.

Conflict pressures arise from the need to manage both internal and external threats to the power of leaders and the integrity of their societies. Some theorists argue that political power becomes increasingly centralized as a leader builds a large military force and wages long-term warfare to defend and expand territory. Conquering neighboring societies allows leaders to command regular tribute. In addition to conquest, military forces provide leaders with large cadres of loyal, well-armed supporters. Other theorists argue that internal tensions are just as pivotal to the centralization of power. State societies are built upon a system of social stratification; that is, they feature class and caste systems with unequal access to wealth and power. With the emergence of a class of privileged elites governing over urban craft workers and rural peasantry, leaders face new forms of inequality and potential conflict. Systems of law and ideology are developed to command the cooperation of disadvantaged groups.

Conclusion

This chapter began with a consideration of meals, but revealed that each individual meal is part of a diet generated through a particular subsistence system. Many of our daily experiences, including our attitudes, skills, and relationships with others, are influenced by our subsistence system. Knowing that the Earth has been transformed for thousands of years by human subsistence

activities, we must also consider the ways in which our future will be shaped by the present. Are we managing our resources in a sustainable way? How will we continue to feed growing populations in the future?

Despite agriculture's tremendous productivity, food shortages, malnutrition, and famines are common around the world. How can this be? Many people assume that the world's agricultural systems are not capable of producing enough food for everyone, but this is incorrect. Evidence from agricultural research demonstrates that there is enough worldwide agricultural capacity to feed everyone on the planet (Food and Agriculture Organization of the United Nations 2015). The problem is that this capacity is unevenly distributed. Some countries produce much more food than they need, and others much less. In addition, distribution systems are inefficient and much food is lost to waste or spoilage. It is also true that in an agricultural economy food costs money, and worldwide many people who are starving or undernourished lack food because they cannot pay for it, not because food itself is unavailable.

Terms You Should Know

Subsistence system

Foodways

Immediate return system

Delayed return system

Modes of subsistence

Foraging

Pastoralism

Horticulture

Agriculture

Modes of production

Modes of exchange

Band

Tribe

Chiefdom

State

Egalitarian

Ranked societies

Stratified

Pedestrian foragers

Aquatic foragers

broad spectrum diet

Potlatch

Gender inequality

Acephalous

Ethnic group

Neolithic Revolution

Staple crop

Division of labor

Big men

Chiefs

Irrigation

Terracing

Raised fields

Study Questions

1. A hallmark of agriculture is the separation of food production from food consumption; many people know almost nothing about where their food has come from. How does this lack of knowledge affect the food choices people make? How useful are efforts to change food labels to notify shoppers about the use of farming techniques such as genetic modification or organic growing for consumers? What other steps could be taken to make people more knowledgeable about the journey that food takes from farm to table?
2. The global commodity chains that bring food from many countries to grocery stores in the United States give wealthy consumers a great variety of food choices, but the farmers at the beginning of the commodity chain earn very little money. What kinds of solutions might help reduce the concentration of wealth at the end of the commodity chain?
3. Mono-cropping is a feature of industrial food production and has the benefit of producing staple foods like wheat and corn in vast quantities, but mono-cropping makes our diet less diverse. Are the effects of agricultural mono-cropping reflected in your own everyday diet? How many different plant foods do you eat on a regular basis? How difficult would it be for you to obtain a more diverse diet by shopping in the same places you shop now?
4. Although state societies are efficient in organizing people and resources, they also are associated with many disadvantages, such as extreme disparities in wealth, use of force to keep people in line, and harsh laws. Given these difficulties, why do you think the state has survived? Do you think human populations can develop alternative political organizations in the future?

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5.3: Ethnicity and Race

Learning Objectives

By the end of this chapter, you will be able to:

- Define the term reification and explain how the concept of race has been reified throughout history.
- Explain why a biological basis for human race categories does not exist.
- Discuss what anthropologists mean when they say that race is a socially constructed concept and explain how race has been socially constructed in the United States and Brazil.
- Identify what is meant by racial formation, hypodescent, and the one-drop rule.
- Describe how ethnicity is different from race, how ethnic groups are different from racial groups, and what is meant by symbolic ethnicity.
- Analyze ways in which the racial and ethnic compositions of professional sports have shifted over time and how those shifts resulted from changing social and cultural circumstances that drew new groups into sports.

Suppose someone asked you the following open-ended questions: How would you define the word “race” as it applies to groups of human beings? How many human races are there and what are they? For each of the races you identify, what are the important or key criteria that distinguish each group (what characteristics or features are unique to each group that differentiates it from the others)? Discussions about race and racism are often highly emotional and encompass a wide range of emotions, including discomfort, fear, defensiveness, anger, and insecurity—why is this such an emotional topic in society and why do you think it is so difficult for individuals to discuss race dispassionately?

How would you respond to these questions? Anthropologist Justin García poses these thought-provoking questions to students enrolled in his Introduction to Cultural Anthropology course just before they begin the unit on race and ethnicity and asks them to answer each question fully to the best of their ability without doing any outside research. At the next class, he assigns the students to small groups of five to eight depending on the size of the class, and gives them a few minutes to share their responses to the questions with one another. They then collectively discuss their responses as a class. The responses are often very interesting and quite revealing and generate memorable classroom dialogues.

Is Anthropology the “Science of Race?”

Anthropology was sometimes referred to as the “science of race” during the eighteenth and nineteenth centuries when physical anthropologists sought a biological basis for categorizing humans into racial types. Since World War II, important research by anthropologists has revealed that racial categories are socially and culturally defined concepts and that racial labels and their definitions vary widely around the world. In other words, different countries have different racial categories, and different ways of classifying their citizens into these categories. At the same time, significant genetic studies conducted by physical anthropologists since the 1970s have revealed that biologically distinct human races do not exist. Certainly, humans vary in terms of physical and genetic characteristics such as skin color, hair texture, and eye shape, but those variations cannot be used as criteria to biologically classify racial groups with scientific accuracy. Let us turn our attention to understanding why humans cannot be scientifically divided into biologically distinct races.

Race: A Discredited Concept in Human Biology

At some point in your life, you have probably been asked to identify your race on a college form, job application, government or military form, or some other official document. And most likely, you were required to select from a list of choices rather than given the ability to respond freely. The frequency with which we are exposed to four or five common racial labels—“white,” “black,” “Caucasian,” and “Asian,” for example—tends to promote the illusion that racial categories are natural, objective, and evident divisions. After all, if Taylor Swift, Jay-Z, and Jungkook stood side by side, those common racial labels might seem to make sense. What could be more objective, more conclusive, than this evidence before our very eyes? By this point, you might be thinking that anthropologists have gone completely insane in denying biological human races!

Physical anthropologists have identified several important concepts regarding the true nature of humans’ physical, genetic, and biological variation that have discredited race as a biological concept. Many of the issues presented in this section are discussed in further detail in Race: Are We So Different, a website created by the American Anthropological Association. The American Anthropological Association (AAA) launched the website to educate the public about the true nature of human biological and

cultural variation and challenge common misperceptions about race. This is an important endeavor because race is a complicated, often emotionally charged topic, leading many people to rely on their personal opinions and hearsay when drawing conclusions about people who are different from them. The website is highly interactive, featuring multimedia illustrations and online quizzes designed to increase visitors' knowledge of human variation. I encourage you to explore the website as you will likely find answers to several of the questions you may still be asking after reading this chapter.

Before explaining why distinct biological races do not exist among humans, I must point out that one of the biggest reasons so many people continue to believe in the existence of biological human races is that the idea has been intensively **reified** in literature, the media, and culture for more than three hundred years. Reification refers to the process in which an inaccurate concept or idea is so heavily promoted and circulated among people that it begins to take on a life of its own. Over centuries, the notion of biological human races became ingrained—unquestioned, accepted, and regarded as a concrete "truth." Studies of human physical and cultural variation from a scientific and anthropological perspective have allowed us to move beyond reified thinking and toward an improved understanding of the true complexity of human diversity.

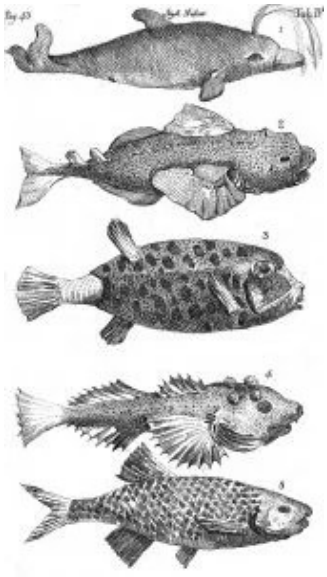


Figure 1: In Systema Naturae, Carolus Linnaeus attempted to create a taxonomy for all living things, including people.

The reification of race has a long history. Especially during the eighteenth and nineteenth centuries, philosophers and scholars attempted to identify various human races. They perceived "races" as specific divisions of humans who shared certain physical and biological features that distinguished them from other groups of humans. This historic notion of race may seem clear-cut and innocent enough, but it quickly led to problems as social theorists attempted to classify people by race. One of the most basic difficulties was the actual number of human races: how many were there, who were they, and what grounds distinguished them? Despite more than three centuries of such effort, no clear-cut scientific consensus was established for a precise number of human races.

One of the earliest and most influential attempts at producing a racial classification system came from Swedish botanist Carolus Linnaeus, who argued in *Systema Naturae* (1735) for the existence of four human races: *Americanus* (Native American / American Indian), *Europaeus* (European), *Asiaticus* (East Asian), and *Africanus* (African). These categories correspond with common racial labels used in the United States for census and demographic purposes today. However, in 1795, German physician and anthropologist Johann Blumenbach suggested that there were five races, which he labeled as *Caucasian* (white), *Mongolian* (yellow or East Asian), *Ethiopian* (black or African), *American* (red or American Indian), *Malayan* (brown or Pacific Islander). Importantly, Blumenbach listed the races in this exact order, which he believed reflected their natural historical descent from the "primeval" Caucasian original to "extreme varieties." Although he was a committed abolitionist, Blumenbach nevertheless felt that his "Caucasian" race (named after the Caucasus Mountains of Central Asia, where he believed humans had originated) represented the original variety of humankind from which the other races had "degenerated."

By the early twentieth century, many social philosophers and scholars had accepted the idea of three human races: the so-called *Caucasoid*, *Negroid*, and *Mongoloid* groups that corresponded with regions of Europe, sub-Saharan Africa, and East Asia, respectively. However, the three-race theory faced serious criticism given that numerous peoples from several geographic regions were omitted from the classification, including Australian Aborigines, Asian Indians, American Indians, and inhabitants of the

South Pacific Islands. Those groups could not be easily pigeonholed into racial categories regardless of how loosely the categories were defined. Australian Aborigines, for example, often have dark complexions (a trait they appeared to share with Africans) but reddish or blondish hair (a trait shared with northern Europeans). Likewise, many Indians living on the Asian subcontinent have complexions that are as dark or darker than those of many Africans and African Americans. Because of these seeming contradictions, some academics began to argue in favor of larger numbers of human races—five, nine, twenty, sixty, and more.

During the 1920s and 1930s, some scholars asserted that Europeans were comprised of more than one "white" or "Caucasian" race: *Nordic*, *Alpine*, and *Mediterranean* (named for the geographic regions of Europe from which they descended). These European races, they alleged, exhibited obvious physical traits that distinguished them from one another and thus served as racial boundaries. For example, "Nordics" were said to consist of peoples of Northern Europe—Scandinavia, the British Isles, and Northern Germany — while "Alpines" came from the Alps Mountains of Central Europe and included French, Swiss, Northern Italians, and Southern Germans. People from southern Europe—including Portuguese, Spanish, Southern Italians, Sicilians, Greeks, and Albanians—comprised the "Mediterranean" race. Most Americans today would find this racial classification system bizarre, but its proponents argued for it on the basis that one would observe striking physical differences between a Swede or Norwegian and a Sicilian. Similar efforts were made to "carve up" the populations of Africa and Asia into geographically local, specific races (see Mukhopadhyay et al. 2013).

The fundamental point here is that any effort to classify human populations into racial categories is inherently arbitrary and subjective rather than scientific and objective. These racial classification schemes simply reflected their proponents' desires to "slice the pie" of human physical variation according to the particular trait(s) they preferred to establish as the major, defining criteria of their classification system.

Racial labels clearly attempt to identify and describe *something*. So why do these racial labels not accurately describe human physical and biological variation? To understand why, we must keep in mind that racial labels are distinct, discrete categories while human physical and biological variations (such as skin color, hair color and texture, eye color, height, nose shape, and distribution of blood types) are *continuous* rather than discrete.

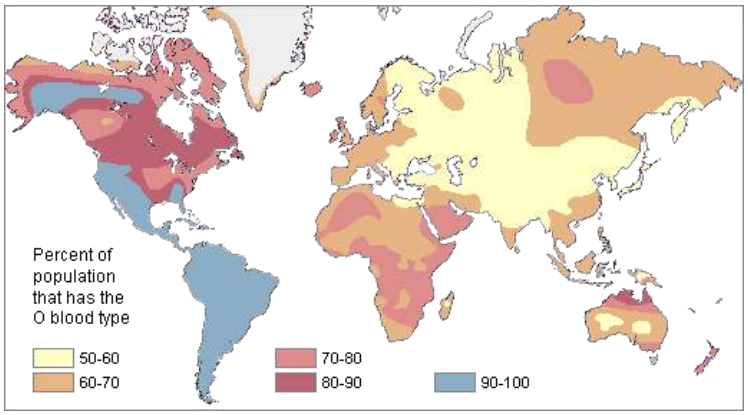


Figure 2: The global distribution of Type O blood reflects a clinal pattern.

Biological anthropologists use the term **cline** to refer to differences in the traits that occur in populations across a geographical area. In a cline, a trait may be more common in one geographical area than another, but the variation is gradual and continuous with no sharp breaks. A prominent example of clinal variation among humans is skin color. Think of it this way: Do all "white" persons who you know actually share the same skin complexion? Likewise, do all "black" persons who you know share an identical skin complexion? The answer, obviously, is no, since human skin color does not occur in just 3, 5, or even 50 shades. The reality is that human skin color, as a continuous trait, exists as a spectrum from very light to very dark with every possible hue, shade, and tone in between.

Imagine two people—one from Sweden and one from Nigeria—standing side by side. If we looked only at those two individuals and ignored people who inhabit the regions between Sweden and Nigeria, it would be easy to reach the faulty conclusion that they represented two distinct human racial groups, one light ("white") and one dark ("black"). However, if we walked from Nigeria to Sweden, we would gain a fuller understanding of human skin color because we would see that skin color generally became gradually lighter the further north we traveled from the equator. At no point during this imaginary walk would we reach a point at

which the people abruptly changed skin color. As biological anthropologists have noted, the average range of skin color gradually changes over geographic space. Thus, human skin color cannot be used as a definitive marker of racial boundaries.

There are a few notable exceptions to this general rule of lighter-complexioned people inhabiting northern latitudes. The Chukchi of Eastern Siberia and Inuits of Alaska, Canada, and Greenland have darker skin than other Eurasian people living at similar latitudes, such as Scandinavians. Physical anthropologists have explained this exception in terms of the distinct dietary customs of indigenous Arctic groups, which have traditionally been based on certain native meats and fish that are rich in Vitamin D (polar bears, whales, seals, and trout).

What does Vitamin D have to do with skin color? The answer is intriguing! Dark skin blocks most of the sun's dangerous ultraviolet rays, which is advantageous in tropical environments where sunlight is most intense. Exposure to high levels of ultraviolet radiation can damage skin cells, cause cancer, and also destroy the body's supply of folate, a nutrient essential for reproduction. Folate deficiency in women can cause severe birth defects in their babies. Melanin, the pigment produced in skin cells, acts as a natural sunblock, protecting skin cells from damage, and preventing the breakdown of folate. However, exposure to sunlight has an important positive health effect: stimulating the production of vitamin D. Vitamin D is essential for the health of bones and the immune system. In areas where ultraviolet radiation is strong, there is no problem producing enough Vitamin D, even as darker skin filters ultraviolet radiation. In environments where the sun's rays are much less intense, a different problem occurs: not enough sunlight penetrates the skin to enable the production of Vitamin D. Over the course of human evolution, natural selection favored the evolution of lighter skin as humans migrated and settled farther from the equator to ensure that weaker rays of sunlight could adequately penetrate our skin. The diet of indigenous populations of the Arctic region provided sufficient amounts of Vitamin D to ensure their health. This reduced the selective pressure toward the evolution of lighter skin among the Inuit and the Chukchi. Anthropologist Nina Jablonski (2012) has also noted that natural selection could have favored darker skin in Arctic regions because high levels of ultraviolet radiation from the sun are reflected from snow and ice during the summer months.

Anthropologists have also found that there are no specific genetic traits that are exclusive to a "racial" group. For the concept of human races to have biological significance, an analysis of multiple genetic traits would have to consistently produce the same racial classifications. In other words, a racial classification scheme for skin color would also have to reflect classifications by blood type, hair texture, eye shape, lactose intolerance, and other traits often mistakenly assumed to be "racial" characteristics. An analysis based on any one of those characteristics individually would produce a unique set of racial categories because variations in human physical and genetic are **nonconcordant**. Each trait is inherited independently, not "bundled together" with other traits and inherited as a package. There is no correlation between skin color and other characteristics such as blood type and lactose intolerance.

A prominent example of nonconcordance is sickle-cell anemia, which Americans often mistakenly think of as a disease that only affects Africans, African Americans, and "Black" persons. In fact, the sickle-cell allele (the version of the gene that causes sickle-cell anemia when a person inherits two copies) is relatively common among people whose ancestors are from regions where a certain strain of malaria, *plasmodium falciparum*, is prevalent, namely Central and Western Africa and parts of Mediterranean Europe, the Arabian peninsula, and India. The sickle-cell trait thus is not exclusively African or "Black." The erroneous perceptions are relatedly primarily to the fact that the ancestors of U.S. African Americans came predominantly from Western Africa, where the sickle-cell gene is prevalent, and are therefore more recognizable than populations of other ancestries and regions where the sickle-cell gene is common, such as southern Europe and Arabia.

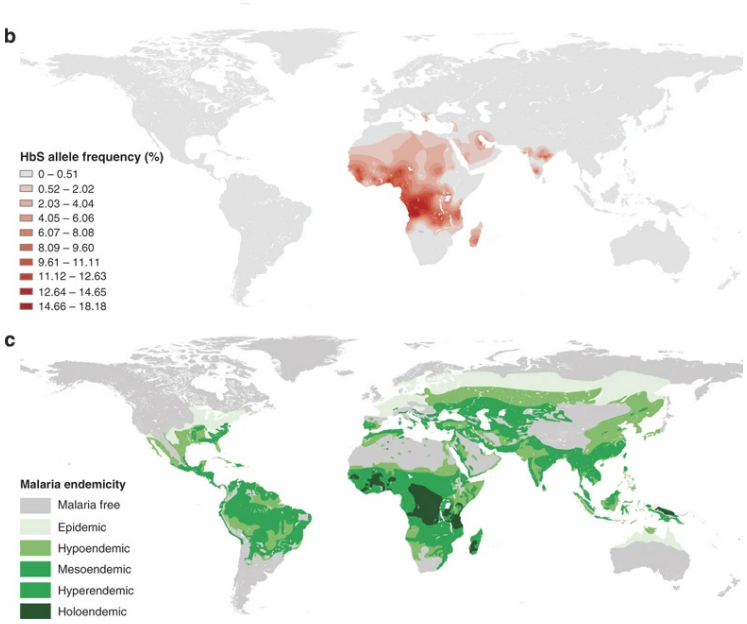


Figure 3. Map of sickle-cell allele frequencies (b) and the prevalence of malaria (c) from open-access article Piel et al. 2010.

Another trait commonly mistaken as defining race is the epicanthic eye fold typically associated with people of East Asian ancestry. The epicanthic eye fold at the outer corner of the eyelid produces the eye shape that people in the United States typically associate with people from China and Japan, but is also common in people from Central Asia, parts of Eastern Europe and Scandinavia, some American Indian groups, and the Khoi San of southern Africa.

The idea of biological human races emphasizes differences, both real and perceived, *between* groups and ignores or overlooks differences *within* groups. The biological differences between "whites" and "blacks" and between "blacks" and "Asians" are assumed to be greater than the biological differences among "whites" and among "blacks." The opposite is actually true; the overwhelming majority of genetic diversity in humans (88–92 percent) is found within people who live on the same continent (Mukhopadhyay et al. 2013). Also, keep in mind that human beings are one of the most genetically similar of all species. There is nearly six times more genetic variation among white-tailed deer in the southern United States than in all humans! Consider our closest living relative, the chimpanzee. Chimpanzees' natural habitat is confined to central Africa and parts of western Africa, yet four genetically distinct groups occupy those regions and they are far more genetically distinct than humans who live on different continents. That humans exhibit such a low level of genetic variation compared to other species reflects the fact that we are a relatively recent species.

Biological anthropologists today analyze human biological variation by examining specific genetic traits to understand how those traits originated and evolved over time and why some genetic traits are more common in certain populations. Since much of our biological diversity occurs mostly within (rather than between) continental regions once believed to be the homelands of distinct races, the concept of race is meaningless in any study of human biology.

Franz Boas, considered the father of modern U.S. anthropology, was the first prominent anthropologist to challenge racial thinking directly during the early twentieth century. Boas challenged conventional thinking at the time that humans could be separated into biological races endowed with unique intellectual, moral, and physical abilities. In one of his most famous studies, Boas challenged craniometrics, in which the size and shape of skulls of various groups were measured as a way of assigning relative intelligence and moral behavior. Boas noted that the size and shape of the skull were not fixed characteristics within groups and were instead influenced by the environment. Children born in the United States to parents of various immigrant groups, for example, had slightly different average skull shapes than children born and raised in the homelands of those immigrant groups. The differences reflected relative access to nutrition and other socio-economic dimensions. In his famous 1909 essay "Race Problems in America," Boas challenged the commonly held idea that immigrants to the United States from Italy, Poland, Russia, Greece, the Austro-Hungarian Empire, and other southern and eastern European nations were a threat to America's "racial purity." He pointed out that the British, Germans, and Scandinavians (popularly believed at the time to be the "true white" heritages that gave the United States its superior qualities) were not themselves "racially pure." Instead, many different tribal and cultural groups had intermixed over the centuries.

In fact, Boas asserted, the notion of "racial purity" was utter nonsense. As present-day anthropologist, Jonathan Marks (1994) noted, "You may group humans into a small number of races if you want to, but you are denied biology as a support for it."

Race as a Social Concept

Just because the idea of distinct biological human races is not a valid scientific concept does not mean, and should not be interpreted as implying, that "there is no such thing as race" or that "race isn't real." Race is indeed real but it is a concept based on arbitrary social and cultural definitions rather than biology or science. Thus, racial categories such as "white" and "black" are as real as categories of "American" and "African." Many things in the world are real but are not biological. So, while race does not reflect biological characteristics, it reflects socially constructed concepts defined subjectively by societies to reflect notions of division that are perceived to be significant. Some sociologists and anthropologists now use the term *social races* instead, seeking to emphasize their cultural and arbitrary roots.

Race is most accurately thought of as a socio-historical concept. Michael Omi and Howard Winant noted (2014: 64) "Racial categories and the meaning of race are given concrete expression by the specific social relations and historical context in which they are embedded." In other words, racial labels ultimately reflect a society's social attitudes and cultural beliefs regarding notions of group differences. And since racial categories are culturally defined, they can vary from one society to another as well as change over time within a society. Omi and Winant referred to this as **racial formation —**"the process by which social, economic, and political forces determine the content and importance of racial categories."

The process of racial formation is vividly illustrated by the idea of "whiteness" in the United States. Over the course of U.S. history, the concept of "whiteness" expanded to include various immigrant groups that once were targets of racist beliefs and discrimination. In the mid-1800s, for example, Irish Catholic immigrants faced intense hostility from America's Anglo-Protestant mainstream society, and anti-Irish politicians and journalists depicted the Irish as racially different and inferior. Newspaper cartoons frequently portrayed Irish Catholics in apelike fashion: overweight, knuckle-dragging, and brutish. In the early twentieth century, Italian and Jewish immigrants were typically perceived as racially distinct from America's Anglo-Protestant "white" majority as well. They were said to belong to the inferior "Mediterranean" and "Jewish" races. Today, Irish, Italian, and Jewish Americans are fully considered "white," and many people find it hard to believe that they once were perceived otherwise. Racial categories as an aspect of culture are typically learned, internalized, and accepted without question or critical thought in a process not so different from children learning their native language as they grow up.

A primary contributor to expansion of the definition of "whiteness" in the United States was the rise of many members of those immigrant groups in social status after World War II. Hundreds of suburban housing developments were constructed on the edge of the nation's major cities during the 1940s and 1950s to accommodate returning soldiers, the Serviceman's Readjustment Act of 1944 offered a series of benefits for military veterans, including free college education or technical training and cost-of-living stipends funded by the federal government for veterans pursuing higher education. In addition, veterans could obtain guaranteed low-interest loans for homes and for starting their own farms or businesses. The act was in effect from 1944 through 1956 and was *theoretically* available to all military veterans who served at least four months in uniform and were honorably discharged, but the legislation did not contain anti-discrimination provisions and most African American veterans were denied benefits because private banks refused to provide the loans and restrictive language by homeowners' associations prohibited sales of homes to nonwhites. The male children and grandchildren of European immigrant groups benefited tremendously from the act. They were able to obtain college educations, formerly available only to the affluent, at no cost, leading to professional white-collar careers, and to purchase low-cost suburban homes that increased substantially in value over time. The act has been credited, more than anything else, with creating the modern middle class of U.S. society and transforming the majority of "white" Americans from renters into homeowners. As the children of Irish, Jewish, Italian, Greek, Anglo-Saxon, and Eastern European parents grew up together in the suburbs, formed friendships, and dated and married one another, the old social boundaries that defined "whiteness" were redefined.

Race is a socially constructed concept but it is not a trivial matter. On the contrary, one's race often has a dramatic impact on everyday life. In the United States, for example, people often use race—their personal understanding of race—to predict "who" a person is and "what" a person is like in terms of personality, behavior, and other qualities. Because of this tendency to characterize others and make assumptions about them, people can be uncomfortable or defensive when they mistake someone's background or cannot easily determine "what" someone is, as revealed in statements such as "You don't *look* black!" or "You *talk* like a white person. Such statements reveal fixed notions about "blackness" and "whiteness" and what members of each race will be like, reflecting their socially constructed and seemingly "common sense" understanding of the world.

Since the 1990s, scholars and anti-racism activists have discussed "white privilege" as a basic feature of race as a lived experience in the United States. Peggy McIntosh coined the term in a famous 1988 essay, "White Privilege: Unpacking the Invisible

Knapsack," in which she identified more than two dozen accumulated unearned benefits and advantages associated with being a "white" person in the United States. The benefits ranged from relatively minor things, such as knowing that "flesh color" Band-Aids would match her skin, to major determinants of life experiences and opportunities, such as being assured that she would never be asked to speak on behalf of her entire race, being able to curse and get angry in public without others assuming she was acting that way because of her race, and not having to teach her children that police officers and the general public would view them as suspicious or criminal because of their race. In 2015, MTV aired a documentary on white privilege, simply titled White People, to raise awareness of this issue among Millennials. In the documentary, young "white" Americans from various geographic, social, and class backgrounds discussed their experiences with race.

Race in Three Nations: The United States, Brazil, and Japan

To better understand how race is constructed around the world, consider how the United States, Brazil, and Japan define racial categories.

The United States

In the United States, race has traditionally been rigidly constructed, and Americans have long perceived racial categories as discrete and mutually exclusive: a person who had one "black" parent and one "white" parent was seen simply as "black." The institution of African enslavement played a major role in defining how the United States has classified people by race through the one-drop rule, which required that any trace of known or recorded non-European ("non-white") ancestry was used to automatically exclude a person from being classified as "white." Someone with one "black" grandparent and three "white" grandparents or one "black" great-grandparent and seven "white" great-grandparents was classified under the one-drop rule simply as "black." The original purpose of the one-drop rule was to ensure that children born from sexual unions (some consensual but many forced) between enslavers and enslaved women would be born into enslavement.

Consider President Barack Obama. Obama is of biracial heritage; his mother was "white" of Euro-American descent and his father was a "Black" man from Kenya. The media often refer to Obama simply as "Black" or "African American," such as when he is referred to as the nation's "first Black President," and never refer to him as "white." It is important to note that President Obama has also stated that he self-identifies as Black. Whiteness in the United States has long been understood and legally defined as implying "racial purity" despite the biological absurdity of the notion, and to be considered "white," one could have no known ancestors of black, American Indian, Asian, or other "non-white" backgrounds. Cultural anthropologists also refer to the one-drop rule as **hypodescent**, a socially constructed racial classification system in which a person of mixed racial heritage is automatically categorized as a member of the less (or least) privileged group.



Figure 4. "Barack Obama at his Chicago Home" by jurvetson is licensed under CC BY 2.0.

An example is birth certificates issued by U.S. hospitals, which, until relatively recently, used a precise formula to determine the appropriate racial classification for a newborn. If one parent was "white" and the other was "non-white," the child was classified as the race of the "non-white" parent; if neither parent was "white," the child was classified as the race of the father.

Not until very recently have the United States government, the media, and pop culture begun to officially acknowledge and embrace biracial and multiracial individuals. The 2000 census was the first to allow respondents to identify as more than one race. Currently, a grassroots movement that is expanding across the United States, led by organizations such as Project RACE (Reclassify All Children Equally) and Swirl, seeks to raise public awareness of biracial and multiracial people who sometimes still experience social prejudice for being of mixed race and/or resentment from peers who disapprove of their decision to identify with all of their backgrounds instead of just one. Prominent biracial and multiracial celebrities such as Tiger Woods, Alicia Keys, Mariah Carey, Beyoncé Knowles, Bruno Mars, and Dwayne "The Rock" Johnson and Barack Obama have also prompted people in the United States to reconsider the problematic nature of rigid, discrete racial categories.

Brazil

Brazil's concept of race is much more fluid, flexible, and multifaceted. The differences between Brazil and the United States are particularly striking because the countries have similar histories. Both nations were born of European colonialism in the New World, established major plantation economies that relied on large numbers of enslaved Africans, and subsequently experienced large waves of immigration from around the world (particularly Europe) following the abolition of enslavement. Despite those similarities, significant contrasts in how race is perceived in these two societies persist, which is sometimes summarized in the expression "The United States has a color line, while Brazil has a color continuum" (Telles 2004). In Brazil, races are typically viewed as points on a continuum in which one gradually blends into another; "white" and "black" are opposite ends of a continuum that incorporates many intermediate color-based racial labels that have no equivalent in the United States.

The Brazilian term for these categories, which correspond to the concept of race in the United States, is *tipos*, which directly translates into Portuguese as "types." Rather than describing what is believed to be a person's biological or genetic ancestry, *tipos* describe slight but noticeable differences in physical appearance. Examples include *loura*, a person with a very fair complexion, straight blonde hair, and blue or green eyes; *sarará*, a light-complexioned person with tightly curled blondish or reddish hair, blue or green eyes, a wide nose, and thick lips; and *cabo verde*, an individual with dark skin, brown eyes, straight black hair, a narrow nose, and thin lips. Sociologists and anthropologists have identified more than 125 *tipos* in Brazil, and small villages of only 500 people may feature 40 or more depending on how residents describe one another. Some of the labels vary from region to region, reflecting local cultural differences.

Since Brazilians perceive race based on phenotypes or outward physical appearance rather than as an extension of geographically based biological and genetic descent, individual members of a family can be seen as different *tipos*. This may seem bewildering to those who think of race as a fixed identity inherited from one's parents even though it is generally acknowledged that family members often have different physical features, such as sisters who have strikingly different eye colors, hair colors, and/or complexions. In Brazil, those differences are frequently viewed as significant enough to assign different *tipos*. Cultural anthropologist Conrad Phillip Kottak (2013), who conducted ethnographic fieldwork in Brazil, noted that something as minor as a suntan or sunburn could lead to a person temporarily being described as a different *tipo* until the effects of the tanning or burning wore off.

Another major difference in the construction of race in the United States and Brazil is the more fluid and flexible nature of race in Brazil, which is reflected in a popular Brazilian saying: "Money whitens." As darker-complexioned individuals increase their social class status (by, for example, graduating from college and obtaining high-salaried, professional positions), they generally come to be seen as a somewhat lighter *tipo* and light-complexioned individuals who become poorer may be viewed as a slightly darker *tipo*. In the United States, social class has no bearing on one's racial designation; a non-white person who achieves upward social mobility and accrues greater education and wealth may be seen by some as more "socially desirable" because of social class but does not change racial classification.

The more fluid construction of race in Brazil is accompanied by generally less hostile, more benign social interactions between people of different colors and complexions, which has contributed to Brazil being seen as a "racial paradise" and a "racial democracy" rainbow nation free of the harsh prejudices and societal discrimination that has characterized other multiracial nations such as the United States and South Africa. The "racial democracy" image has long been embraced by the government and elites in Brazil as a way to provide the country with a distinct identity in the international community. However, scholars in Brazil and the United States have questioned the extent to which racial equality exists in Brazil despite the appearance of interracial congeniality on the surface. Many light-complexioned Brazilians reject the idea that racial discrimination and inequalities persist and regard such claims as divisive, while Afro-Brazilians have drawn attention to these inequalities in recent years.



Figure 5: A scene from the Black Women's March against Racism and Violence in Brasilia, Brazil, 2015.

Though Afro-Brazilians comprise approximately half of the country's population, they have historically accounted for less than 2 percent of all university students, and severe economic disparities between *tipos* remain prominent in Brazil to this day (Cottrol 2013). The majority of the country's Afro-Brazilians lives in the less-affluent northern region, site of the original sugar cane plantations while the majority of Brazilians of European descent live in the industrial and considerably wealthier southern region. The *favelas* (slums) located on the edge of major cities such as Rio de Janeiro and São Paolo, which often lack electricity or running water, are inhabited largely by Afro-Brazilians, who are half as likely to have a working toilet in their homes as the overall Brazilian population. Another significant area of concern centers on brutality and mistreatment of darker-complexioned Brazilians. As a result, some scholars of race and racism describe Brazil as a prominent example of a **pigmentocracy**: a society characterized by a strong correlation between a person's skin color and their social class.

Afro-Brazilian activism has grown substantially since the 1980s, inspired in part by the successes of the Civil Rights movement in the United States and by actions taken by the Brazilian government since the early 2000s. One of the Brazilian government's strategies has been to implement U.S.-style affirmative action policies in education and employment to increase the number of Afro-Brazilians in the nation's professional ranks and decrease the degree of economic disparity. Those efforts sparked an intense backlash among lighter-complexioned Brazilians and created a complex social and political dilemma: who, exactly, should be considered "dark/black enough" for inclusion in affirmative action, who makes that decision, and on what grounds will the decision be based? Many Brazilian families include relatives whose complexions are quite different and the country has clear racial categories only in terms of its demographic statistics. Nevertheless, Luiz Inacio Lula da Silva, Brazil's president from 2003 through 2011 (and in 2023 was returned to that office), made promotion of greater racial equality a prominent objective of his administration. In addition to supporting affirmative action policies, Lula appointed four Afro-Brazilians to his cabinet, appointed the first Afro-Brazilian justice to the nation's supreme court, and established a government office for promotion of racial equality. These recent developments have led many in Brazil and elsewhere to reconsider the accuracy of Brazil's designation as a racial democracy, which has been as a central component of its national identity for decades.

Scholars mostly agree that race relations are more relaxed and genteel in Brazil than in the United States. They tend to disagree about why that is the case. Some have suggested that the differences in racial constructions stem from important colonial-era distinctions that set the tone for years to come. A common expression describing the situation is: "the United States had two British parents while Brazil had a Portuguese father and an African mother." British settlers who colonized North America thoroughly subjugated their enslaved population, intermarriage was rare, and African cultural influences on mainstream U.S. society were marginalized compared to British cultural traditions and customs. In Brazil, on the other hand, sexual and marital unions between the Portuguese settlers, who were overwhelmingly male, and female Africans were common, creating individuals who exhibit a wide range of physical appearances. Sexual unions certainly occurred in the United States between male European enslavers and female African enslaved, but the one-drop rule ensured that any children born of such unions would be classified as "black" and as enslaved. In Brazil in the late nineteenth and early twentieth centuries, the government and the Roman Catholic Church strongly encouraged European-descended men to marry the African and indigenous women they impregnated in order to "whiten" the nation.The United States government did not advocate for interracial families and most states had anti-miscegenation laws. The United States also implemented an official, government-sanctioned system of **Jim Crow** racial segregation laws in that had no equivalent in Brazil.

Japan

Japan represents an example of a third way of constructing race that is not associated with Western society or African enslavement. Japanese society is more diverse than many people realize; the number of Korean, Chinese, Indian, and Brazilian immigrants began to increase in the 1980s, and the number of children who had one Japanese and one non-Japanese parent has increased substantially since the 1950s. Still, the majority Japanese population often downplays such diversity and promotes the idea of a homogenous nation defined in opposition to outsiders.

Yet, one segment of Japan's population known as the *burakumin* (formerly called the *eta*, a word meaning "pure filth") vividly illustrates the arbitrary nature of racial categories. Though physically and genetically indistinguishable from other Japanese people, the burakumin are a socially stigmatized and outcast group. They are descendants of people who worked dirty, low-prestige jobs that involved handling dead and slaughtered animals during the feudal era of Japan in the 1600s, 1700s, and 1800s. In feudal times, they were forced to live in communities separated from the rest of society, had to wear a patch of leather on their clothing to symbolize their burakumin status, and were not permitted to marry non-burakumins.

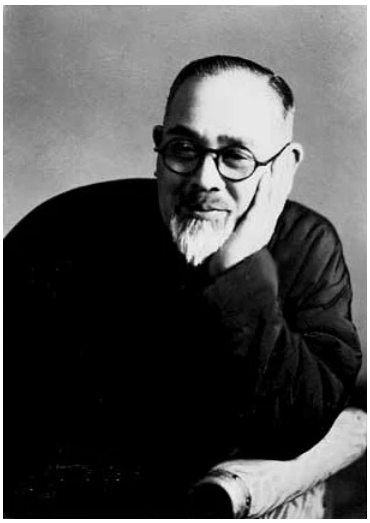


Figure 6: Jiichirō Matsumoto, a leader of the Buraku Liberation League.

Japan no longer legally prohibits marriage between burakumin and non-burakumin (today, approximately 75 percent of burakumins are married to non-burakumins), but prejudices and discrimination persist, particularly among older generations, and the marriages remain socially stigmatized. Employment for the burakumin remains concentrated in low-paying occupations involving physical labor despite the relative affluence and advanced education in Japanese society overall. Burakumin earn only about 60 percent of the national average household income. Stereotypes of the burakumin as unintelligent, lazy, and violent still exist, but burakumin men account for a significant portion of Japan's professional athletes in popular sports such as baseball and sumo wrestling, an interesting pattern that reflects events in the United States, where racially stigmatized groups have long found relatively abundant opportunities for upward mobility in professional sports.

Ethnicity and Ethnic Groups

The terms race and ethnicity are similar and there is a degree of overlap between them. The average person frequently uses the terms "race" and "ethnicity" interchangeably as synonyms and anthropologists also recognize that race and ethnicity are overlapping concepts. Both race and ethnic identity draw on an identification with others based on common ancestry and shared cultural traits. As discussed earlier, a *race* is a social construction that defines groups of humans based on arbitrary physical and/or biological traits that are believed to distinguish them from other humans. An **ethnic group**, on the other hand, claims a distinct identity based on cultural characteristics and a shared ancestry that are believed to give its members a unique sense of peoplehood or heritage.

The cultural characteristics used to define ethnic groups vary; they include specific languages spoken, religions practiced, and distinct patterns of dress, diet, customs, holidays, and other markers of cultural distinction. In some societies, ethnic groups are geographically concentrated in particular regions, as with the Kurds in Turkey and Iraq and the Basques in northern Spain.

Ethnicity refers to the degree to which a person identifies with and feels an attachment to a particular ethnic group. As a component of a person's identity, ethnicity is a fluid, complex phenomenon that is highly variable. Many individuals view their ethnicity as an important element of their personal and social identity. Numerous psychological, social, and familial factors play a role in ethnicity, and ethnic identity is most accurately understood as a range or continuum populated by people at every point. One's sense of ethnicity can also fluctuate across time. Children of Korean immigrants living in an overwhelmingly white town, for example, may choose to self-identify simply as "American" during their middle school and high school years to fit in with their classmates and then choose to self-identify as "Korean," "Korean American," or "Asian American" in college or later in life as their social settings change or from a desire to connect more strongly with their family history and heritage. Do you consider your ethnicity an important part of your identity? Why do you feel the way you do?



Figure 7: Many people in the United States cherish their ethnic identities and cultural traditions. This Hindu altar is from a home in San Diego, California.

In the United States, ethnic identity can sometimes be largely symbolic particularly for descendants of the various European immigrant groups who settled in the United States during the nineteenth and early twentieth centuries. Regardless of whether their grandparents and great-grandparents migrated from Italy, Ireland, Germany, Poland, Russia, the Austro-Hungarian Empire, Greece, Scandinavia, or elsewhere, these third and fourth-generation Americans likely do not speak their ancestors' languages and have lost most or all of the cultural customs and traditions their ancestors brought to the United States. A few traditions, such as favorite family recipes or distinct customs associated with the celebration of a holiday, that originated in their homelands may be retained by family members across generations, reinforcing a sense of ethnic heritage and identity today. More recent immigrants are likely to retain more of the language and cultural traditions of their countries of origin. Non-European immigrants groups from Asia, Africa, the Middle East, Latin America, and the Caribbean also experience significant linguistic and cultural losses over generations, but may also continue to self-identify with their ethnic backgrounds if they do not feel fully incorporated into U.S, society because they "stick out" physically from Euro-American society and experience prejudice and discrimination. Psychological, sociological, and anthropological studies have indicated that retaining a strong sense of ethnic pride and identification is common among ethnic minorities in the United States and other nations as a means of coping with and overcoming societal bigotry.

Ethnic groups and ethnicity, like race, are socially constructed identities created at particular moments in history under particular social conditions. The earliest views of ethnicity assumed that people had innate, unchanging ethnic identities and loyalties. In actuality, ethnic identities shift and are recreated over time and across societies. Anthropologists call this process **ethnogenesis**—gradual emergence of a new, distinct ethnic identity in response to changing social circumstances. For example, people whose ancestors came from what we know as Ireland may identify themselves as Irish Americans and generations of their ancestors as Irish, but at one time, people living in that part of the world identified themselves as Celtic – certainly not innate and unchanging!

In the United States, ethnogenesis has led to a number of new ethnic identities, including African American, Native American, American Indian, and Italian American. Enslaved Africans brought to America in the colonial period came primarily from Central and Western Africa and represented dozens of ethnic heritages, including Yoruba, Igbo, Akan, and Chamba, that had unique languages, religions, and cultures that were mostly lost because enslaved persons were not permitted to speak their own languages or practice their customs and religions. Over time, a new unified identity emerged among their descendants. But that identity continues to evolve, as reflected by the characteristics deemed to be most important in identifying membership.

A Melting Pot or a Salad Bowl?

There is tremendous ethnic, linguistic, and cultural diversity throughout the United States, largely resulting from a long history and ongoing identification as a "nation of immigrants" that attracted millions of newcomers from every continent. Still, elected officials and residents ardently disagree about how the United States should approach this diversity and incorporate immigrant, ethnic, and cultural minority groups into the larger framework of American society. Similar debates exist in many other nations around the world. The fundamental question is whether cultural minority groups should be encouraged to forego their ethnic and cultural identities and **acculturate** to the values, traditions, and customs of mainstream culture or should be allowed and encouraged to retain key elements of their identities and heritages. This is a highly emotional question. Matters of cultural identity are often deeply personal and associated with strongly held beliefs about the defining features of their countries' national identities. Over the

past 400 years, three distinct social philosophies have developed from efforts to promote national unity and tranquility in societies that have experienced large-scale immigration: assimilation, multiculturalism, and amalgamation.

Assimilation encourages and may even demand that members of ethnic and immigrant minority groups abandon their native customs, traditions, languages, and identities as quickly as possible and adopt those of mainstream society—"When in Rome, do as the Romans do." Advocates of assimilation generally view a strong sense of national unity based on a shared linguistic and cultural heritage as the best way to promote a strong national identity and avoid ethnic conflict. They point, for example, to ethnic warfare and genocide in Rwanda and the former Yugoslavia during the 1990s and to recent independence movements by French Canadians in Quebec and in Scotland as evidence of negative consequences of groups retaining a strong sense of loyalty and identification with their ethnic or linguistic communities. The "English as the Official Language" movement in the United States is another example. People are concerned that U.S. unity is weakened by immigrants who do not learn to speak English. In recent years, the U.S. Census Bureau has identified more than 300 languages spoken in the United States. In 2010, more than 60 million people representing 21 percent of the total U.S. population spoke a language other than English at home and 38 million of those people spoke Spanish.

Multiculturalism takes a different view of assimilation, arguing that ethnic and cultural diversity is a positive quality that enriches a society and encouraging respect for cultural differences. The basic belief behind multiculturalism is that group differences, in and of themselves, do not spark tension, and society should promote tolerance for differences rather than urging members of immigrant, ethnic, and cultural minority groups to shed their customs and identities. Vivid examples of multiculturalism can be seen in major cities across the United States, such as New York, where ethnic neighborhoods such as Chinatown and Little Italy border one another, and Los Angeles, which features many diverse neighborhoods, including Little Tokyo, Koreatown, Filipinotown, Little Armenia, and Little Ethiopia. The ultimate objective of multiculturalism is to promote peaceful coexistence while allowing each ethnic community to preserve its unique heritage and identity. Multiculturalism is the official governmental policy of Canada; it was codified in 1988 under the Canadian Multiculturalism Act, which declares that "multiculturalism reflects the cultural and racial diversity of Canadian society and acknowledges the freedom of all members of Canadian society to preserve, enhance, and share their cultural heritage."

Amalgamation promotes hybridization of diverse cultural groups in a multiethnic society. Members of distinct ethnic and cultural groups freely intermingle, interact, and live among one another with cultural exchanges and, ultimately, inter-ethnic dating and intermarriage occurring as the social and cultural barriers between groups fade over time. Amalgamation is similar to assimilation in that a strong, unified national culture is viewed as the desired end result but differs because it represents a more thorough "melting pot" that blends the various groups in a society (the dominant/mainstream group and minority groups) into a new hybridized cultural identity rather than expecting minority groups to conform to the majority's standards.

Anthropology Meets Popular Culture: Sports, Race, Ethnicity, and Diversity

Throughout this chapter, I have stated that the concept of race is a socially constructed idea and explained why biologically distinct human races do not exist. Still, many in the United States cling to a belief in the existence of biological racial groups (regardless of their racial and ethnic backgrounds). Historically, the nature of popular sports in the United States has been offered as "proof" of biological differences between races in terms of natural athletic skills and abilities. In this regard, the world of sports has served as an important social institution in which notions of biological racial differences become reified—mistakenly assumed as objective, real, and factual. Specifically, many Americans have noted the large numbers of African Americans in Olympic sprinting, the National Football League (NFL), and the National Basketball Association (NBA) and interpreted their disproportionate number as perceived "evidence" or "proof" that "blacks" have unique genes, muscles, bone structures, and/or other biological qualities that make them superior athletes relative to people from other racial backgrounds—that they are "naturally gifted" runners and jumpers and thus predominate in sports.

This topic sparked intense media attention in 2012 during the lead-up to that year's Olympics in London. Michael Johnson, a retired African American track star who won gold medals at the 1992, 1996, and 2000 Summer Olympic Games, declared that "black" Americans and West Indians (of Jamaican, Trinidadian, Barbadian, and other Caribbean descent) dominated international sprinting competitions because they possessed a "superior athletic gene" that resulted from African enslavement: "All my life, I believed I became an athlete through my own determination, but it's impossible to think that being descended from [enlsaved Africans] hasn't left an imprint through the generations . . . [enslavement] has benefited descendants like me. I believe there is a superior athletic gene in us."[33] Others have previously expressed similar ideas, such as writer John Entine, who suggested in his book, *Taboo: Why Black Athletes Dominate Sports and Why We're Afraid to Talk About It* (2000), that the

brutal nature of the trans-Atlantic trade in Africans and harsh conditions of enslavement in the Americas produced those enslaved persons who could move faster and who had stronger, more durable bodies than the general population and that those supposedly hardier bodies persisted in today's African Americans and Afro-Caribbeans, giving them important athletic advantages over others.

Despite such beliefs, even among people who otherwise do not harbor racist sentiments, the notion of innate "black" athletic supremacy is misguided, fallacious, and self-contradictory when we examine the demographic composition of the full range of sports in the United States rather than focusing solely on a few extremely popular sports that pay high salaries and have long served as inspiration for upward mobility and fame in a society in which lower-income and impoverished minority groups (often concentrated in inner-city communities) have fewer educational and employment opportunities. Take the myth that "blacks" have an innately superior jumping ability. The idea that "white men can't jump" stems from the relatively small number of white American players in the NBA and has been reified by the fact that only one "white" player (Brent Barry of the Los Angeles Clippers in 1996) has ever won the NBA's annual slam-dunk contest. However, the stereotype would be completely inverted if we look at the demographic composition and results of high jump competitions. The high jump is arguably a better gauge of leaping ability than a slam-dunk contest since it requires raising the entire body over a horizontal bar and prohibits extension of the arms overhead, thus diminishing any potential advantage from height. For decades, both the men's and the women's international high jump competitions have been dominated by white athletes from the United States and Europe. Yet no one attributes their success to "white racial genes." American society does not have a generational history of viewing people who are socially identified as "white" in terms of body type and physical prowess as it does with African Americans.

The same dynamic is at play if we compare basketball with volleyball. Both sports require similar sets of skills, namely, jumping, speed, agility, endurance, and outstanding hand-eye coordination. Nevertheless, beach volleyball has tended to be dominated by "white" athletes from the United States, Canada, Australia, and Europe while indoor volleyball is more "racially balanced" (if we assume that biological human races actually exist) since the powerhouse indoor volleyball nations are the United States, China, Japan, Brazil, Cuba, and Russia.

Further, like basketball, boxing has been an urban sport popular among working-class ethnic groups. During the early twentieth century, both amateur and professional boxing in the United States were dominated by European immigrant groups, particularly the Irish, Italians, and Jewish Americans. As with basketball, which inspired the "hoop dreams" of inner-city youths to escape poverty by reaching the professional ranks, boxing provided sons of lower-income European immigrants with dreams of upward mobility, fame, and fortune. In fact, it was one of the few American sports that thrived during the Great Depression, attracting a wave of impoverished young people who saw pugilism as a ticket to financial security. Throughout the first half of the twentieth century, intra-European ethnic rivalries (Irish vs. Italian, Italian vs. Jewish) were common in U.S. boxing; fighters were seen as quasi-ambassadors of their respective neighborhoods and ethnic communities. The demographic composition of boxers began to change in the latter half of the twentieth century when formerly stigmatized and racialized Eastern European immigrant groups began to be perceived simply as "white" and mainstream. They attained middle-class status and relocated to the newly established suburbs, and boxing underwent a profound racial and ethnic transition. New urban minority groups—African Americans, Puerto Ricans, and Mexican Americans who moved into inner-city neighborhoods vacated by Europeans began to dominate boxing.

Thus, a variety of factors, including cultural affinities and preferences, social access and opportunities, existence of a societal infrastructure that supports youth participation and development in particular sports, and the degree of prestige assigned to various sports by nations, cultures, and ethnic communities, all play significant roles in influencing the concentration of social and/or ethnic groups in particular sports. It is not a matter of individual or group skills or talents; important socio-economic dimensions shape who participates in a sport and who excels. Think about a sport in which you have participated or have followed closely. What social dynamics do you associate with that sport in terms of the gender, race/ethnicity, and social class of the athletes who predominate in it?

Conclusion

Issues of race, racism, and ethnic relations remain among the most contentious social and political topics in the United States and throughout the world. Anthropology offers valuable information to the public regarding these issues, as anthropological knowledge encourages individuals to "think outside the box" about race and ethnicity. This "thinking outside the box" includes understanding that racial and ethnic categories are socially constructed rather than natural, biological divisions of humankind and realizing that the current racial and ethnic categories that exist in the United States today do not necessarily reflect categories used in other

countries. Biological anthropologists, who study human evolution, epidemiology, and genetics, are uniquely qualified to explain why distinct biological human races do not exist. Nevertheless, race and ethnicity – as social constructs – continue to be used as criteria for prejudice, discrimination, exclusion, and stereotypes well into the twenty-first century. Cultural anthropologists play a crucial role in informing the public how the concept of race originated, how racial categories have shifted over time, how race and ethnicity are constructed differently within various nations across the world, and how the current racial and ethnic categories utilized in the United States were arbitrarily labeled and defined by the federal government. Understanding the complex nature of clines and continuous biological human variation, along with an awareness of the distinct ways in which race and ethnicity have been constructed in different nations, enables us to recognize racial and ethnic labels not as self-evident biological divisions of humans, but instead as socially created categories that vary cross-culturally.

Terms you should know

Acculturation

Amalgamation

Assimilation

Cline

Ethnic group

Ethnicity

Ethnogenesis

Hypodescent

Jim Crow

Multiculturalism

Nonconcordant

One-drop rule

Pigmentocracy

Race

Racial formation

Reified

Taxonomy

Study Questions

1. This chapter describes the reasons that race is considered a “discredited concept in human biology.” Despite this scientific fact, most people continue to believe that race is “real.” Why do you think race has continued to be an important social reality even after it has been discredited scientifically?
2. The process of racial formation is different in every society. In the United States, the “one-drop rule” and hypodescent have historically affected the way people with multiracial backgrounds have been racialized. How have ideas about multiracial identity been changing in the past few decades? As the number of people who identify as “multiracial” increases, do you think there will be changes in the way we think about other racial categories?
3. Members of some ethnic groups are able to practice symbolic ethnicity, limited or occasional displays of ethnic pride and identity. Why can ethnicity be displayed in an optional way while race cannot?
4. There is no scientific evidence supporting the idea that racial or ethnic background provides a biological advantage in sports. Instead, a variety of social dynamics, including cultural affinities and preferences as well as access and opportunities influence who will become involved in particular sports. Think about a sport in which you have participated or have followed closely. What social dynamics do you think are most responsible for affecting the racial, ethnic, gender, or social class composition of the athletes who participate?

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5.4: Religion in Anthropology

Learning Objectives

By the of this chapter, you will be able to:

- Define religion and explain its significance in human cultures.
- Summarize theories developed by anthropologists to explain the importance of supernatural beliefs in human communities.
- Identify the four elements of religion (cosmology, belief in the supernatural, rules of behavior, and rituals) and explain how each element contributes to religious practices.
- Define rites of passage, rites of intensification, and rites of revitalization and explain the purpose of each type of ritual.

Humans have always wondered about the meaning of the life, the nature of the universe, and the forces that shape our lives. While it is impossible to know for sure how the people who lived thousands of years ago answered these kinds of questions, there are some clues. Fifty thousand years ago, human communities buried the dead with stone tools, shells, animal bones, and other objects, a practice that suggests they were preparing the deceased for an afterlife, or a world beyond this one. Thirty thousand years ago, artists entered Chauvet Cave in France and painted dramatic scenes of animals on the cave walls along with abstract symbols that suggest the images were part of a supernatural belief system, possibly one focused on ensuring safety or success in hunting. A few thousand years later, collections of small clay sculptures, known as Venus figurines, began appearing across Eurasia. They seem to express ideas about fertility or motherhood and may have been viewed as magical.



Figure 1: An image from the Chauvet cave painted about 32,000 years ago. The paintings may have been part of religious ceremonies intended to ensure success in hunting. and 25,000 BC and may have been associated with spiritual beliefs about motherhood or fertility.



Figure 2: The Venus of Willendorf figurine was made between 28,000 and 25,000 BC and may have been associated with spiritual beliefs about motherhood or fertility.

Defining Religion

Because ideas about the supernatural are part of every human culture, understanding these beliefs is important to anthropologists. However, studying supernatural beliefs is challenging for several reasons. The first difficulty arises from the challenge of defining the topic itself. The word "religion," which is commonly used in the United States to refer to participation in a distinct form of faith such as Christianity, Islam, or Judaism, is not a universally recognized idea. Many cultures have no word for "religion" at all and many societies do not make a clear distinction between beliefs or practices that are "religious," or "spiritual" and other habits that are an ordinary part of daily life. For instance, leaving an incense offering in a household shrine dedicated to the spirits of the ancestors may be viewed as a simple part of the daily routine rather than a "religious" practice. There are societies that believe in supernatural beings, but do not call them "gods." Some societies do not see a distinction between the natural and the supernatural observing, instead, that the spirits share the same physical world as humans. Concepts like "heaven," "hell," or even "prayer" do not exist in many societies. The divide between "religion" and related ideas like "spirituality" or even "magic" is also murky in some cultural contexts.

To study supernatural beliefs, anthropologists must cultivate a perspective of cultural relativism and strive to understand beliefs from an insider's perspective. Imposing the definitions or assumptions from one culture on another is likely to lead to misunderstandings. One example of this problem can be found in the early anthropological research of James Frazer, who attempted to compose the first comprehensive study of the world's major magical and religious belief systems. Frazer was part of early generation of anthropologists whose work was based on reading and questionnaires mailed to missionaries and colonial officials rather than ethnography and participant-observation. As a result, he had only minimal information about the beliefs he wrote about and he was quick to apply his own opinions. In *The Golden Bough* (1890) he dismissed many of the spiritual beliefs he documented: "I look upon [them] not merely as false but as preposterous and absurd." His contemporary, E.B. Tylor, was less dismissive of unfamiliar belief systems, but he defined religion minimally as "the belief in supernatural beings." This definition excludes much of what people around the world actually believe. As researchers gained more information about other cultures, their ideas about religion became more complex. The sociologist Emile Durkheim recognized that religion was not simply a belief in "supernatural beings," but a set of practices and social institutions that brought members of a community together. Religion, he said, was "a unified system of beliefs and practices relative to sacred things, that is to say, things set aside and forbidden—beliefs and practices which unite into one single moral community called a Church, all those who adhere to them" (1915: 62)

Durkheim's analysis of religion emphasized the significance of spiritual beliefs for relationships between people. Subsequent anthropological research in communities around the world has confirmed that rituals associated with beliefs in the supernatural play a significant role in structuring community life, providing rules or guidelines for behavior, and bonding members of a community to one another. Interestingly, religious "beings," such as gods or spirits, also demonstrate social qualities. Most of the time, these beings are imagined in familiar terms as entities with personalities, desires, and **agency**, an ability to make decisions and take action. Supernatural beings, in other words, are not so different from people. In keeping with this idea, **religion** can be defined as "the means by which human society and culture is extended to include the nonhuman." This definition is deliberately broad and can be used to encompass many different kinds of belief systems.

Many religions involve ideas or rituals that could be described as "magical" and the relationship between religion and magic is complex. In his book *A General Theory of Magic* (1902), Marcel Mauss suggested that religion and magic were two opposite poles on a spectrum of spiritual beliefs. Magic was at one end of the spectrum; it was private, secret, and individual. Religion was at the opposite end of the spectrum; it was public and oriented toward bringing the community together. Although Mauss' formulation presented religion and magic as part of the same general way of thinking, many contemporary anthropologists are convinced that making a distinction between religion and magic is artificial and usually not particularly useful. With this caution in mind, **magic** can be defined as practices intended to bring supernatural forces under one's personal control. **Sorcerers** are individuals who seek to use magic for their own purposes. It is important to remember that both magic and sorcery are labels that have historically been used by outsiders, including anthropologists, to describe spiritual beliefs with which they are unfamiliar. But the definitions of those terms would also encompass a range of behaviors that you might be familiar with in your own life, including intercessionary prayer, superstitions, and good-luck charms. So words and descriptions from the local language are almost always preferable for representing how people think about themselves.

Elements of Religion

Despite the wide variety of supernatural beliefs found in cultures around the world, most belief systems do share some common elements. The first of these characteristic is **cosmology**, an explanation for the origin, history, and nature of the world. Religious cosmologies provide "big picture" explanations for how human life was created and provide a perspective on the forces or powers

at work in the world. A second characteristic of religion is a belief in the **supernatural**, a realm beyond direct human experience. This belief could include a God or gods, but this is not a requirement. Quite a few religious beliefs, as discussed below, involve more abstract ideas about supernatural forces. Most religions also share a third characteristic: **rules governing behavior**. These rules define proper conduct for individuals and for society as a whole and are oriented toward bringing individual actions into harmony with spiritual beliefs. A fourth element is **ritual**, practices or ceremonies that serve a religious purpose and are usually supervised by religious specialists. Rituals may be oriented toward the supernatural, such as rituals designed to please the gods, but at the same time they address the needs of individuals or the community as a whole. Funeral rituals, for instance, may be designed to ensure the passage of a deceased person to the afterlife, but also simultaneously provide emotional comfort to those who are grieving and provide an outlet for the community to express care and support.

Religious Cosmologies

Religious cosmologies are ways of explaining the origin of the universe and the principles or "order" that governs reality. In its simplest form, a cosmology can be an origin story, an explanation for the history, present state, and possible futures of the world and the origins of the people, spirits, divinities, and forces that populate it. The ancient Greeks had an origin story that began with an act of creation from Chaos, the first thing to exist. The deities Erebus, representing darkness, and Nyx, representing night, were born from Chaos. Nyx gave birth to Aether (light) and Hemera (day). Hemera and Nyx took turns exiting the underworld, creating the phenomenon of day and night. Aether and Hemera next created Gaia (Earth), the mother of all life, who gave birth to the sky, the mountains, the sea, and eventually to a pantheon of gods. One of these gods, Prometheus, shaped humans out of mud and gave them the gift of fire. This origin story reflects many significant cultural ideas. One of these is the depiction of a world organized into a hierarchy with gods at the top and humans obligated to honor them.

Traditional Navajo origin stories provide a different view of the organization of the universe. These stories suggested that the world is a set of fourteen stacked "plates" or "platters." Creation began at the lowest levels and gradually spread to the top. The lower levels contained animals like insects as well as animal-people and bird-people who lived in their own fully-formed worlds with distinct cultures and societies. At the top level, First Man and First Woman eventually emerged and began making preparations for other humans, creating a sweat lodge, hoghan (a traditional house), and preparing sacred medicine bundles. During a special ceremony, the first human men and women were formed and they created those who followed. Like the Greek origin story, the Navajo cosmology explains human identity and emphasizes the debt humans owe to their supernatural ancestors.

The first two chapters of the Biblical Book of Genesis, which is the foundation for both Judaism and Christianity, describe the creation of the world and all living creatures. The exact words vary in different translations, but describe a God responsible for creating the world and everything in it: "In the beginning God created the heavens and the earth." The six-day process began with the division of light from darkness, land from water, and heaven from earth. On the fifth day, "God created the great sea monsters and every living creature that moves, with which the waters swarmed after their kind, and every winged bird after its kind; and God saw that it was good." On the sixth day, "God created man in His own image, in the image of God He created him; male and female He created them." This cosmology differs from the others in describing an act of creation by a single deity, God, but shares with the Greek and Navajo versions a description of creation that emphasizes the relationship between people and their creator.

Reading these cosmologies also raises the question of how they should be interpreted. Are these origin stories regarded as literal truth in the cultures in which they originated? Or, are the stories metaphorical and symbolic? There is no simple answer to this question. Within any culture, individuals may disagree about the nature of their own religious traditions. Christians, for instance, differ in the extent to which they view the contents of the Bible as fact. Cultural relativism requires that anthropologists avoid making judgments about whether any cultural idea, including religious beliefs, is "correct" or "true." Instead, a more useful approach is to try to understand the multiple ways people interpret or make sense of their religious beliefs. In addition it is important to consider the function a religious cosmology has in the wider society.

Belief in the Supernatural

Another characteristic shared by most religions is a concept of the supernatural, spirits, divinities, or forces not governed by natural laws. The supernatural can take many forms. Some supernatural entities are **anthropomorphic**, having human characteristics. Other supernatural forces are more generalized, seen in phenomena like the power of the wind. The amount of involvement that supernatural forces or entities have in the lives of humans varies cross-culturally.

Abstract Forces

Many cultures are organized around belief in an impersonal supernatural force, a type of religion known as **animatism**. The idea of *mana* is one example. The word itself comes from Oceania and may originally have meant "powerful wind," "lightning" or

"storm." Today, it still refers to power, but in a more general sense. Aram Oroi, a pastor from the Solomon Islands, has compared mana to turning on a flashlight: "You sense something powerful but unseen, and then—*click*—its power is made manifest in the world." Traditionally, the ability to accumulate mana in certain locations, or in one's own body, was to become potent or successful. Certain locations such as mountains or ancient sites (*marae*) have particularly strong mana. Likewise, individual behaviors, including sexual or violent acts, were traditionally viewed as ways to accumulate mana for oneself.

A well-known example of animatism in popular culture is "the Force" depicted in the George Lucas *Star Wars* films. The Force is depicted as flowing through everything and is used by Luke Skywalker as a source of potency and insight when he destroys the Death Star.

Spirits



Figure 3: A spirit house in Thailand. The houses provide shelter for local spirits that could trouble humans if they become displeased.

The line between the natural and the supernatural can be blurry. Many people believe that humans have a supernatural or spiritual element that coexists within their natural bodies. In Christianity, this element is called the soul. In Hinduism, it is the *atman*. The Tausūg, a group who live in the Philippines, believe that the soul has four parts: a transcendent soul that stays in the spiritual realm even when a person is alive; a life-soul that is attached to the body, but can move through dreams; the breath, which is always attached to the body, and the spirit-soul, which is like a person's shadow. Many people believe that the spirit survives after an individual dies, sometimes remaining on Earth and sometimes departing for a supernatural realm. Spirits, or "ghosts," who remain on Earth may continue to play an active role in the lives of their families and communities. Some will be well-intentioned and others will be malevolent. Almost universally, spirits of the deceased are assumed to be needy and to make demands on the living. For this reason, many cultures have traditions for the veneration of the dead, rituals intended to honor the deceased, or to win their favor or cooperation. When treated properly, ancestor spirits can be messengers to gods, and can act on behalf of the living after receiving prayers or requests. If they are displeased, ancestor spirits can become aggravated and wreak havoc on the living through illness and suffering. To avoid these problems, offerings in the form of favorite foods, drinks, and gifts are made to appease the spirits. In China, as well as in many other countries, filial piety requires that the living continue to care for the ancestors. In Madagascar, where bad luck and misfortune can be attributed to spirits of the dead who believe they have been neglected, a body may be repeatedly exhumed and shown respect by cleaning the bones.

If humans contain a supernatural spirit, essence, or soul, it is logical to think that non-human entities may have their own sparks of the divine. Religions based on the idea that plants, animals, inanimate objects, and even natural phenomena like weather have a spiritual or supernatural element are called **animism**. The first anthropological description of animism came in the 19th century from Edward Burnett Tylor, who believed it was the earliest type of religious practice to develop in human societies. Tylor assumed that animist religions evolved into what he viewed as more sophisticated religious systems involving a God or gods.



Figure 4: The first torii at the entrance to Nikkō Tōshō-gū, Tochigi Prefecture, Japan.

Today, anthropologists know no belief system is inherently more sophisticated than another, nor is one system likely to evolve into another. Several animist religions exist today and have millions of adherents. One of the most well-known is Shintoism, the traditional religion of Japan. Shintoism recognizes spirits known as *kami* that exist in plants, animals, rocks, places and sometimes people. Certain locations have particularly strong connections to the kami, including mountains, forests, waterfalls, and shrines. Shinto shrines in Japan are marked by *torii* gates that mark the separation between ordinary reality and sacred space (Figure 4).

Gods

The most powerful non-human spirits are gods, though in practice there is no universal definition of a "god" that would be recognized by all people. In general, gods are extremely powerful and not part of nature—not human, or animal. Despite their unnaturalness, many gods have personalities or qualities that are recognizable and relatable to humans. They are often anthropomorphic, imagined in human form, or zoomorphic, imagined in animal form. In some religions, gods interact directly with humans while in others they are more remote.

Anthropologists categorize belief systems organized around a God or gods using the terms monotheism and polytheism. **Monotheistic** religions recognize a single supreme God. The largest monotheistic religions in the world today are Christianity, Islam, and Judaism. Together these religions have more than 3.8 billion adherents worldwide. **Polytheistic** religions include several gods. Hinduism, one of the world's largest polytheistic religions with more than 1 billion practitioners, has a pantheon of deities each with different capabilities and concerns.

Rules of Behavior

Religious beliefs are an important element of **social control** because these beliefs help to define acceptable behaviors as well as punishments, including supernatural consequences, for misbehavior. One well-known example are the ideas expressed in the Ten Commandments, which are incorporated in the teachings of Christianity, Islam, and Judaism and prohibit behaviors such as theft, murder, adultery, dishonesty, and jealousy while also emphasizing the need for honor and respect between people. Behavior that violates the commandments brings both social disapproval from other members of the religious community and potential punishment from God.

Buddhism, the world's fourth largest religion, demonstrates the strong connection between spiritual beliefs and rules for everyday behavior. Buddhists follow the teachings of Buddha, who was an ordinary human who achieved wisdom through study and discipline. There is no God or gods in some forms of Buddhism. Instead, individuals who practice Buddhism use techniques like meditation to achieve the insight necessary to lead a meaningful life and ultimately, after many lifetimes, to achieve the goal of *nirvana*, release from suffering.

Although Buddhism defies easy categorization into any anthropological category, there is an element of animatism represented by *karma*, a moral force in the universe. Individual actions have effects on one's karma. Kindness toward others, for instance, yields positive karma, while acts that are disapproved in Buddhist teachings, such as killing an animal, create negative karma. The amount of positive karma a person builds-up in a lifetime is important because it will determine how the individual will be reborn. **Reincarnation,** the idea that a living being can begin another life in a new body after death, is a feature of several religions. In Buddhism, the form of a human's reincarnation depends on the quality of the karma developed during life. Rebirth in a human form is considered good fortune because humans have the ability to control their own thoughts and behaviors. They can follow the Noble Eightfold Path, rules based on the teachings of Buddha that emphasize the need for discipline, restraint, humility, and kindness in every aspect of life.

Rituals

The most easily observed element of any religious belief system are rituals. Victor Turner (1972) defined ritual as "a stereotyped sequence of activities … performed in a sequestered place, and designed to influence preternatural entities or forces on behalf of the actors' goals and interests." Rituals have a concrete purpose or goal, such as a wedding ritual that results in a religiously sanctioned union between people, but rituals are also symbolic. The objects and activities involved in rituals "stand in for" or mean more than what they actually are. In a wedding ceremony in the United States, the white color of the wedding dress is a traditional symbol of purity.

A large amount of anthropological research has focused on identifying and interpreting religious rituals in a wide variety of communities. Although the details of these practices differ in various cultural settings, it is possible to categorize them into types based on their goals. One type of ritual is a **rite of passage**, a ceremony designed to transition individuals between life stages. A second type of ritual is a **rite of intensification**, actions designed to bring a community together, often following a period of crisis. **Revitalization rituals**, which also often follow periods of crisis in a community, are ambitious attempts to resolve serious problems, such as war, famine, or poverty through a spiritual or supernatural intervention.

Rites of Passage

In his original description of rites of passage, Arnold Van Gennep (1909) noted that these rituals were carried out in three distinct stages: 1. separation; 2. liminal phase, and 3. incorporation (reincorporation). During the first stage, individuals are removed from their current social identity and begin preparations to enter the next stage of life. The liminal period that follows is a time in which individuals often undergo tests, trials, or activities designed to prepare them for their new social roles. In the final stage of incorporation, individuals return to the community with a new socially recognized status.

Rites of passage that transition children into a new status as adults are common around the world. In Xhosa communities in South Africa, teenage boys were traditionally transitioned to manhood using a series of acts that moved them through each of the three ritual stages. In the separation stage, the boys leave their homes and are circumcised; they cannot express distress or signs of pain during the procedure. Following the circumcision, they live in isolation while their wounds heal, a liminal phase during which they do not talk to anyone other than boys who are also undergoing the rite of passage. This stressful time helps to build bonds between the boys that will follow them through their lives as adult men. Before their journey home, the isolated living quarters are burned to the ground, symbolizing the loss of childhood. When the participants return to their community, the incorporation phase, they are recognized as men and allowed to learn the secret stories of the community.

Rites of Intensification



Figure 5: Land Diving on Pentecost Island, Vanuatu.

Rites of intensification are also extremely common worldwide. These rituals are used to bind members of the community together, to create a sense of **communitas** or unity that encourages people to see themselves as members of community. (Communitas can also often occur during the liminal phase of the rite of passage.) One particularly dramatic example of this ritual is the Nagol land

diving ceremony held each spring on the island of Pentecost in Vanuatu in the South Pacific. Like many rituals, land diving has several goals. One of these is to help ensure a good harvest by impressing the spirits with a dramatic display of bravery. To accomplish this, men from the community construct wooden towers sixty to eighty feet high, tie ropes made from tree vines around their ankles, and jump head-first toward the ground (Figure 5). Preparations for the land diving involve almost every member of the community. Men spend a month or more working together to build the tower and collect the vines. The women of the community prepare special costumes and dances for the occasion and everyone takes care of land divers who may be injured during the dive. Both the preparations for the land diving and the festivities that follow are a powerful rite of intensification. Interestingly, the ritual is simultaneously a rite of passage; boys can be recognized as men by jumping from high portions of the tower witnessed by elders of the community.

Rites of Revitalization

All rites of revitalization originate in difficult or even catastrophic circumstances. One notable example is a ritual that developed on the island of Tanna in the South Pacific. During World War II, many islands in the South Pacific were used by the U.S. military as temporary bases. Tanna was one of these locations and this formerly isolated community experienced an extremely rapid transformation as the U.S. military introduced modern conveniences such as electricity and automobiles. In an attempt to make sense of these developments, the island's residents developed a variety of theories about the reason for these changes. One possible explanation was that the foreign materials had been given to the islanders by a powerful deity or ancestral spirit, an entity who eventually acquired the name John Frum. The name may be based on a common name the islanders would have encountered while the military base was in operation: "John from America."

When the war ended and the U.S. military departed, the residents of Tanna experienced a kind of trauma as the material goods they had enjoyed disappeared and the John Frum ritual began. Each year on February fifteenth, many of the island's residents construct copies of U.S. airplanes, runways, or towers and march in military formation with replicas of military rifles and American blue jeans. The ritual is intended to attract John Frum, and the material wealth he controls, back to the island. Although the ritual has not yet had its intended transformative effect, the participants continue the ritual. When asked to explain his continued faith, one village elder explained: "You Christians have been waiting 2,000 years for Jesus to return to Earth, and you haven't given up hope."

Religious Practitioners

Since rituals can be extremely complicated and the outcome is of vital importance to the community, specialist practitioners are often charged with responsibility for supervising the details. In many settings, religious specialists have a high social status and are treated with great respect. Some may become relatively wealthy by charging for their services, while others may be impoverished, sometimes deliberately as a rejection of the material world. There is no universal terminology for religious practitioners, but there are three important categories: priests, prophets, and shamans.

Priests, who may be of any gender, are full-time religious practitioners. The position of priest emerges only in societies with substantial occupational specialization. Priests are the intermediaries between humans and the supernatural. Religious traditions vary in terms of the qualifications required for individuals entering the priesthood. In Christian traditions, it is common for priests to complete a program of formal higher education. Hindu priests, known as *pujari*, must learn the sacred language Sanskrit and spend many years becoming proficient in Hindu ceremonies. They must also follow strict lifestyle restrictions such as a vegetarian diet. Traditionally, only men from the Brahmin caste were eligible to become pujari, but this is changing. Today, people from other castes, as well as women, are joining the priesthood. One notable feature of societies that utilize full-time spiritual practitioners is a separation between ordinary believers and the God or gods. As intermediaries, priests have substantial authority to set the rules associated with worship practice and to control access to religious rites.

The term **shaman** refers to a part-time religious practitioner. Shamans carry out religious rituals when needed, but also participate in the normal work of the community. A shaman's religious practice depends on an ability to engage in direct communication with the spirits, gods, or supernatural realm. An important quality of a shaman is the ability to transcend normal reality in order to communicate with and perhaps even manipulate supernatural forces in an alternate world. This ability can be inherited or learned. Transcending from the ordinary to the spiritual realm gives shamans the ability to do many things such as locate lost people or animals, or heal the sick by identifying the spiritual cause of illness.

Among the Chukchi, who live in northern Russia, the role of the shaman is thought to be a special calling, one that may be especially appropriate for people whose personality traits seem abnormal in the context of the community. Young people who suffer from nervousness, anxiety, or moodiness, for example, may feel a call to take up shamanistic practice. There has been some

research suggesting that shamanism may be a culturally accepted way to deal with conditions like schizophrenia. If true, this might be because achieving an altered state of consciousness is essential for shamanic work. Entering an altered state, which can be achieved through dreams, hallucinogenic drugs, rhythmic music, exhaustion through dance, or other means, makes it possible for shamans to directly engage with the supernatural realm.

Shamans of the upper Amazon in South America have been using *ayahuasca*, a drink made from plants that have hallucinogenic effects, for centuries. The effects of ayahuasca start with the nervous system (Villarejo 1988):

> One under the control of the narcotic sees unroll before him quite a spectacle: most lovely landscapes, monstrous animals, vipers which approach and wind down his body or are entwined like rolls of thick cable, at a few centimeters distance; as well, one sees who are true friends and those who betray him or who have done him ill; he observes the cause of the illness which he sustains, at the same time being presented with the most advantageous remedy; he takes part in fantastic hunts; the things which he most dearly loves or abhors acquire in these moments extraordinary vividness and color, and the scenes in which his life normally develop adopt the most beautiful and emotional expression.

Among the Shipibo people of Peru, ayahuasca is thought to be the substance that allows the soul of a shaman to leave his body in order to retrieve a soul that has been lost or stolen. In many cultures, soul loss is the predominant explanation for illness. The Shipibo believe that the soul is a separate entity from the body, one that is capable of leaving and returning at will. Shamans can also steal souls. The community shaman, under the influence of ayahuasca, is able to find and retrieve a soul, perhaps even killing the enemy as revenge.

A **prophet** is a person who claims to have direct communication with the supernatural realm and who can communicate divine messages to others. Many religious communities originated with prophecies, including Islam, which is based on teachings revealed to the prophet Muhammad by God. In Christianity and Judaism, Moses is an example of a prophet who received direct revelations from God. Another example of a historically significant prophet is Joseph Smith, who founded the Church of Latter Day Saints after receiving a prophecy from an angel named Moroni who guided him to the location of a buried set of golden plates. The information from the golden plates became the basis for the Book of Mormon.

The major distinction between a priest and the prophet is the source of their authority. A priest gets his or her authority from the scripture and occupational position in a formally organized religious institution. A prophet derives authority from his or her direct connection to the divine and ability to convince others of his or her legitimacy through charisma**.** The kind of insight and guidance prophets offer can be extremely compelling, particularly in times of social upheaval or suffering.

Theories of Religion

James Frazer's (1890) effort to interpret religious mythology was the first of many attempts to understand the reasons why cultures develop various kinds of spiritual beliefs. In the early twentieth century, many anthropologists applied a *functional* approach to this problem by focusing on the ways religion addressed human needs. Bronislaw Malinowski (1931), who conducted research in the Trobriand Islands located near Papua New Guinea, believed that religious beliefs met psychological needs. He observed that religion "is not born out of speculation or reflection, still less out of illusion or apprehension, but rather, out of the real tragedies of human life, out of the conflict between human plans and realities."

At the time of Malinowski's research, the Trobriand Islanders participated in an event called the kula ring, a tradition that required men to build canoes and sail on long and dangerous journeys between neighboring islands to exchange ritual items. Malinowski noticed that before these trips several complex rituals had to be performed, but ordinary sailing for fishing trips required no special preparations. What was the difference? Malinowski concluded that the longer trips were not only more dangerous, but also provoked more anxiety because the men felt they had less control over what might happen. On long voyages, there were many things that could go wrong, few of which could be planned for or avoided. He argued that religious rituals provided a way to reduce or control anxiety when anticipating these conditions. The use of rituals to reduce anxiety has been documented in many other settings. George Gmelch (1971) documented forms of "baseball magic" among professional athletes. Baseball players, for instance, have rituals related to how they eat, dress, and even drive to the ballpark, rituals they believe contribute to good luck.

Malinowski believed that religion provided shared values and behavioral norms that created *solidarity* between people. Emile Durkheim also believed that religion played an important role in building connections between people by creating shared definitions of the sacred and profane. **Sacred** objects or ideas are set apart from the ordinary and treated with great respect or care while **profane** objects or ideas are ordinary and can be treated with disregard or contempt. Sacred things could include a God or

gods, a natural phenomenon, an animal, a holy relic, or many other things. Religion, Durkheim concluded, was "a unified system of beliefs and practices relative to sacred things, that is to say, things set apart and forbidden—beliefs and practices that unite, into one single moral community called a Church, all those who adhere to them." Once a person or a thing was designated as sacred, Durkheim believed that celebrating it through ritual was a powerful way to unite communities around shared values. In addition, celebrating the sacred can create an intense emotional experience which magnifies the emotional impact of an event and can create a sense of awe or wonder.

Following Durkheim, many anthropologists, including Mary Douglas, have found it useful to explore the ways in which definitions of sacred and profane structure religious beliefs. In her book *Purity and Danger* (1966), Douglas analyzed the way in which cultural ideas about things that were "dirty" or "impure" influenced religious beliefs. The kosher dietary rules observed by Jews were one prominent example of the application of this kind of thinking.

The philosopher and historian Karl Marx (1844) famously called religion "the opium of the people." He viewed religion as an *ideology*, a way of thinking that attempts to justify inequalities in power and status. In his view, religion created an illusion of happiness that helped people cope with the economic difficulties of life under capitalism. As an institution, Marx believed that the Christian church helped to legitimize and support the political and economic inequality of the working class by encouraging ordinary people to orient themselves toward the afterlife, where they could expect to receive comfort and happiness. He argued that the obedience and conformity advocated by religious leaders as a means of reaching heaven also persuaded people not to fight for better economic or social conditions in their current lives. Numerous other examples of the use of religion to legitimize or justify power differences have been documented cross-culturally including the existence of divine rulers, who were believed to be empowered by the Gods themselves, in ancient Egyptian and Incan societies. A glimpse of the legitimizing role of religion is also seen in the U.S. practice of having elected officials take an oath of office using the Bible or another holy book.

One interesting interpretation of religious beliefs that builds on the work of Marx and Durkheim is Marvin Harris' analysis of the Hindu prohibition against killing cows. In Hinduism, the cow is honored and treated with respect because of its fertility, gentle nature, and association with some Hindu deities. In his book *Cow, Pigs, Wars, and Witches* (1974), Harris suggested that these religious ideas about the cow were actually based in an economic reality. In India, cows are more valuable alive as a source of milk or for doing work in the fields than they are dead as meat. For this reason, he argued, cows were defined as sacred and set apart from other kinds of animals that could be killed and eaten. The subsequent development of religious explanations for cows' specialness reinforced and legitimated the special treatment.

A *symbolic* approach to the study of religion developed in the mid-twentieth century and presented new ways of analyzing supernatural beliefs. Clifford Geertz (1993), one of the anthropologists responsible for creating the symbolic approach, defined religion as "a system of symbols which acts to establish powerful, persuasive, and long-lasting moods and motivations…. by formulating conceptions of a general order of existence and clothing these conceptions with such an aura of factuality that the moods and motivations seem uniquely realistic." Geertz suggested that religious practices were a way to enact or make visible important cultural ideas. The symbols used in any religion, such as a cross or even a cow, can be interpreted or "read" by members of the culture, and eventually anthropologists too, to discern important cultural values. At the same time, religious symbols reinforce values or aspirations in members of the religious community. The Christian cross, which is associated with both death and resurrection, demonstrates ideas about sacrifice and putting the needs of others in the community first. The cross also symbolizes deeper ideas about the nature of life itself: that suffering can have positive outcomes and that there is something beyond the current reality.

A symbolic approach to religion treats religious beliefs as a kind of "text" or "performance" that can be interpreted by outsiders. Like the other theories described in this section, symbolic approaches present some risk of misinterpretation. Religious beliefs involve complex combinations of personal and social values as well as embodied or visceral feelings that cannot always be appreciated or even recognized by outsiders. The persistently large gap between emic (insider) and etic (outsider) explanations for religious beliefs and practices makes the study of religion one of the most challenging topics in cultural anthropology.

Conclusion

Religion is of central importance to the lives of people in the majority of the world's cultures; more than eight-in-ten people worldwide identify with a religious group. However, it is also true that the number of people who say that they have no religious affiliation is growing. There are now about as many people in the world who consider themselves religiously "unaffiliated" as there are Roman Catholics. Still, this trend is not equivalent across all regions of the world, and in some places particular religions traditions are expanding rapidly. This is an important reminder that religions, like culture itself, are highly dynamic and subject to constant changes in interpretation and allegiance. Anthropology offers a unique perspective for the study of religious beliefs, the

way people think about the supernatural, and how the values and behaviors these beliefs inspire contribute to the lives of individuals and communities. No single set of theories or vocabulary can completely capture the richness of the religious diversity that exists in the world today, but cultural anthropology provides a toolkit for understanding the emotional, social, and spiritual contributions that religion makes to the human experience.

Terms You Should Know

Agency

Animatism

Animism

Anthropomorphic

Cosmology

Magic

Monotheistic

Polytheistic

Priests

Profane

Prophet

Reincarnation

Religion

Revitalization rituals

Rite of intensification

Rite of passage

Sacred

Shaman

Sorcerer

Supernatural

Study Questions

1. This chapter describes theories about religion developed by Durkheim, Marx, Malinowski, and Geertz. What are the strengths and weaknesses of each theory? Which theory would be the most useful if you were attempting to learn about the religious beliefs of another culture?
2. Rites of passage and rites of intensification are an important part of many religious traditions, but these same rituals also exist in secular (non-religious) contexts. What are some examples of these rituals in your own community? What role do these rituals play in bringing people together?
3. Durkheim argued that a distinction between the sacred and the profane was a key characteristic of religion. Thinking about your own culture, what are some examples of ideas or objects that are considered “sacred”? What are the rules concerning how these objects or ideas should be treated? What are the penalties for people who do not follow these rules?

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5.5: Gender and Marriage in Anthropology

Learning Objectives

By the end of this chapter, you will be able to:

- Define the concepts of sex and gender and explain the difference between the two concepts.
- Distinguish between public and private social realms and identify the consequences of this distinction for gender categories.
- Define the concept of intersex.
- Give a detailed example of a culture with multiple genders.
- Explain the concept of gender ideology and identify two such ideologies
- State the anthropological definition of marriage.
- Provide examples of different forms of marriage across cultures.
- Describe how marriage intersects with residence rules, family, and kinship.

A friend announces, “My sister just had a baby last night!” Many people will immediately ask, “Is it a boy or a girl?” Gender is central to the way people think about and interact with others.

Anthropologists are curious about the many ways in which gender shapes impressions and assumptions about people and why gender is such a primary concern. Gender influences how people think about their own identities, how they present themselves to others, and how they plan to lead their lives. People’s sexual identities and desires are shaped by gendered notions of themselves and others. Power operates in cultural constructions of gender and sexuality. Ideas about gender also influence marriage practices, as we will see.

Sex, Gender, and Sexuality in Anthropology

For many people, *male* and *female* refer to natural categories that neatly divide up the human population. Often, people associate these two categories with different abilities and personality traits. Setting aside these ideas and assumptions, anthropologists explore aspects of human biology and culture to understand where notions of gender come from while documenting the diversity of gender and sexuality in cultures all over the world, past and present.

The Terms: Sex, Gender, and Sexuality

In the social sciences, the term **sex** refers to the biological categories of male and female (and potentially other categories, as discussed later in this chapter). The sex of a person is determined by biological and anatomical features, including (but not limited to): visible genitalia (e.g., penis, testes, vagina), internal sex organs (e.g., ovaries, uterus), secondary sex characteristics (e.g., breasts, facial hair), chromosomes (XX for females, XY for males, and other possibilities), reproductive capabilities (including menstruation), and the activities of growth hormones, particularly testosterone and estrogen. It may seem as though nature divides humans neatly into females and males, but such a long list of distinguishing factors results in a great deal of ambiguity and diversity within categories. For instance, hormonal influences can produce results different from the ways that people typically develop. Hormonal influences shape the development of sex organs over time and can stimulate the emergence of secondary sex characteristics associated with the other sex. Clothes on or clothes off, people can have body features associated with one sex category and chromosomes associated with another.

While sex is based on biology, the term **gender** was developed by social scientists to refer to cultural roles based on these biological categories. The cultural roles of gender assign certain behaviors, relationships, responsibilities, and rights differently to people of different genders. As elements of culture, gender categories are learned rather than inherited or inborn, making childhood an important time for gender enculturation. As opposed to the seeming universality of sex categories, the specific content of gender categories is highly variable across cultures and subject to change over time.

The two terms, biological sex and cultural gender, are often distinguished from one another to clarify the differences embedded in “nature” versus the differences constructed by “culture.” But are biological sex categories based on an objective appraisal of nature? Are sex categories universal and durable? Some scholars question the biological objectivity of sex and its opposition to the more flexible notion of gender.



FIGURE 1: Transgender activist Aurora Claire Borin at a women's march in Calgary, Canada. (credit: "Women's March in Calgary" by JMacPherson/flickr, CC BY 2.0)

Associated with sex and gender, the concept of **sexuality** refers to erotic thoughts, desires, and practices and the sociocultural identities associated with them. The complex ways in which people experience their own bodies and perceive their own gender contribute to the physical behaviors they engage in to achieve pleasure, intimacy, and/or reproduction. This complex of thoughts, desires, and behaviors constitutes a person's sexuality.

Some cultures have very strict cultural norms regarding sexual practices, while others are more flexible. Some cultures confer a distinctive identity on people who practice a particular form of sexuality, while others allow a person to engage in an array of sexual practices without adopting a distinctive identity associated with those practices (Nanda 2000). **Sexual orientation** refers to sociocultural identities associated with specific forms of sexuality. For instance, in American culture, sex between a woman and a man is conventionalized into the normative identity of **heterosexual**. If you are a person who practices that kind of sex (and *only* that kind), then most Americans would consider you to be a heterosexual person. If you are a person who engages in sex with someone of the same sex/gender category, then in American culture, you would be considered a **gay** person (if you identify as male) or a **lesbian** (if you identify as female). So anxious are Americans about these categorical identities that many young people who have erotic dreams or passing erotic thoughts about a same-sex friend may worry that they are "really" not heterosexual. As American norms have changed over the past several decades, some people who have romantic, emotional, or erotic feelings toward people of their own gender and another gender have adopted the identity of **bisexual**. People who may have erotic desires about and relations with others without regard to their biological sex, gender identity, or sexual orientation may consider themselves to be **pansexual**. Even more recently, some people who do not engage in sexual thoughts, desires, or practices of any kind have embraced the identity of **asexual**. While there are many aspects and manifestations of sexual orientation, sexual orientation is considered to be a central and durable aspect of a person's sociocultural identity.

In some cultures, heterosexuality was previously thought to be the most "natural" form of sexuality, a notion called **heteronormativity**. This notion has been challenged by research and the growth of the global LGBTQIA+ movement. In other cultures, people are allowed or even expected to engage in more than one form of sexuality without necessarily adopting any specific sexual identity. This is not to say that these other cultures are consistently more liberal and tolerant of sexual diversity. In many societies, it is acceptable for people to engage in same-sex practices in certain contexts, but they are still expected to marry someone of the opposite sex and have children.

Scholars who have studied sexuality in many cultures have also pointed out that a person's gender identity, sexual orientation, and sexuality tend to change significantly over the life span, responding to different contexts and relationships. The term ***queer***, originally a pejorative term in American culture for a person who did not conform to the rigid norms of heterosexuality, has been appropriated by people who do not abide by those norms, particularly people who take a more situational and fluid approach to the expression of gender and sexuality. Rather than a set of fixed and durable identities, queer gender and sexuality are more fluid, constantly emerging, and contingent on multiple factors.

As complex as sex, gender, and sexuality can be, it is helpful to have a diagram illustrating the possible relationships among these factors. Activist Sam Killermann has developed a useful diagram known as "The Genderbread Person," depicting the various aspects of identity, attraction, expression, and physical characteristics that combine in the gender/sexuality of whole persons.

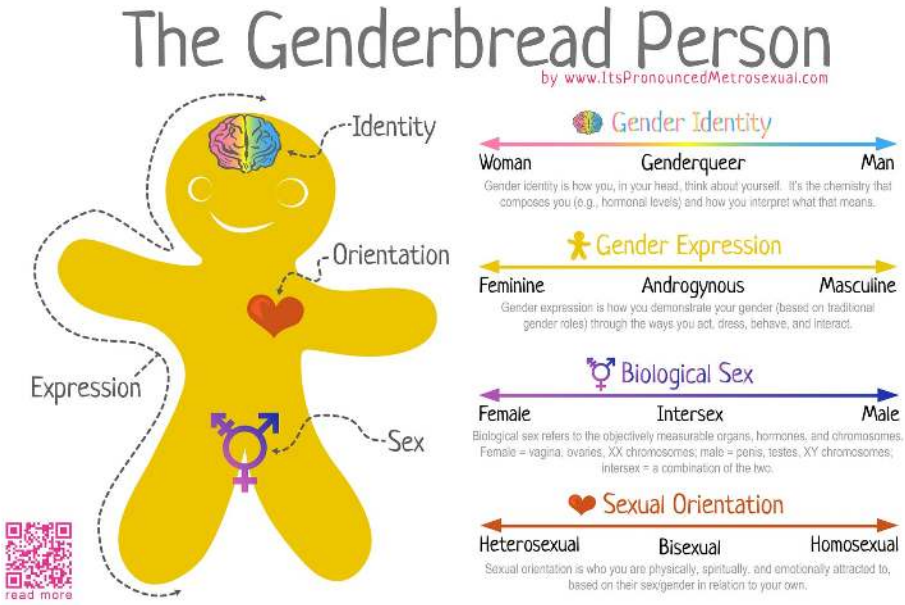


FIGURE 2: Sam Killermann's "Genderbread Person" illustrates how identity, attraction, expression, and physical characteristics all contribute to gender and sexuality. (credit: "Genderbread Person v4" by Sam Killermann/ Wikimedia Commons, Public Domain)

Evidence from Biological Anthropology

Given humans' close biological relationship to primates, one might expect to see similar dynamics of sex and gender between human and nonhuman primate social groups. Biologists and primatologists have examined sex differences in the biology and behavior of both nonhuman and human primates, looking for commonalities that might suggest a common biological genesis for sex/gender categories.

Primate Sex Differences: Biology and Behavior

In the 1950s, a time when American men were supposed to be breadwinners and American women were urged to be housewives and mothers, most primatologists believed that males were the actors in primate social life, while females were passive, marginal figures. Primatologists of the time believed that males constantly competed against one another for dominance in a rigid group hierarchy, while females were more narrowly interested in raising young (Fedigan and Fedigan 1989). In fact, primatologists described the total social organization of primates in terms of male competition. This view went along with Charles Darwin's notion that males are forced to compete for the opportunity to mate with females and so, therefore, must be assertive and dominant. Females, in Darwin's theory, were shaped by evolution to choose the strongest male to mate with and then concern themselves exclusively with nurturing their offspring to adulthood.

By the 1980s, however, a number of strong studies were showing some very surprising things about primate social organization. First, most primate groups are essentially composed of related females, with males as temporary members who often move between groups. The heart of primate society, then, is not a set of competitive males but a set of closely bonded mothers and their young. Females are not marginal figures but central actors in most social life. The glue that holds most primate groups together is not male competition but female kinship and solidarity.

Second, social organization in primates turned out to be incredibly complex, with both males and females actively strategizing for desirable resources, roles, and relationships. Research on a number of primate species has demonstrated that females are often sexually assertive and highly competitive. Female primates actively exercise their preference to mate with certain male "friends" rather than aggressive or dominant males. For males, friendliness with females may be a much better reproductive strategy than fighting with other males. Moreover, many primatologists have begun to identify cooperation rather than competition as the central feature of primate social life, while still recognizing competition for resources by both males and females in their pursuit of survival and reproduction (Fedigan and Fedigan 1989). What this means, in a nutshell, is that (1) both females and males are competitive, (2) both females and males are cooperative, and (3) both females and males are central actors in primate social life.

While evidence suggests that in primate groups males and females are equally important to social life, this still leaves open the question of biological differences and their link to behavioral differences. The anatomy of primate males and females differs in two main respects. First, of course, adult females can and often do experience pregnancy and bear offspring. The females of most

primate species are often pregnant or nursing for most of their adult lives and devote more time and resources to care of young than males do (although there are some notable exceptions, such as certain species of New World monkeys). And some researchers have noted the tendency of juvenile females to pay more attention to primate babies in the group than do juvenile males.

Second, male primates tend to be slightly bigger than females, although this difference itself is quite variable. The size difference between males and females of any species is referred to as **sexual dimorphism**. Male and female gibbons are nearly the same size, while male gorillas are nearly twice the size of females. Female chimpanzees are about 75 percent the size of males. Human females are about 90 percent the size of males, making human sexual dimorphism closer to gibbons than chimpanzees.

Some researchers suggest that a high level of sexual dimorphism is associated with strong male dominance, rigid hierarchy, and male competition for mating with females. Certainly these features reinforce one another in gorilla society. A low level of sexual dimorphism may be associated with long-term monogamy, as with gibbons. However, anthropologist Adrienne Zihlman cautions against making any firm judgments about the relationship between biological features such as size and behavioral features such as sexual relations. She remarks, “There is no simple correlation between anatomy and behavioral expression, within or between species” (1997: 100). Reviewing research on sex differences in gibbons, chimpanzees, gorillas, and orangutans, she concludes that each species features a unique “mosaic” of sex differences involving anatomy and behavior, with no clear commonality that might predict what is “natural” for humans.



FIGURE 3: Bonobo group hug. Bonobos, which share 99% of their DNA with humans, live in female-dominant groups that are mostly egalitarian and peaceful. (credit: Wikimedia Commons group hug.jpg)

Humans’ closest primate relatives are chimpanzees and bonobos, both sharing 99 percent of their DNA with humans, and yet each species exhibits very different gender-related behaviors. Bonobos are female-dominant, while chimpanzees are male-dominant. Bonobo groups are mostly egalitarian and peaceful, while chimpanzee groups are intensely hierarchical, with frequent male aggression within and between groups. Sexual behavior among bonobos is remarkably frequent and extraordinarily variable, with a wide range of same-sex and opposite-sex pairings involving various forms of genital contact. Some researchers believe that sexual contact helps build social bonds and ease conflicts in bonobo groups. Bonobos have been called the “make love, not war” primate. Sexual behavior among chimpanzees is also variable but much more limited to opposite-sex pairings. A female in estrus may mate with several males, a pattern called opportunistic mating. Short-term exclusive relationships may form, in which a male guards a female to prevent other males from mating with her. Consortships also happen, in which a female and a male leave the group for a week or more.

With such variability between humanity’s two closest DNA relatives, it is not possible to use nonhuman primate behavior to make assertions about what is “natural” for human males and females. In fact, with regard to gender, the lessons of primatology may be that apes (like humans) are biologically quite flexible and capable of many social expressions of gender and sexuality.

Human Sex Differences: Biology and Behavior

Just as with primate research, research on human biological sex differences has been considerably slanted by the gender bias of the (often male) researchers. Within the Euro-American intellectual tradition, scholars in the past have argued that women’s biological

constitution makes them unfit to vote, go to college, compete in the job market, or hold political office. More recently, beliefs about the different cognitive abilities of men and women have become widespread. Males are supposedly better at math and spatial relationships, while females are better at language skills. Hormonal activities supposedly make males more aggressive and females more emotional.

In her book *Myths of Gender*, biologist Anne Fausto-Sterling (1992) conducts a massive review of research on cognitive and behavioral sex/gender differences in humans. Looking very closely at the data, she finds that the vast number of studies show no statistically significant difference whatsoever between the cognitive abilities of boys and girls. A minority of studies found very small differences. For instance, among four studies of abstract reasoning abilities, one study indicated that females were superior in this skill, one study indicated that males were superior, and two studies showed no difference at all. Overall, when differences are found in verbal abilities, girls usually come out ahead, but the difference is so small as to be irrelevant to questions of education and employment. Likewise, more than half of all studies on spatial abilities find no difference between girls and boys. When differences are found, boys come out ahead, but the difference is again very small. Looking at the overall variation of skill levels in this area, only about 5 percent of it can be attributed to gender. This means that 95 percent of the differences are due to other factors, such as educational opportunities.



FIGURE 4 A girl solving math problems in school. Research has found no statistically significant difference between the cognitive abilities of boys and girls. (credit: “Uganda_13” by mattlucht/flickr, CC BY 2.0)

Even the tiny differences that may exist in the cognitive talents of different genders are not necessarily rooted in biological sex differences. Several studies of spatial abilities have shown that boys may initially perform better on spatial ability tests, but when given time to practice, girls increase their skill levels to become equal to boys, while boys remain the same. Some researchers reason that styles of play such as sports, often encouraged more by parents of boys, may build children’s spatial skills. Parenting styles, forms of play, and gender roles—all elements of culture—may shape the data more than biology. Cross-cultural studies also indicate that culture plays an important role in shaping abilities. A study of the Inuit found no differences at all in the spatial abilities of boys and girls, while in a study of the Temne of Sierra Leone, boys outperformed girls. Inuit girls are generally allowed more freedom and autonomy, while Temne girls are more restricted in their activities.



FIGURE 5 The relative freedom of Inuit girls may enhance their spatial abilities. (credit: Susan van Gelder)

Similar complexities emerge in the analysis of studies on aggression. Fausto-Sterling found that most studies revealed no clear relationship between testosterone levels and levels of aggression in males. Moreover, testosterone aggression studies have been riddled with problems such as poor methodology, questionable definitions of aggression, and an inability to prove whether testosterone provokes aggression or the other way around. Where differences in aggression between girls and boys are documented, some researchers have concluded that cultural factors may play a strong role in producing those differences. Anthropologist Carol Ember studied levels of aggression among boys and girls in a village in Kenya. Overall, the boys exhibited more aggressive behavior, but there were exceptions. In families lacking girl children, boys were made to perform more "feminine" work such as childcare, housework, and fetching water. Boys who regularly performed those tasks exhibited less aggression than other boys—up to 60 percent less for boys who performed a lot of this work.

As with the primate research on sex differences, research on the brains, bodies, and behaviors of male and female humans does not seem to suggest that significant behavioral differences are biologically hardwired. While researchers have discovered differences in the cognitive talents and social behaviors of males and females, those differences are very small and could very well be due to social and cultural factors rather than biology. As with bonobos and chimpanzees, humans are biologically quite flexible, allowing for a diverse array of forms of gender and sexuality.

Performing Gender Categories

So if gender is not a "natural" expression of sex differences, then what is it? Cultural anthropologists explore how people's ideas of gender are formed in their minds, bodies, social institutions, and everyday practices.

Gender not only influences how people *think* about themselves and others; it also influences how they *feel* about themselves and others—and how others make them feel. Romantic or sexual passion draws from gendered identities and reinforces them. In the words sung by Aretha Franklin, "You make me feel like a natural woman." There is something about gendered identity that can feel deep and real. The sense that some trait is so profoundly deep and consequential that it creates a common identity for everyone who has that trait is called **essentialism**. Gender essentialism is the basis of a lot of circular thinking. When a boy kicks a ball through the neighbor's window and someone says, "Boys will be boys!"—that's essentialist. You may be familiar with this little essentialist ditty from Euro-American culture:

Sugar and spice and everything nice, that's what little girls are made of.
Snips and snails and puppy dog tails, that's what little boys are made of.

In this view, gender is what you're "made of"—that is, your biological essence.
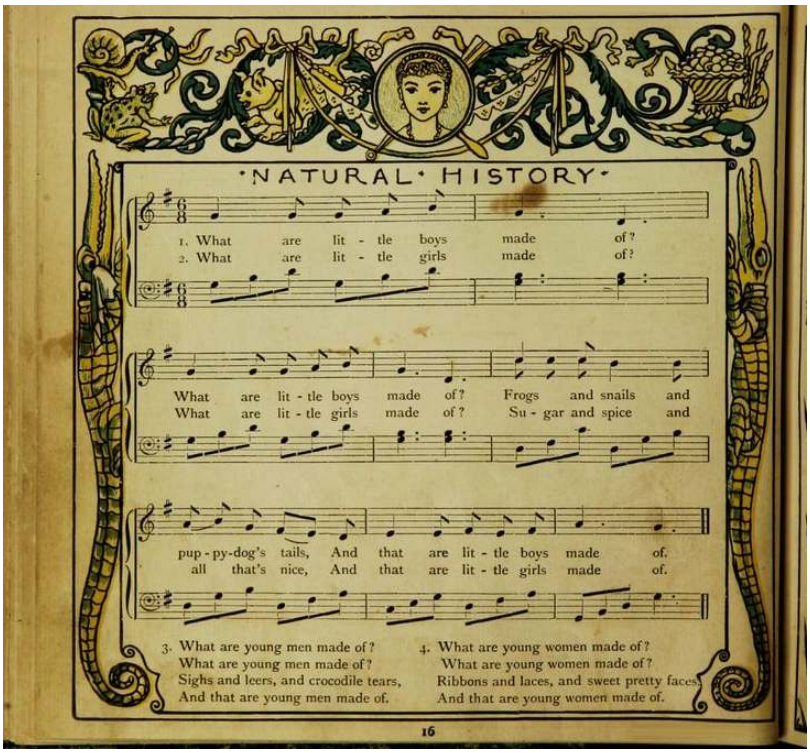


FIGURE 6 The "natural history" of gender, according to this English nursery rhyme, is based on little boys being composed of "frogs and snails and puppy dog's tails," while little girls consist of "sugar and spice and all that's nice." (credit: Walter Crane/Wikimedia Commons, Public Domain)

And yet, biology and archaeology have shown that gender differences are complicated and illusory. What *is* a natural woman . . . or a natural man? Cultural anthropologists find that some cultures consider men and women to be quite similar, while other cultures emphasize differences between genders. All cultures promote a distinctive set of ideal norms, values, and behaviors, considering those ideals to be natural and good. In cultures that consider men and women to be similar, those ideals apply equally to all people. In cultures that consider men and women to be quite different, one set of ideals applies to men and another set applies to women. In all cases, the content of those ideals varies enormously across cultures.

Cultural anthropologist Margaret Mead conducted research on gender in several societies in New Guinea. She confessed that she had initially assumed that gendered behaviors were grounded in biological differences and would vary only slightly across cultures. In her 1935 book, *Sex and Temperament*, she describes her surprise at discovering three cultural groups with vastly different interpretations of gender. Among the Arapesh and Mundugumor, men and women were considered temperamentally quite similar, with little acknowledgment of emotional or behavioral differences between them. The Arapesh valued cooperation and gentleness, expecting everyone to show tolerance and support for younger and weaker members of the group. In contrast, among the Mundugumor, both men and women were expected to be competitive, aggressive, and violent. Among the Tchambuli (or Chambri), however, men and women were assumed to be temperamentally different: men were seen to be neurotic and superficial, while women were thought of as relaxed, happy, and powerful. While Mead's dramatic findings have been subject to criticism, subsequent analysis and fieldwork by other anthropologists have largely substantiated her main conclusions (Lipset 2003).

Like race, gender involves the cultural interpretation of biological differences. To make things even more complicated, the very process of cultural interpretation alters the way those biological differences are perceived and experienced. In other words, gender is based on a complex dynamic of culture and nature. Gender identities feel more natural than, say, class or religious identities because they involve direct reference to one's body. Most people's bodies feel "natural" to them even with the knowledge that culture shapes the way individuals experience their bodies. In this way, gender is not so much natural as it is *naturalized*, or made to seem natural.

In the past three decades, many gender scholars have argued that gender is not so much a set of naturalized categories to which people are assigned as it is a set of cultural identities that people perform in their daily lives. In her influential book *Gender Trouble* (1990), philosopher Judith Butler describes gender as a kind of relation between categorical norms and individual performances of those norms. In childhood, people are presented with the idealized categories of male and female and taught how to enact the

category to which they have been assigned. For Butler, gender is "an impersonation" because "becoming gendered involves impersonating an ideal that nobody actually inhabits."

If gender involves both established categories and everyday performances, then it's necessary to pay close attention to the idealized norms of gender constructed in a particular cultural context and the various ways in which people enact those norms in practice. In *Gender and Sexuality in Muslim Cultures* (Ozyegin 2015), researchers studying Muslim communities in Turkey, Egypt, Pakistan, Syria, and Iran examine the ideals of Muslim masculinity and femininity in those contexts, as well as how those ideals are enacted and resisted in everyday life. Salih Can Açıksôz describes how the Turkish government provides disabled veterans with access to assisted reproductive technologies so that they can father children. The aim of this program is to make them feel like "real men" again, renormalizing their masculinity in the context of heterosexual family life. Maria Frederika Malmstroöm shows how Muslim women in Cairo strive to achieve the purity and cleanliness associated with femininity through such practices as cooking, skin care, and becoming circumcised. The idea is that gender is not at all "natural"; you have to work at it every day and make sure you're doing it right. If you cannot seem to approximate your gender norm for some reason, then your family members, friends, and even the government may step in to help you perform it.

Women and Feminist Theories of Gender

Inspired by the women's movement of the 1960s, many female anthropologists in the early 1970s began taking a critical look at mainstream Anthropology, noticing how the discipline focused almost exclusively on the activities of men—both as researchers and objects of study. In most early and mid-20th-century ethnographies, men were represented as the major social actors, and men's activities were assumed to be the most important ones. Where were the women, and what were they doing? Calling for an "anthropology of women," many feminist anthropologists set out to correct the ethnographic record by focusing more on the voices, perspectives, and practices of women in cultures all over the world.

Examining the roles of women in many cultures, feminist anthropologists began to see some patterns. In contexts where women made strong and direct contributions to subsistence and the economy, they seemed to enjoy greater social status and equality with men. Among gatherer-hunters, for instance, where women's gathering activities provided the majority of calories in the overall diet, women held positions of equality. In contexts where women were relegated to the home as housekeepers and mothers, they were more subordinate to men and were not considered equal actors in sociocultural activities. Agricultural and industrial societies both created "public" spheres of work separate from the "private" sphere of the household. Women in these societies were more often assigned to work in the private sphere and sometimes even prohibited from entering public areas. In capitalist market systems, the domestic work of housewives is uncompensated and virtually invisible. Cultural anthropologist Michelle Rosaldo (1974) argued that the division of sociocultural life into public and private spheres resulted in the marginalization of women.

While this early wave of feminist anthropology focused on women, more recently researchers have questioned the essentialism of this approach. Is gender always the most important factor in determining the status of women in all cultures? Gender intersects with race, class, ethnicity, age, sexuality, and physical ability to make the experiences of women diverse and complex, a position called **intersectionality**. Due to economic necessity, women of color in American society have more often been forced to work outside the home. In fact, many privileged white women have been able to hire domestic workers to relieve them of their household chores—and often those domestic workers have been women of color. For cooks, nannies, and housekeepers, the private domestic sphere of privileged women constitutes their own public sphere of work, supervised by the woman of the house. The experiences of people of color complicate the idea that women are subordinated through their confinement to the private domestic sphere.

Men and Masculinities

While men had been the primary focus of anthropological research up to the 1970s, they had always been studied as general representatives of their cultures. The establishment of gender studies in anthropology prompted both male and female anthropologists to view all persons in a culture through the lens of gender. That is, men began to be seen as not just "people" but people who are socialized and culturally constructed as men in their societies (Gutmann 1997). In the 1990s, a wave of scholarship emerged probing the identities of men and the features of masculinity across cultures.

Cultural anthropologist Stanley Brandes (1980) studied how men in Monteros, an Andalusian town in southern Spain, used folklore to express their ambivalent feelings of desire and hostility toward women. Through their jokes, pranks, riddles, wordplay, nicknames, and dramas, men in Monteros built camaraderie and constructed a male-centered ideology of dominance. A good part of each man's day in Monteros was devoted to telling jokes and playing pranks among other men. Many jokes expressed fears about the sexual power of women, in particular the ability of women to seduce and destroy their male victims. This research on

masculinity demonstrates that “male” is not a stand-alone category but is always held in opposition to “female,” even when women are not present.

Other studies of masculinity have focused on the construction of masculinity through initiation rites, friendships, marriage, and fatherhood. Studying fatherhood among the Aka of central Africa, Barry Hewlett (1991) discovered that fathers in these communities are remarkably affectionate, attentive, and involved in the care of their children. Among families with young children, fathers spend 47 percent of their day within arm’s length of their children and frequently hold and care for them, especially in the evenings. Ethnographic research suggests that men are not “naturally” awkward or inept at childcare, nor are they less able to forge intimate and emotional bonds with their children. Rather, men are socialized to perform specific versions of fatherhood as proof of their masculine identities.

Beyond Male and Female

With the inclusion of masculinity, the anthropological study of gender came to be dominated by the opposed categories of male and female. Many studies took it as given that people are assigned at birth to one of these two categories and remain in their assigned category for a lifetime. A significant number of people in every culture, however, are not obviously male or female at birth, and some people do change their gender identities from one category to another—or even to an entirely different gender category that is neither male nor female. Over the past few decades, anthropological studies of gender have similarly broadened to consider those experiences as well.

Intersex and the Ambiguities of Identity

A friend tells you, “My sister just had a baby last night!” You respond, “Is it a boy or a girl?” Your friend replies, “Well, they don’t know. Maybe neither, maybe both.”

Based on a detailed analysis of extensive data, Anne Fausto-Sterling (2000) concluded that in about 1.7 percent of births, a baby’s sex cannot be completely determined just by glancing at the baby’s genitalia. (Note that due to different or changing considerations of sex determination, you may see different percentages or other differences in information; this text is using the most widely accepted and adopted research.) **Intersex** is an umbrella term for people who have one or more of a range of variations in sex characteristics or chromosomal patterns that do not fit the typical conceptions of male or female; the prefix *inter–* means “between” and refers here to an apparent biological state “between” male and female. There are many causal factors that can make a person intersex. Genetically, the baby may have a different number of sex chromosomes. Rather than two X chromosomes (associated with females) or one X and one Y chromosome (associated with males), babies are sometimes born with an alternative number of sex chromosomes, such as XO (only one chromosome) or XXY (three chromosomes). In other cases, hormonal activity or even chance occurrences in the womb can affect the baby’s anatomy.

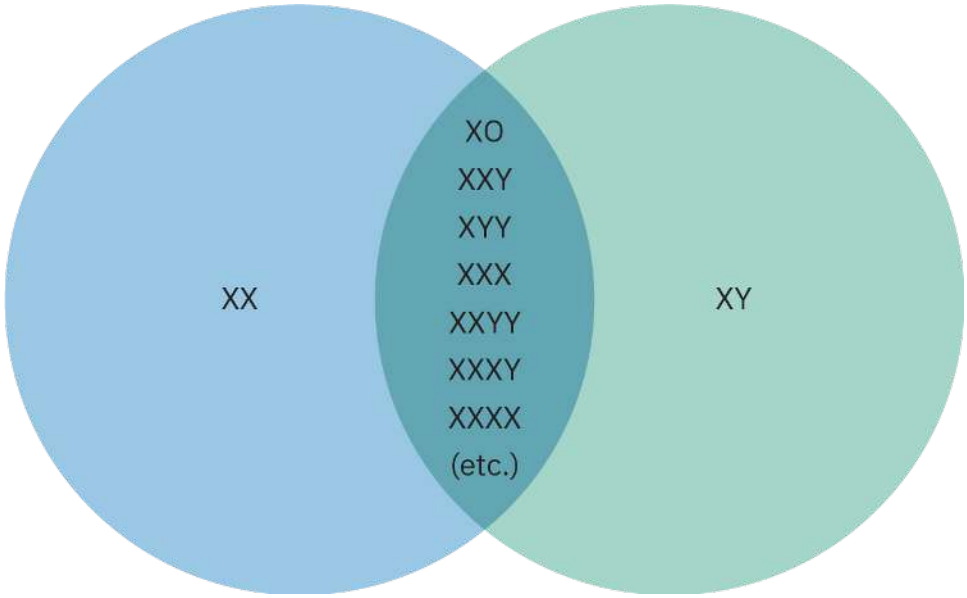


FIGURE 7 Chromosomal compositions associated with sex categories. On the far left, the combination of two X chromosomes is associated with female sex. On the far right, the combination of one X and one Y chromosome is associated with male sex. In the center, the most common intersex chromosomal combinations are listed. An embryo lacking an X chromosome is not viable. (attribution: Copyright Rice University, OpenStax, under CC BY 4.0 license)

While it is true that the majority of humans display biological characteristics associated with either one sex or another, 1.7 percent is not insignificant. If that percentage were applied to the global total of about 140 million babies born every year, it would mean that that more than two million of these babies could be intersex. On a more local level, if that percentage were applied to any town of 300,000 people, there could be more than 5,000 intersex people.

Beyond biology, the category of intersex reveals a great deal about the cultural mechanisms of gender. Intersexuality can be recognized at any point in a person's life, from infancy to well into adulthood. Parents often discover their child is intersex in a medical context, such as at birth or during a subsequent visit to the pediatrician. When a doctor explains that a child is intersex, parents may be confused and concerned. Some doctors who are uncomfortable with biological sex ambiguity may order tests to determine the child's chromosomal count and hormone levels and take measurements of the child's genitals. They may urge parents to assign a specific gender to the baby and commit to plans for hormonal treatments and surgical interventions to affix that assigned gender to the growing child. Doctors are often taught to present the chosen gender as the "real" underlying sex of the baby, making medical treatment a process of allowing the baby's "natural" (meaning unambiguous) sex to emerge. This conceptualization of intersex babies as "really" either male or female contradicts the complex mix of male and female traits presented by most intersex bodies.

Many intersex persons support a ban on what they call intersex genital mutilation, or IGM. In a 2017 article, Latinx intersex author and activist Hida Viloria calls attention to the hundreds of intersex people who have come forward to say that IGM has harmed them. The underlying goal of sexual assignment surgery, Viloria points out, is to create bodies capable of heterosexual sex and matching a gender binary. Medical ethicist Kevin Behrens (2020) argues that surgical interventions should only be carried out when surgery serves the best medical interests of the child and, in most cases, medical intervention should be delayed until the intersex person is old enough to give informed consent. Behrens also emphasizes that parents and children have the right to know the truth about an intersex child's diagnosis and the possible consequences of any suggested treatment.

Intersex ambiguity and the rush to hide or eliminate it reveal important lessons about biology and culture. The process of determining what an intersex person was "meant to be" often involves a large set of biological variables, many of them subject to change over time. Those factors vary not only for intersex people but for everyone. Chromosomes alone do not make females and males. Rather, the interactions of genetic factors with hormones and environmental forces produce a complex continuum of gender. Instead of a binary of male and female separated by a hard boundary, many gender scholars recognize gender as a multidimensional spectrum of differences. There is far more biological variation within the cultural categories of male and female than between the two. This is not to deny the existence of biological differences but rather to complicate the concepts of sex and gender, allowing for the normalcy of ambiguity and the tolerance of variation.

Multiple Gender and Variant Gender

Many societies construct additional gender categories in addition male and female to accommodate people who do not fit into a binary gender system. The term **multiple gender** indicates a gender system that goes beyond male and female, adding one or more categories of **variant gender** to accommodate more sex/gender diversity. A variant gender is an added version of male or female that accommodates those who were not assigned to that category at birth but adopt that identity during the course of their lives. A person whose biology, identity, or sexual orientation contradicts their assigned sex/gender role can adopt a variant-gender identity. For instance, a person might be considered female at birth but later transition to a masculine version of female—what anthropologists term *female variant*.

Anthropologist Serena Nanda (2000) has studied variant-gender categories in many societies, including Native North American societies and peoples in Brazil, India, Polynesia, Thailand, and the Philippines. The widespread practice of multiple gender indicates a common cultural need to accommodate the complexities of human sex, gender, and sexuality. In contrast, European and Euro-American societies have inherited a rigid two-gender system that stigmatizes people who do not conform to the gender identity assigned to them at birth. Activists pressing for more gender flexibility can be inspired by examples of alternative gender in many non-European cultures.

When Spanish explorers first came to North America, they were astonished to find men in Native American societies who dressed as women, did the work of women, and had sexual relationships with men. Later, anthropologists who studied Native American groups discovered that some groups, including the Crow and the Navajo, had categories of **variant male** (assigned a male identity at birth but adopting a feminine identity later on) and **variant female** (assigned female at birth but adopting a masculine identity later on). Note that people in variant categories did not fully transition to the opposite gender but rather took on a masculine or feminine variant of the sex assigned at birth. Ignoring the Native American terms for variant gender, early European explorers referred to variant males as *berdache*, a Portuguese term that indicated a male prostitute—though that is not what they were at all.

In 1990, as Native American LGBTQ people sought to resurrect their heritage of variant gender, they coined the pan-Indian term **two-spirit**, meaning people with both male and female spirits.

Two-spirit people were highly valued and esteemed in Native American cultures. Rather than facing stigma or rejection, their alternate gender identity was thought to give them special talents and spiritual powers. In many Native American societies, two-spirit people often became healers and spiritual leaders. They were typically very successful at performing the work of the opposite gender. Male-variant people were known for their excellent cooking and needlework, and many female-variant people were great hunters and warriors. Two-spirit people were also called upon to act as intermediaries between genders, such as in marriage arrangements.

Like gender-nonconforming people in many societies, two-spirit people began to realize their variant identities in childhood, rejecting the activities associated with their assigned gender. A boy might want to cook or weave, or a girl might prefer to hunt and play with the boys. If there were not enough boys to hunt, a family might even encourage a girl to develop a variant identity so that she could help provide meat to the family. Sometimes, children would experience visions or dreams guiding them to the tools associated with the opposite gender.

Generally speaking, people of variant gender had sexual relationships with people of the gender opposite their lived identity. So if a person took on the clothing and work of a woman, they would be expected to have intimate relationships with men, and people who lived as men would have relationships with women. Neither two-spirit people nor their opposite-gender partners were considered lesbian or gay.

With European colonization of North America came a much more restrictive system of gender categories and sexualities. As Euro-Americans expanded into Native American territories, Native Americans were pressured to assimilate to Euro-American norms. From 1860 to 1978, children were removed from their families and sent to assimilationist schools, where they were taught that Native cultures were backward and variant genders were sinful and deviant. By the 1930s, variant-gender practices had largely disappeared. However, with the rise of the American LGBTQ movement, many Native Americans have rediscovered the more flexible and tolerant gender system of their ancestors.

The Power of Gender: Patriarchy and Matriarchy

In cultural constructions of gender, two or more genders are defined in an overall system that assigns various forms of behavior and activity (and stereotypes!) to different categories or gendered realms of society. Some of those activities are considered more important than others, and some of those behaviors are more authoritative and dominant. Gender is not only a system of differences between the realms of female and male but also a system of power between those two realms.

Patriarchy: Ideology and Practice

Anthropologist Jennifer Hasty, reflects on what she learned about gender ideology while working as wedding videographer:



FIGURE 8 Weddings reveal a lot about a culture's gender ideology. ("Father of the Bride" by stevebrownd50/flickr)

As a side gig to my anthropology job, I ran my own business as a wedding videographer in the Philadelphia metropolitan area from 2010 to 2017. While the whole venture was driven by economic necessity (I was teaching part-time), the wedding industry turned out to be a fascinating vantage point from which to view gender relations in American society. Most weddings were meticulously planned by the bride, with the groom deferring to her wishes or staying out of the whole process. Brides who were attracted to my artsy, minimalist film aesthetic tended to be middle-class professionals, college graduates heading

into careers in education, finance, law, or medicine. Many of these weddings were grand potlatches of middle-class style and markers of identity.

Though my brides were well-educated women with professional jobs, when it came to planning their "special day," nearly all of them reverted to traditions infused with old-fashioned gender roles. Nearly all of them wore a long, white wedding dress, a symbol of virginal purity, although many of them had been cohabiting with their grooms (and some already had children with them). Nearly all of them insisted on being "given away" by their fathers, even when those fathers had been largely absent for some part of their childhood due to divorce. This notion of being a gift, given away to the groom, was so powerful that one bride, whose father was not there, declared in her personal vows, "I give myself in marriage to you." Grooms and their families did not use this language of human gift giving.

The notion that a woman is passed from the paternalistic domain of her father into the care and supervision of her groom reflects a larger **gender ideology** about the relations between men and women in family life. A gender ideology is a coordinated set of ideas about gender categories, relations, behaviors, norms, and ideals. These ideas are embedded in the institutions of the family, the economy, politics, religion, and other sociocultural spheres. As with racial and class ideologies, people often challenge the explicit terms of a gender ideology while actively participating in the institutionalized forms associated with it. Though women have made great strides in American public life in past decades, in their weddings, they still enact a gender ideology that positions them as dependent objects passed between men in the transaction of marriage. The power of gender ideology is that it most frequently operates below the level of consciousness. An ideology that becomes naturalized as "common sense" becomes hegemonic.

Patriarchy is a widespread gender ideology that positions men as rulers of private and public life. Within the household, the eldest male is recognized as head of the family, organizing the activities of dependent women and children and governing their behavior. Family resources such as money and land are controlled by senior men. Men make decisions; women acquiesce. Beyond the family, men are accorded positions of leadership throughout society, and women are summoned to play a supportive and enabling role as marginalized subordinates.

Contemporary forms of patriarchy in American and European contexts are linked to the European development of capitalism in the 1600s. As economic activities moved out of households and into factories and offices, the household came to be defined as a private sphere, while the world of economic and political activities came to be called the public sphere. Women were assigned to the private sphere of family life, where they were expected to carry out nurturing roles as wives and mothers. Men not only governed the private sphere but also participated in the competitive and sometimes dangerous public sphere.

Different forms of patriarchy have emerged throughout the world. In India, the development of agriculture and the rise of the state resulted in the increasing subordination of women in patriarchal social institutions (Bonvillain 1995). Patriarchal ideology and social structure date back to the Vedic period (1500–800 BCE). In the Vedic communities of ancient India, men dominated economic and political life, and women were mostly excluded from these spheres. However, women could exercise some forms of authority as mothers in their households. Girl children, though not preferred, were generally treated well. Girls and boys both were educated and participated in religious activities. Female chastity and fidelity were highly valued, but women could engage in premarital sex without being shunned, and wives could divorce their husbands. Legally, however, daughters and wives were dependent on the men in their lives, who could make decisions on their behalf. A woman was not permitted to inherit property unless she was the only child. In the post-Vedic period, patriarchy was strengthened with the systematic codification of Hindu law. Patriarchy grew even more domineering, with the cultural spread of child marriage, wife-beating, female infanticide, and the disfigurement and ritual death of widows. When India came under Muslim rule in the 12th century, Islamic customs for veiling and secluding women further marginalized women in Hindu and Muslim communities alike.

Though contemporary India is a country of ethnic and religious diversity, patriarchy has become a dominant organizational force throughout Indian society. In rural areas, people often live in large extended family households structured by patrilineal descent. These families consist of a married couple, their sons and sons' families, and their unmarried daughters. Men are recognized as heads of their households, exercising authority over their wives and children. Beginning in the 19th century, a reform movement called for the elimination of many patriarchal customs such as child marriage and *sati* (the ritual death of widows). Reformers, most of them elite men and women, encouraged the education of girl children and the legalization of inheritance for women. In response, *sati* became outlawed, widows were allowed to remarry, the marriage age was fixed at 12, and women were permitted to divorce, inherit, and own property. In the latter part of the 20th century, the Indian state passed laws to enhance women's equality in many areas, including education, inheritance, and employment. Urban women in middle- and upper-class families have benefited from these reforms. However, in rural areas, many of the patriarchal customs outlawed by the state continue to be practiced.

Matriarchy: Ideology and (Not) Practice

As the term suggests, **matriarchy** means rule by senior women. In a matriarchal society, women would exercise authority throughout social life and control power and wealth. Like patriarchy, matriarchy is a gender ideology. Unlike patriarchy, however, matriarchy is not embedded in structures and institutions in any culture in the contemporary world. That is to say, it's *just* an ideology—not a dominant one, and certainly not hegemonic.

While societies with patrilineal kinship systems are strongly patriarchal, societies with matrilineal kinship systems are not matriarchal. This is a common source of confusion. In matrilineal kinship systems, children primarily belong to their mother's kin group, and inheritance passes through the maternal line. However, even in matrilineal societies, leadership is exercised by the senior men of the family. Instead of a woman's husband, it is her brother or mother's brother (her maternal uncle) who makes decisions about family resources and disciplines the behavior of family members. Scholars who theorize the existence of ancient matriarchies suggest that those societies were not only matrilineal but also dominated by the leadership of women as well as the values of fertility and motherhood.

Where are the matriarchies? Why is patriarchy so prevalent while matriarchy is nonexistent? Nobody really knows the answers to these questions. Some anthropologists think that pregnancy and childcare marginalized women, while men were freer to participate in cultural practices, technologies, and institutions. Others suggest that women's reproductive power posed a threat to men. Patriarchy may have been developed as a system of subordination and control over the acknowledged power of women.

In the search for matriarchy, it could be that anthropologists and feminists are looking for the wrong thing. While anthropologists have not found societies in which women dominate and control men, there are plenty of examples of cultures in which women and men enjoy relative equality and freedom from sexual oppression and control.

Gender and Power in Everyday Life

Contemporary anthropologists who study gender pay little attention to hypothetical debates about the origins of patriarchy or the possible existence of ancient matriarchy. Rather, cultural anthropologists are interested in how people interact with the cultural norms and systematized practices of gender in their societies today. Gender is diffused throughout culture, embedded in systems of kinship, modes of subsistence, political leadership and participation, law, religion, and medicine. Anthropologists study how people move through these gendered realms in their everyday lives. They explore how identities and possibilities are shaped by the structures of gender as well as how people struggle against and sometimes transform gendered expectations.

Cultural anthropologists who study women in patriarchal cultures highlight the diversity of women's experiences and their various techniques of asserting their interests in difficult circumstances. In her study of the problem of fistula among women in Niger, Allison Heller (2019) explores how women navigate gendered realms as they cope with a debilitating reproductive problem. Obstetric fistula is a complication of childbirth in which tissues separating the bladder from the vagina are ruptured, often resulting in chronic incontinence (uncontrolled urination). Often the result of prolonged or obstructed labor, fistula disproportionately affects women in rural and poor communities, who frequently give birth without professional medical assistance. The incontinence, pain, and reproductive complications of fistula stigmatize many of the women who have this condition. A host of global aid and relief agencies depict such women as victims of fistula, rejected by their husbands and ostracized by their communities. Heller's ethnography complicates this simplistic picture. In her interviews with women affected by fistula, Heller discovered that family structures and relationships profoundly shape women's experiences of fistula and the treatments available to them. In social and medical crises, these women turn to their mothers for support and advocacy. Mothers may insist that their daughters be brought to the hospital in cases of complicated labor, thereby preventing or mitigating the severity of fistula. Mothers may also act as intermediaries between women and their relatives and neighbors, working to reduce the stigma of fistula and promote sympathy and acceptance. Heller also found that marriage conditioned a woman's experience of fistula. Whether her marriage was arranged or a marriage "for love," a woman whose family supported her marriage was more likely to receive extended family support. Women who had strong relationships with their husbands were far less likely to be rejected by them after developing fistula.

The cultural anthropology of gender considers the situations people face as gendered persons and how they draw from available resources and relationships to fulfill their roles and sometimes challenge gendered expectations. Contemporary anthropologists of gender study, for instance, women's experiences of migration, genocide, religious practice, and media, and men's experiences of culture within the social construction of masculinity, among many other topics. A growing number of studies also focus on the experiences of trans, non-binary, and variable gender individuals, as will be discussed below.

Sexuality and Queer Anthropology

Intersecting with gender, the anthropological study of sexuality explores the diversity of meanings, practices, relationships, and experiences associated with erotic interactions. Since the 1980s, the study of sexuality in anthropology has burgeoned into the dynamic subfield of **queer anthropology**. Anthropologists working in this subfield focus on areas of sociocultural activity distinguished from the presumed norms of heterosexuality and binary gender identities.

Same-Sex and Queer Studies

Cultural anthropologists have long been fascinated with sexuality. Of central importance to marriage, kinship, and gender relations, sexuality also pervades art, religion, medicine, economics, and even politics in cultures around the world. As they documented sexuality and sexual practices in cultures around the world, anthropologists demonstrated the prevalence of same-sex erotic interactions.

British anthropologist E. E. Evans-Pritchard spent his early career studying social organization among two different African groups, the Azande and the Nuer. Later in his career, Evans-Pritchard began thinking about the many stories he had heard in the course of his years studying African societies, particularly stories describing the prevalence of same-sex erotic practices in Zande society in precolonial times. In an article on the topic, he describes how unmarried adult warrior men, unable to marry due to the scarcity of marriageable women and forbidden to engage in adultery with other men's wives, often took younger men as sexual partners or "wives" (1970). The warrior paid bride wealth to the parents of the younger man and performed services to the young man's family just as he would have to the natal family of a female wife. The partners took on the roles of husband and wife, and the younger men referred to themselves as women. As the Azande did not approve of anal sex, male partners had sex "between the thighs"—that is, the older man penetrating between the thigh gap of the younger one.

Like the men, Zande women also commonly engaged in same-sex practices and relationships. In Zande culture, men were permitted to have more than one wife and a husband took turns sleeping with each of his wives. In a family of several wives, then, a woman would wind up sleeping alone many nights. Zande men and women told Evans-Pritchard that lonely wives would often get together at night, and engaged in sexual activity. Women could also formalize a "love-friend" relationship in public, widely considered to be a cover for same-sex relations.

While some same-sex practices are ritualized in some cultures, others are more informal and less public. Some cultures construct same-sex practices as a phase associated with adolescent experimentation and tutelage. As in many parts of contemporary Africa, girls in boarding schools in Ghana are known to experiment with same-sex relationships. In Ghana, it's called *supi* (possibly short for *supervisor* or *superintendent*). In boarding high schools, a senior girl might take a junior girl as a special friend (Dankwa 2009; Gyasi-Gyamera and Søgaard 2020). Some of these bonds are fairly casual. The junior girl runs errands for the senior girl, such as fetching water or food. The senior girl provides protection and help to the junior girl (such schools could be full of difficulties, including supply shortages and bullying). Some *supi* relationships can become emotionally and physically intense. The two girls often exchange gifts, write each other love letters, and fondle and caress one another. They might shower together or share a bed. *Supi* is not limited to a special category of girls (i.e., identified lesbians) but has been widespread among schoolgirls, nearly all of whom eventually marry men and fulfill their conventional roles as wives and mothers.

Many anthropological studies describe same-sex practices in societies that otherwise strongly value heterosexual marriage and fertility. In such contexts, sexuality is not so much an identity as it is a ritual, life stage, coping technique, or form of pleasure. Though sometimes shielded from public view, same-sex relations are seen as complementary to heterosexual relations in some cultural contexts, fully compatible with conventional demands for heterosexual marriage and family life. In his research on gender and sexuality in Nicaragua, for instance, Roger Lancaster (1992) found that conventionally masculine men could maintain their essentially heterosexual identities if they took the "active," penetrative role in same-sex encounters.

With the progress of the LGBTQIA+ movement originating in the United States and western Europe, people around the world who engage in same-sex and transgender practices have formed public identities and communities, calling for the acceptance and legal recognition of their relationships. Rather than indulging in same-sex pleasures as a substitute for "the real thing" or as something done "on the side," American gay and lesbian communities recast their own practices as "the real thing," a set of practices and relationships central to their whole way of life. This assertion has profound implications for notions of family and community. If heterosexual marriage and reproduction form the foundation of kinship systems based on the idea of biological descent, then same-sex relationships suggest new forms of kinship based on networks and shared values. In *Families We Choose* (1991), anthropologist Kath Weston explores how lesbian and gay families in the San Francisco Bay Area constructed family networks that both reflected and challenged mainstream notions of family.



FIGURE 9 Boston Pride Parade, 2007. LGBTQIA+ people around the world have publicly advocated for the acceptance and legal recognition of their relationships. (credit: "Children in Wagon (Part 2)" by greenmelinda/flickr, CC BY 2.0)

Transgender Studies

Evans-Pritchard's research on male-male marriage among the precolonial Azande provided an example of young men who were socially constructed as women through their wifely role in these marriages. Across the continent, in West Africa, women in precolonial Igbo society could be ritually transformed into men and then engage in female-female marriages as husbands. In *Male Daughters and Female Husbands* (1987), Ifi Amadiume describes how a father with no sons could make his eldest daughter into an honorary "son" who could inherit and carry on the patrilineage. This woman became a "male daughter." If she were married, she would return to her natal compound to undergo a ceremony that transferred her into the social category of male. She would then wear men's clothes, live in the male section of the compound, perform men's work rather than women's, and participate in community life as a man. She could marry women who then became her wives (thus becoming a "female husband"). Those wives would have discreet liaisons with men in the area in order to bear children, who would belong to the lineage of the female husband. It was also possible for Igbo women who became wealthy and powerful in their communities to take a title through ritual means that allowed them to take wives of their own, just as male daughters could. Even if she were married herself, a powerful woman could have wives to do most or all of her domestic work. Did these powerful women have sexual relations with their wives? Anthropologists just don't know. Amadiume describes women joking about sex between women in such marriages, but nobody knows how common it might have been.

Building on this earlier research, a fresh area of inquiry has developed in anthropology centered on the experiences, identities, and practices of transgender and gender-nonbinary persons and communities. **Transgender** describes a person who transitions from a gender category ascribed at birth to a chosen gender identity. **Gender nonbinary** describes a person who rejects strict male and female gender categories in favor of a more flexible and contextual expression of gender. Cultural anthropologists have described a great diversity in the expression of trans identities, pointing to the prevalence of transgender practices the world over.

Taking an innovative approach, anthropologist Marcia Ochoa (2014) devised a research project on "spectacular femininity" in Venezuela by examining two communities: female beauty pageant contestants and transgender sex workers who also hold beauty pageants. Ochoa traces the emergence of the beauty pageant in Venezuela and identifies this ritual competition as a carrier of notions of modernity and nationhood. She explores the competition of young women, or *misses*, in the Miss Venezuela pageant as well as the local and regional beauty pageants for *transformistas*, gay Venezuelans who identify as women. The stylized performances of *transformistas* carry over into their displays on Avenida Libertador in central Caracas, the neighborhood where they conduct their trade as sex workers. In order to compete in these realms of spectacular femininity, both *misses* and *transformistas* undergo painful surgical procedures to make their bodies conform to an exaggerated ideal of femininity.

Ochoa's work is pathbreaking in its ability to bring together concepts often explored separately or held in opposition: heterosexuality and non-heterosexuality, gender and sexuality, and cis and trans identities (**cisgender** describes gender identity

constructed on the sex assigned at birth). By juxtaposing *misses* and *transformistas*, she shows how these seemingly disparate concepts are threaded together in the complex web of Venezuelan culture.

The End of Gender?

In cultures that are strongly heteronormative with rigid two-gender systems, some people feel restricted in their gender identities and sexual practices. In many countries, efforts to create more flexibility in the expression of gender and sexuality have focused on gaining equal rights for and combating discrimination against women and LGBTQIA+ persons. In the past 50 years, this social movement has achieved great strides at national and global levels. In 2011, the United Nations Human Rights Council passed a resolution recognizing LGBTQIA+ rights. The United Nations subsequently urged all countries to pass laws to protect LGBTQIA+ persons from discrimination, hate crimes, and the criminalization of non-heterosexuality. Same- sex marriage has now been legalized in 29 countries, including the United States, Canada, Mexico, Taiwan, and most of western Europe. In many countries, however, same-sex acts and gender nonconformity are still criminalized, sometimes punishable by death.

Where progress has been made on human rights for LGBTQIA+ persons, these changes have made life much easier for many people, allowing them to feel secure in their families, their jobs, and their public lives. Some activists are concerned that such legal reforms do not go far enough, however. Gender and sexuality are not just legal issues; they are cultural issues as well. The strict heterosexual two-gender scheme common to European and American cultures is a system infused with patriarchal values, expressed in patriarchal practices and institutions. That is to say, inequality is built into the heteronormative system of gender. In order to achieve true freedom and full equality, is it necessary to get rid of categories of gender and sexuality altogether? Are gender categories inherently oppressive?

Some people think so, arguing that society should transition to more gender-blind forms of language and social relations. In the United States, a movement is underway to neutralize gender in everyday language. Whereas masculine pronouns (he/him) were previously the default way of referring to hypothetical persons or situations where gender is not specified, followed by a movement toward specifying both masculine and feminine pronouns (he or she/him or her), new conventions call for the use of third-person plural forms (they/ them) as singular pronouns instead, particularly to include people who identify as neither man nor woman. Notably, this is already an accepted feature of everyday English that people commonly use without thinking about; if a housemate tells you, “Someone left a message for you,” you’re more likely to respond with “What did *they* want?” than with “What did *he* want?” or “What did *he or she* want?” Moreover, a convention is evolving that allows people to specify the pronouns they would prefer, either gendered (she/her, he/him) or neutral (they/them, other).

Will changes in pronoun usage bring about greater freedom and equality in patriarchal societies? Maybe. Many languages have gender-free pronouns, such as Twi, a West African language of the Akan people in central Ghana. However, though matrilineal, the Akans are also patriarchal. And gender is a very fundamental aspect of identity in Akan societies, structuring norms of dress, language, behavior, and relationships throughout a person’s life. In other words, pronouns do not bear much relationship to the organization of gender in culture and social institutions. In the United States, the English language pronoun system might change to be gender-neutral, but women and LGBTQIA+ people will still inhabit those cultural categories. Those categories will not just disappear.

Previous discussions of racial categories have addressed the fact that race is not a set of biological categories objectively found in nature. Rather, race, like gender, is socioculturally constructed. Even so, it is naive to pretend that race does not exist as a social reality that structures inequality in many societies. When people try to be “color blind,” they ignore the sociocultural reality of race and make it more difficult to recognize and remediate racial inequalities. Similarly, the fact that gender is a social construct does not mean that people can easily transition to a gender-blind society. Scholars of gender and sexuality argue that American society still grants forms of authority and privilege to heterosexual men through the cultural norms pervading public and private life. Asserting a “gender blind” perspective may obscure forms of inequality and violence that operate through gender and sexuality. Race and gender are both powerful sociocultural categories embedded in social practices and institutions. Anthropology encourages recognition of the diversity and complexity of those constructed categories alongside acknowledgment of the real histories of marginalization and struggle. Perhaps changes in pronoun use are just the beginning of more far-reaching changes to come.

OPTIONAL MINI-FIELDWORK ACTIVITY

Consider your own body. What do you do to your body on a daily or weekly basis? Why? For two nonconsecutive days, make careful note of all of the routine practices devoted to your body (including hygiene, dress, exercise, etc.). Are these practices shaped by notions of gender? Of sex or sexuality? Do these practices shape the way you think of your body as gendered? Do they influence the way you present yourself in social situations? Do you think they influence the way others interact with you?

> Consider how other people respond to and interact with your body (or refuse to interact with it). How are these interactions shaped by cultural notions of gender and sexuality? Are there notions of power embedded in these bodily practices? Patriarchy? Feminism? Heteronormativity?

Marriage and Families across Cultures

As we have seen above, gender norms and ideologies play a significant role in shaping marriage practices. Because of the importance of marriage in creating socially sanctioned families, and thus reproducing cultural norms and gender roles, it is worth considering in greater detail.

Anthropological Definition of Marriage



FIGURE 10 Customers peruse goods in a market in downtown Lima, Peru. Some Indigenous people in Peru begin marriage with a practice known as *servinakuy*. In *servinakuy* , a couple establish an independent household and live together until the birth of their first child, after which they are formally considered to be a fully married couple. (credit: “Lima, Peru” by YoTuT/flickr, CC BY 2.0)

Marriage is the formation of a socially recognized union. Depending on the society, it may be a union between a man and a woman, between any two adults (regardless of their gender), or between multiple spouses in polygamous societies. Marriages are most commonly established to provide a formal structure in which to raise and nurture offspring (whether biological or adopted/fostered), but not all marriages involve reproduction, and marriage can serve multiple functions. For instance, another function of marriage is to create alliances between individuals, families, and sometimes larger social networks. These alliances may provide political and economic advantages. While there are variations of marriage, the institution itself is, with a few notable exceptions, almost universal across cultures.

Marriage is an effective means of addressing several common challenges within families. It provides a structure in which to produce, raise, and nurture offspring. It reduces competition among and between males and females. And it creates a stable, long-term socioeconomic household in which the family unit can more adequately subsist with shared labor and resources. All societies practice rules of marriage that determine what groups an individual should marry into (endogamy rules) and which groups are considered off limits and not appropriate for marriage partners (exogamy rules). These rules are behavioral norms in a society. For example, in the United States, individuals tend to marry within the same generation (endogamy) and usually the same linguistic group, but they marry outside of very close kin (exogamy).

Across all cultures, there is an **incest taboo**, a cultural norm that prohibits sexual relations between parents and their offspring. This taboo sometimes extends to other relations considered too close for sexual relationship. In some societies, this taboo may extend to first cousins. In the United States, first-cousin marriage laws vary across states. French anthropologist Claude Lévi-Strauss argued that the incest taboo is the original social structure because it naturally separates groups of people into two types—those with whom an individual has family ties (so-called *biological ties*) and those with whom an individual can have sexual relations and establish ties.

Defining marriage can be complex. In the southern Andes of Peru and Bolivia, Indigenous people begin marriage with a practice known as *servinakuy* (with spelling variations). In *servinakuy*, a man and woman establish their own independent household with very little formal social acknowledgement and live together until the birth of their first child, after which they are formally considered to be a fully married couple. Not a trial marriage and not considered informal cohabitation, *servinakuy* is, instead, a prolonged marriage process during which family is created over time. Andean legal scholars argue that these unions should carry with them the legal rights and protections associated with a formal marriage from the time the couple begins living together.

Like all social institutions, ideas about marriage can adapt and change. Within urban Western societies, the concept of marriage is undergoing a great deal of change as socioeconomic opportunities shift and new opportunities open up for women. In Iceland, in 2016, almost 70 percent of children were born outside of a marriage, usually to committed unmarried couples (Peng 2018). This trend is supported by national social policies that provide generous parental leave for both married individuals and those within a consensual union, but the change is also due to the more fluid nature of family today. As norms change in Iceland across generations, it will be interesting to see if the practiced form of consensual union we see today eventually comes to be considered a sanctioned form of marriage.

Forms of Marriage

Anthropologists group marriage customs into two primary types: a union of two spouses only (*monogamy*) or a union involving more than two spouses (*polygamy*). **Monogamy** is the socially sanctioned union of two adults. In some societies this union is restricted to a man and a woman, and in other societies it can be two adults of any gender. In June 2015, in *Obergefell v. Hodges*, the US Supreme Court legalized same-sex marriage in the United States, following earlier legal recognitions in many other Western countries. Today, same-sex marriage is legal in 30 countries. While the movement to legalize same-sex marriage has been long and tumultuous in many of these countries, same-sex marriages and unions have historically played significant roles in both Indigenous and Western societies.

Serial monogamy is a form of monogamy in which adults have a series of two-person monogamous marriages over a lifetime. It is increasingly common in Western societies, but it is also practiced in some small-scale societies. In serial monogamy, divorce and remarriage are common.

Polygamy is the socially sanctioned union of more than two adults at the same time. In polygamous societies, families usually begin with a two-person marriage between a man and a woman. In some cases, the marriage will remain as a single couple for a long period of time or for the duration of their lives because of lack of resources or availability of partners. Adding partners is frequently a sign of status and is considered an ideal for families in polygamous societies. In some cases, too, polygamy is practiced to address extreme social stress due to things such as warfare or skewed population distributions caused by famine and high mortality rates.



FIGURE 11 In a polygynous marriage, there is one husband and more than one wife. This is the cast of Sister Wives, a television series about a polygamous household in the United States. (credit: “Sister Wives Cast on Valder Beebe” by Valder Beebe Show/Wikimedia Commons, CC BY 3.0)

There are two main kinds of polygamy, based on the partners involved, as multiple men and multiple women in a single marriage (called *group marriage*) is not common. **Polygyny**, which is the more common form of polygamy, is the marriage of one man to more than one woman. There is often marked age asymmetry in these relationships, with husbands much older than their wives. In polygynous households, each wife commonly lives in her own house with her own biological children, but the family unit cooperates together to share resources and provide childcare. The husband usually "visits" his wives in succession and lives in each of their homes at various times (or lives apart in his own). It is common, though not universal, for there to be a hierarchy of wives based on seniority. Polygyny is found worldwide and offers many benefits. It maximizes the family labor force and the shared resources and opportunities available for family members and creates wide kinship connections within society. Commonly in polygynous societies, larger families are afforded higher social status and they have stronger political and economic alliances.

The second main form of polygamy is polyandry. In **polyandry**, which is comparatively rare, there is one wife and more than one husband. Polyandrous marriages minimize population growth and may occur in societies where there is a temporary surfeit of males and scarcity of females or scarcity of resources. In fraternal polyandry, brothers marry a single wife. This is the most common in Nepal, where it is practiced by a minority of mainly rural families. Fraternal polyandry offers several benefits for societies like Nepal with scarce resources and dense population. Where there is extreme scarcity of land acreage, it allows brothers to share an inheritance of land instead of dividing it up. It reduces inequality within the household, as the family can thus collectively subsist on the land as a family unit. Also, in areas where land is scattered over large distances, it allows brothers to take turns living away from home to tend herds of animals or fields and then spending time at home with their shared wife. It also minimizes reproduction and population growth in a society where there is a very dense population, as the wife can carry only one pregnancy at a time.

Marriage Integrated with Family

Following marriage, a couple begins a new family and establishes a shared residence, whether as a separate family unit or as part of an already established family group. The social rules that determine where a newly married couple will reside are called **postmarital residence rules** and are directly related to the descent rules that operate in the society. These rules may be adapted due to extenuating circumstances such as economic need or lack of housing. In the United States today, for example, it is increasingly common for newly married couples to postpone the establishment of a separate household when work, schooling, or children create a need for familial support.

In all cultures, marriage is a consequential matter not only to the adults immediately involved, but also to their families and to the broader community. In societies that practice unilineal descent, the newly married couple moves away from one family and toward another. This creates a disadvantage for the family that has "lost" a son or daughter. For example, in a patrilineal society, while the wife will remain a member of her birth lineage (that of her father), her children and her labor will now be invested mostly in her husband's lineage. As a result, in societies practicing unilineal descent, there is a **marriage compensation** from one family to the other for this perceived loss. Marriage compensation is the transfer of some form of wealth (in money, material goods, or labor) from one family to another to legitimize the marriage as a creation of a new social and economic household. It is not seen as payment for a spouse, but as recognition that the marriage and future children are part of one lineage rather than another. There are several forms of marriage compensation, each symbolically marked by specific cultural practices.

Bride wealth is the transfer of material and symbolic value from the groom's to the bride's family. Depending on the cultural group, this may involve transfer of money, cattle, house goods, jewelry, or even symbolic ritual artifacts. Bride wealth is the most common form of marriage compensation across cultures. If marriages conducted using bride wealth end in divorce, normally the bride wealth (or equivalent value) is returned to the groom's family to signify the dissolution of the contract. Similar to bride wealth, **bride service** involves a transfer of something of value from the groom's to the bride's family, but in this case the arrangement involves the contracted labor of the groom, whether before or after the marriage. Future grooms may work for months or years for the bride's family (usually her father's household) prior to the marriage, or husbands may work for months or years with the bride's family after the marriage.

Dowry, a third form of marriage compensation, functions differently than bride wealth and bride price. Dowry is a form of material value, such as money, jewelry, house goods, or family heirlooms, that the bride brings into her own marriage to provide her with wealth within her husband's lineage. In some societies women turn their dowry over to their husbands, but in other societies they retain rights to this wealth as married women. Regardless of how the wealth is used, a woman's most stable route to higher status within these patrilineal societies is through the birth of her sons.



FIGURE 12 A display of a woman's dowry in Turkmenistan, in Central Asia. These goods have been laid in preparation for the woman's marriage. (credit: "wedding gifts 2" Salvatore D'Alia/flickr, CC BY 2.0)

While marriage compensation is most commonly associated with patrilineal societies, it is important to note that almost all marriages represent shared investments of one kind or another. Since marriage is the creation of a new family, spouses most often bring with them into their marriage their skills, traditions, and social networks, all of which carry symbolic weight within societies.

Terms You Should Know

asexual

bisexual

bride wealth

bride service

cisgender

dowry

essentialism

gay

gender

gender ideology

gender nonbinary

heteronormativity

heterosexual

incest taboo

intersectionality

intersex

lesbian

marriage

marriage compensation

matriarchy

multiple gender

pansexual

patriarchy

polyandry

polygamy

polygyny

queer

queer anthropology

serial monogamy

sex

sexual dimorphism

sexual orientation

sexuality

transgender

variant gender

Study Questions

1. How would your life be different if you had been ascribed a different gender category at birth? Would your parents, siblings, and other relatives have treated you differently? Would your experiences in school have been different? Would you be the same person?
2. How did you learn to perform your assigned gender role? What lessons were explicitly taught, and what did you learn through observation and experience? Who taught you? Have you ever felt as though you were failing to successfully perform your gender role?
3. Do all men benefit from patriarchy? How might men be limited or harmed by patriarchal beliefs and practices? Do some women benefit from patriarchy? How so?
4. Do you live in a heteronormative culture? How can you tell? Are things changing? What same- sex practices and relationships might have existed in the past in your culture?
5. What does the prevalence of transgender practices in many cultures tell us about human gender and sexuality? Do you think that your gender identity and sexual orientation are fixed, or might they change throughout your lifetime?
6. In your culture, do men and women live in different subcultures? In what contexts are women and men segregated, either formally or informally? What forms of social interaction and bonding occur in those situations? What might be the function of the gendered subcultures found in many societies?
7. Describe the different types of marriage with which you are familiar in your own community. How are they alike and different? What is the role of individuals' families in your community before and after marriage?
8. Marriage compensation occurs in many different cultures. What are the potential advantages and disadvantages of each of these forms of compensation? Consider the importance of each of these forms over the course of an individual's lifetime.

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5.6: Globalization, Colonialism, and World Systems

Learning Objectives

By the end of this chapter, you will be able to:

- Define globalization and the 5 “scapes” that can be used to characterize global flows or exchanges.
- Explain the relationship between globalization and the creation of new “glocal” lifestyles and forms of consumption.
- Describe some of the ways people use agency to respond to globalization including syncretism and participation in alternative markets.
- Understand the significance and progression of colonialism
- Assess the relationship between globalization, neoliberalism, and neocolonialism.
- Evaluate the advantages and disadvantages of the intensification of globalization.
- Discuss the implications of globalization for anthropology.

Empires, Colonialism and Early Globalization

Globalization is a word commonly used in public discourse, but it is often loosely defined in today’s society (much like the word “culture” itself). First appearing in the English language in the 1940s, the term “globalization” is now commonplace and is used to discuss the circulation of goods, the fast and furious exchange of ideas, and the movement of people. Despite its common use, it seems that the many people using the term are often not defining it in the same way. Some treat globalization as simply an economic issue while others focus more on the social and political aspects. What is clear, however, is that globalization has influenced many different facets of contemporary social life. This actually makes globalization an ideal topic of study for anthropologists, who pride themselves on taking a holistic approach to culture. For our purposes, we adopt political scientist Manfred Steger’s (2013) definition of globalization: “the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa.”

It is challenging to determine precisely when globalization began. Although some people discuss globalization as if it was an entirely new process without historical antecedents, in truth its precursors have been going on for a very long time. In this chapter, we argue that the distinguishing feature of globalization in the contemporary era is the speed, rather than the scope, of global interactions. Early technological innovations hastened global links. For instance, the invention of the wheel facilitated transport of animal-drawn carts. These wheeled vehicles increased people’s mobility, which in turn facilitated the sharing of both goods and ideas. Similarly, the creation of written communication systems allowed ideas to be shared between people in distant locations.

Certainly extensive empires have existed at various times throughout human history, including Chinese Dynasties (the Han dynasty, 206 BCE-220 CE, for instance, reached the same size the Roman Empire achieved much later); the Achaemenid or Persian Empire, and the Incan Empire. Most recently in world history, European colonial expansion into Africa, Asia, and the Americas marked another landmark of globalization. **Colonialism** refers to the political, social, economic, and cultural domination of a territory and its people by a foreign power for an extended period of time. Technically, colonialism can be practiced by any group that is powerful enough to subdue other groups—and this certainly would be an accurate term for Incan and Roman imperial expansion—but as a term, colonialism is typically associated with the actions of European countries starting in the 1500s and lasting through the 1900s. During this period, European colonial powers divvied up “unclaimed” land with little regard for ethnic groups who already lived in those places, their political structures, belief systems, or lifeways. By 1914, European nations ruled more than 85 percent of the world, and it is not by accident that the image of the world most often seen on conventional maps continues to be very Eurocentric in its orientation.

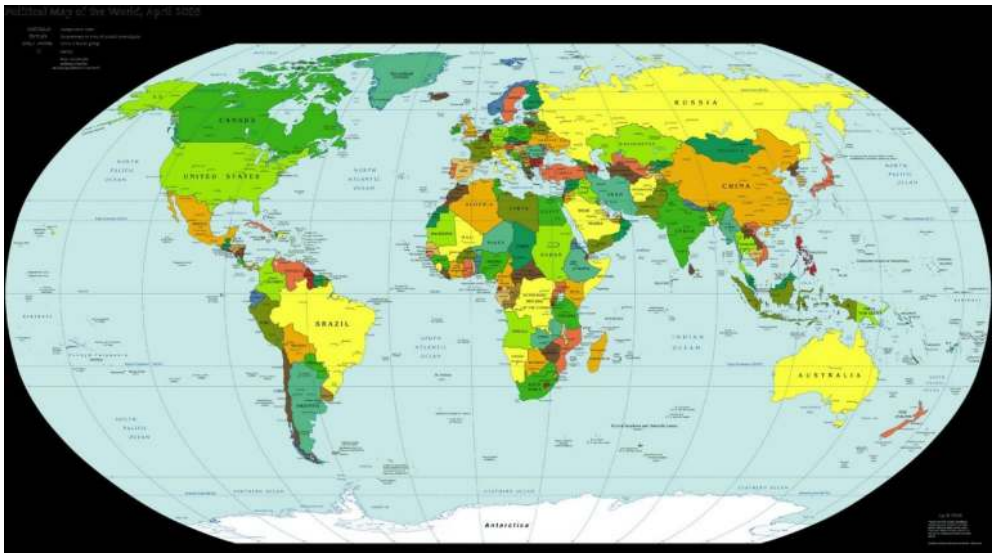


Figure 1. World map by Martyn Wright. Licensed under CC BY 2.0.

Colonialism in the Americas was the result of European conquest of newly "discovered" territories during the Age of Exploration. Columbus was likely not the first explorer to reach the Americas, but his "discovery" intensified Europeans' desires to colonize this "new" territory. European leaders began expanding their spheres of influence in Europe before turning their attention to lands further afield; the successes they had in colonizing nearby lands, amplified by a growing demand for trade items found in "the Orient," fueled their enthusiasm for exploration outside the region. The Catholic Church also supported this economically motivated mission, as it coincided with a weakening of their religious-stronghold in places like England, Germany, and France.

One of the most devastating features of the colonial period was the forced labor of both Indigenous Americans and Africans who were enslaved and shipped off as chattel. Between 1525 and 1866, 12.5 million enslaved persons were sent to the New World from Africa. Only 10.7 million Africans survived until arriving in the Americas. The U.S. imported approximately 450,000 of these enslaved Africans. It is not by coincidence that the ethically irredeemable shipment of enslaved Africans to the Americas corresponded to massive shipments of goods to Europe and down the west coast of Africa in the "Triangular Trade." As far as the total scope of international flows, however, European colonialism pales in comparison to the scope of globalization that has transpired since the 1990s.

Contemporary globalization, at least in terms of economics, is perhaps best pinpointed as coinciding with the conclusion of World War II and the Bretton Woods Conference. The agreements made at the Bretton Woods Conference led to the creation of the International Monetary Fund (IMF) as well as the International Bank for Reconstruction and Development, which later became the World Bank (WB). It also laid the groundwork for the World Trade Organization (WTO). Taken together, these three organizations have had a tremendous role in accelerating globalization and in shaping the lives of people in the developing world. The very idea of governing bodies like the United Nations, or regulatory institutions like the IMF and WB, that exist outside the confines of a specific nation-state contributes to undermining local sovereignty. Although local, regional, and national identities and affiliations retain salience in the global era, their importance has shifted relative to the growing sense many people have of being citizens of the world.

The 5 "Scapes" of Contemporary Globalization

As we have already established, globalization refers to the increasing pace and scope of interconnections crisscrossing the globe. Anthropologist Arjun Appadurai (1996) has discussed this in terms of five specific "scapes" or flows: ethnoscapes, technoscapes, ideoscapes, financescapes, and mediascapes. Thinking of globalization in terms of the people, things, and ideas that flow across national boundaries is a productive framework for understanding the shifting social landscapes in which contemporary people are often embedded in their daily lives. Questions about where people migrate, their reasons for migration, the pace at which they travel, the ways their lives change as a result of their travels, and how their original communities change can all be addressed within this framework. Questions about goods and ideas that travel without the accompaniment of human agents can also be answered using Appadurai's notion of scapes.

Ethnoscape refers to the flow of people across boundaries. While people such as labor migrants or refugees travel out of necessity or in search of better opportunities for themselves and their families, leisure travelers are also part of this scape. The World Tourism

Organization, a specialized branch of the United Nations, argues that tourism is one of the fastest growing commercial sectors and that approximately one in eleven jobs is related to tourism in some way. Tourism typically puts people from developed parts of the world in contact with people in the developing world, which creates both opportunities and challenges for all involved.

Technoscape refers to flows of technology. Apple's iPhone is just one example of how the movement of technologies across boundaries can radically affect day-to-day life for people all along the commodity chain. Throughout the 2010's sales records were surpassed with each release of a new iPhone, with lines of customers spilling out of Apple stores and snaking around the block. Demand for this new product drove (and continues to drive) a fast and furious pace of production. Workers who struggle to keep up with demand are subjected to labor conditions most iPhone users would find abhorrent. The revenue associated with the production and export of such technological goods is drastically altering the international distribution of wealth. As the pace of technological innovation increases, so does the flow of technology. This is not, of course, an entirely new phenomenon; earlier technologies have also drastically and irrevocably changed the human experience. For example, the large-scale production and distribution of the printing press throughout Europe (and beyond) dramatically changed the ways in which people thought of themselves—as members not only of local communities, but of national communities as well (Anderson 1983).

Ideoscape refers to the flow of ideas. This can be small-scale, such as an individual posting her or his personal views on social media for public consumption, or it can be larger and more systematic. Missionaries provide a key example. Christian missionaries to the Amazon region made it their explicit goal to spread their religious doctrines. As the experiences of missionary-turned-anthropologist Daniel Everett (2009) show, however, local people do not necessarily interpret the ideas they are brought in the way missionaries expect. All people have agency to accept, reject, or adapt the ideologies that are introduced to or imposed on them.

Financescape refers to the flow of money across political borders. Like the other flows discussed by Appadurai, this phenomenon has been occurring for centuries. The Spanish, for example, conscripted indigenous laborers to mine the silver veins of the Potosí mines of Bolivia. The vast riches extracted from this region were used to pay Spain's debts in northern Europe. The pace of the global transfer of money has only accelerated and today transactions in the New York Stock Exchange, the Nikkei index, the Shanghai Stock Exchange and other such finance hubs have nearly immediate effects on economies around the world.

Mediascape refers to the flow of media across borders. In earlier historic periods, it could take weeks or even months for entertainment and education content to travel from one location to another. From the telegraph to the telephone, and now the Internet (and myriad other digital communication technologies), media are far more easily and rapidly shared regardless of geographic borders. For example, Brazilian telenovelas may provide entertainment on long-distance African bus trips, Bollywood films are shown in Canadian cinemas, and people from around the world regularly watch mega-events such as the World Cup and the Olympics live from wherever they are.

While the five scapes defined by Appadurai provide useful tools for thinking about these various forms of circulation, disentangling them in this way can also be misleading. Ultimately, the phenomena studied by most anthropologists will involve more than one of these scapes. Take clothing for instance. Kelsey Timmerman (2012), an author whose undergraduate concentration was in anthropology, was inspired to find out more about the lives of the people who made his clothing. In a single day, he found, the average American might be wearing clothes made in Honduras, Bangladesh, Cambodia, and China. Something as seemingly simple as a T-shirt can actually involve all five of Appadurai's scapes. The transnational corporations responsible for the production of these shirts themselves are part of capitalism, an idea which has become part of the international ideoscape. The financescape is altered by a company in the U.S. contracting a production facility in another country where labor costs are cheaper. The equipment needed to create these T-shirts is purchased and delivered to the production facility, thus altering the technoscape. The ethnoscape is affected by individuals migrating from their homes in rural villages to city centers, often disrupting traditional residence patterns in the process. Finally, the mediascape is involved in the marketing of these T-shirts.

Selective Importation and Adaptation

Globalization most certainly changes the landscape of contemporary social life. Yet it would be a mistake to think of globalization as a state that emerges without human agency. In most cases, people make decisions regarding whether or not they want to adopt a new product or idea that has been made available to them via globalization. They also have the ability to determine the ways in which that product or idea will be used, including many far different from what was originally intended. A cast-off Boy Scout uniform, for example, may be adopted by a Maasai village leader as a symbol of his authority when dealing with Tanzanian government officials.

First emerging in the late 1980s, the term **glocalization** refers to the adaptation of global ideas into locally palatable forms. In some instances, this may be done as a profit-generating scheme by transnational corporations. For example, McDonald's offers different

menu items in different countries. While a Big Mac may be the American favorite, when in India you might try a McAloo Tikki (a breadcrumb-coated potato and pea patty), in Hong Kong mixed veggies and egg mini twisty pasta in a chicken broth for breakfast, in Thailand corn pies or pineapple pies, or a Steak Mince N' Cheese pie in New Zealand. In other cases, people rather than corporations find innovative ways to adopt and adapt foreign ideas. The Zapotec of Oaxaca, Mexico, for example, have found a way to adapt globally available consumer goods to fit their longstanding cultural traditions. Traditionally, when a member of the community dies, that individual's relatives have an obligation to ease his or her passing to the afterlife. One part of this obligation is making an extraordinary number of tamales for the mourners who come to pay their respects at the home altar that has been erected for the deceased. These tamales are intended to be taken home and were once shared in traditional earthen containers. Rather than disrupting this tradition, the introduction of modern consumer goods like Tupperware has made the old tradition of sharing food easier (Royce 2011). In this case, Zapotec culture is not threatened by the introduction of foreign goods and ideas because the community incorporates new things into their pre-existing practices without completely trading old ideas for new ones. Practices like these provide evidence that fears about globalization leading to nothing but cultural homogenization may be exaggerations. Yet, other communities refuse these products precisely because they equate modernization and globalization with culture loss. For example, Nobel Peace Prize recipient Dr. Rigoberta Menchu recounts how adamantly the Maya elders where she was raised warned the youth away from consuming Coca-Cola or even using modern corn mills rather than the traditional mano and metate.

Lifestyle, Taste, and Conspicuous Consumption

While some aspects of globalization are best studied at the societal level, others are best examined at smaller scales such as the trends visible within specific socio-economic strata or even at the level of individual decision-making. The concept of lifestyle refers to the creative, reflexive, and sometimes even ironic ways in which individuals perform various social identities. David Chaney (1996) describes lifestyles as "characteristic modes of social engagement, or narratives of identity, in which the actions concerned can embed the metaphors at hand." The lifestyles we live and portray, then, can be seen as reflexive projects in the sense that they display both to ourselves and to our audiences who we think we are, who we want to be, and who we want to be seen to be.

Chaney argues that people only feel the need to differentiate themselves when confronted with an array of available styles of living. Within this framework, the rise of a consumerist economy enables individuals to exhibit their identities through the purchase and conspicuous use of various goods and media. Globalization has increased the variety of goods available for individuals to purchase and media for them to consume—as well as people's awareness of these products—thus expanding the range of identities that can be performed through their consumption habits. In some situations, identity is an individual project, with conspicuous consumption used to display one's sense of self. For example, a student who feels alienated by the conservative, "preppy," students at her East Coast school can cultivate an alternative identity by growing dreadlocks, wearing Bob Marley T-shirts, and practicing djembe drumming, all of which are associated with the African diaspora outside the United States.

Critics have argued that a consequence of globalization is the **homogenization of culture**. Along similar lines, some have worried that the rapid expansion of the leisure market would decrease the diversity of cultural products (e.g. books, movies) consumed by the populace. The disappearance of small-scale shops and restaurants has certainly been an outcome of the rise of global conglomerates, but the homogenization of culture is not a foregone conclusion, and many who study globalization point to countervailing trends of **heterogenization of culture**. Globalization enables individuals in far-flung corners of the world to encounter new ideas, commodities, belief systems, and voluntary groups to which they might choose to belong. At times these are at the expense of existing options, but it is also important to acknowledge that people make choices and can select the options or opportunities that most resonate with them, sometimes rejecting or reshaping the global to maintain local traditions. The concept of lifestyle thus highlights the degree of decision-making available to individual actors who can pick and choose from global commodities, ideas, and activities. At the same time as individual choices are involved, the decisions made and the assemblages selected are far from random. Participating in a lifestyle implies knowledge about consumption; knowing how to distinguish between goods is a form of symbolic capital that further enhances the standing of the individual.

How much free will, freedom of choice, or autonomy an individual actually has is an age-old question far beyond the scope of this chapter, but in many cases a person's consumption patterns are actually a reflection of the social class in which she or he was raised —even when an individual thinks he or she is selectively adopting elements from global flows that fit with his or her unique identity. In other words, an individual's "taste" is actually an outgrowth of his or her **habitus**, the embodied dispositions that arise from one's enculturation in a specific social setting. For example, children who have been raised in upper-class homes are able to more seamlessly integrate into elite boarding schools than classmates on scholarships who might find norms of dining, dress, and overall comportment to be unfamiliar.

Globalization as Positive, and Globalization as Negative

Given the structure of the discourse surrounding globalization, it is increasingly difficult to avoid being pigeonholed as “pro” or “anti” globalization. In truth though, globalization has had both positive and negative impacts.

Advantages of the Intensification of Globalization

Starting with the positive interpretation of globalization, political scientist Manfred Steger (2013) has argued that “humane forms of globalization” have the potential to help us deal with some of the most pressing issues of our time, like rectifying the staggering inequalities between rich and poor or promoting conservation. The mediascape has made people in the **Global North** increasingly aware of the social injustices happening in other parts of the world. In his book on the global garment industry, Kelsey Timmerman (2012) highlights the efforts undertaken by activists in the U.S., ranging from public demonstrations decrying the fur industry to boycotts of products produced in socially unsustainable ways. While many of these efforts fall short of their intended outcome—and typically overlook the complexities of labor situations in the **Global South** where families often rely upon the labor of their children to make ends meet—such examples nonetheless underscore the connections people in one location now feel with others (who they will likely never meet) through the commodity chains that link them.

Globalization has also facilitated the rise of solidarity movements that would not have been likely in an earlier era. To take a recent example, within hours of the 2015 terrorist attacks in Paris, individuals from different nations and walks of life had changed their Facebook profile pictures to include the image of the French flag. This movement was criticized because of its Eurocentrism; the victims of a bombing in Beirut just the day before received far less international support than did the French victims. Shortcomings aside, it still stands as a testament to how quickly solidarity movements can gain momentum thanks to technological innovations like social media.

Micro-loan programs and crowd-source fundraising are yet more ways in which individuals from disparate circumstances are becoming linked in the global era. Kiva, for example, is a microfinance organization that enables anyone with an Internet connection to make a small ($25) donation to an individual or cooperative in various parts of the developing world. The projects for which individuals/groups are seeking funding are described on the Kiva website and donors choose one or more specific projects to support. The recipient must then repay the loan to Kiva with interest.

Advances in transportation technologies, combined with an increased awareness of humanitarian crises abroad (an awareness that is largely facilitated by advances in communication technologies) also create new ethnoscapes. Programs like the Peace Corps have a relatively long history of sending Westerners into foreign nations to assist with humanitarian efforts on a regular basis. Other volunteers are mobilized in times of crisis. Medical professionals may volunteer their services during a disease epidemic, flocking to the regions others are trying to flee. Engineers may volunteer their time to help rebuild cities in the wake of natural disasters. And even lay people without a specialized skill set may lend their energy to helping others in the aftermath of a disaster, or by collecting and/or donating goods to be used in various relief efforts. Clearly, then, there are benefits facilitated by globalization.

Disadvantages of the Intensification of Globalization

In the previous section, we concluded by noting how the intensification of globalization can bring benefits to people in times of crisis. Yet it bears remembering and reiterating that sometimes such crises are themselves brought about by globalization. The decimation of Indigenous tribes in the Americas, who had little to no resistance to the diseases carried by European explorers and colonists, is but one early example of this. Addressing a more-recent instance, the Covid-19 pandemic resulted in the deaths of more than 7 million people and upended many aspects of life around the world. Regarding crises beyond epidemics, the research program on Climate Change, Agriculture and Food Security (CCAFS) coordinated by the University of Copenhagen in Denmark, has called attention to the role of human-caused climate change in exacerbating the recent Syrian refugee crisis.

The rise in hate crimes against Asian-Americans during the pandemic serves as a reminder of the xenophobic attitudes held by many Americans even in this age of globalization, attitudes that are mirrored in many other parts of the world. There are many reasons for this. Racial prejudice is still very much a reality in today’s world, as is prejudice against other religions, non-normative gender identity, the differently abled, and others. In some ways, these fears have been heightened by globalization rather than diminished. Especially after the global recession of 2008, some nation-states have become fearful for their economic security and have found it easy to use marginalized populations as scapegoats. While advances in communication technology have enabled social justice focused solidarity movements as discussed above, unfortunately the same media have been used as a platform for hate-mongering by others. Social media enables those who had previously only been schoolyard bullies to broadcast their taunts further than ever before. Terrorists post videos of unspeakable violence online and individuals whose hateful attitudes might have been curbed through the informal sanctions of gossip and marginalization in a smaller-scale society can now find communities of

like-minded bigots in online chat rooms. By foregrounding the importance of the hypothetical "average" person, populist politics has engaged in scapegoating of minority ethnic and religious groups, and populist nationalism is on the rise in many nations around the world.

That rise, in part, represents backlash against some of the inequities generated by globalization. At the world scale, the Global North continues to extract wealth from the Global South. More tellingly though is the widening wealth-gap even in "rich" countries. Without sufficient social protection, capitalism—a system wherein profit motivates political and economic decision making—has led to a situation in which the world's eight richest men (note the gendering) now control as much wealth as the bottom 50 percent of the entire world's population. In other words, eight men now have just as much money as 3.75 *billion* people combined, and no nation in the world has a larger wealth-gap (the difference between those with the most and the least in a society) than the United States. So, while globalization has facilitated advantages for some, more and more people are being left behind. Social scientists often use the term "re-entrenchment" to describe efforts people make to reassert their traditional values and ways of life. While this impulse is understandable, many of these people are susceptible to the rhetoric of scapegoating: being told some other group is at fault for the problems they are facing. This is the double-edged sword of globalization. Additionally, in some cases globalization is forced on already marginal populations in peripheral nations through institutions like the IMF and World Bank. In these instances, globalization facilitates and amplifies the reach and impact of **neoliberalism**, a multi-faceted political and economic philosophy that emphasizes privatization and unregulated markets.

Globalization and Neoliberalism

Latin America provides a good example of how the shift from colonialism to neoliberalism has been disseminated through and exacerbated by globalization. By the beginning of the twentieth century, the Latin American colonies' independence from Spain and Portugal was secure, but the relations of power that prevailed during the colonial period had largely been replicated with local elites controlling the means of production. During this period, citizens individually and collectively endeavored to establish a new national identity. Despite nominal commitments to democracy throughout the region, patron/client relationships functioned as the primary political mechanism. Internal divisions ran deep in many Latin American countries, with the supporters (or clients) of rival elites periodically drawn into violent contests for rule on behalf of their patrons. In the last decade of the 1800s and the first decade of the 1900s, people in Latin America began to question the right of the elites to rule, as well as the hidden costs of modernization. Peasant uprisings, like the one that took place at Canudus in Brazil in 1896, were evidence of the shifting political framework. People also saw the imperialistic tendencies of the U.S. as a negative force of modernization which they hoped to avoid. Together, this led to a situation in which people in Latin America sought a national identity that resonated with their sense of self.

During this same period there was a slight but significant change in the economic structure of the region. The economy was still based on exports of agriculture and natural resources like minerals, and the profits remained in the hands of the elite. What was new, however, was the introduction and modest growth of manufacturing in the cities, which created new job opportunities. Economic diversification led to a more complex class structure and an emerging middle class. Unfortunately, this period of relative prosperity and stability soon ended. Because of the plentiful natural resources and the captive labor source "available" for exploitation in Latin America, wealthy landowners were able to undersell their European competitors on agricultural products and provide "exotic" minerals. The privileged position of Latin American landowner compared to European farmers led to widespread poverty among farmers in Europe, which led to out-migration and political instability in Europe. As locally born Latin American peasants migrated from the countryside to the cities *and* the cities filled with European immigrants, the landowning elite began to lose control, or at least the kind of power they used to hold over the farmers who worked their land and had no other work options.

While city living provided certain opportunities, it also introduced new challenges. In the city, for instance, people rarely had access to land for subsistence agriculture. This made them far more vulnerable to economic fluctuations, and the vulnerability of city living necessitated the adoption of new political philosophies. Urban poverty and desperation created a climate in which many people found socialist philosophies appealing, starting as early as the 1920s in some places like Brazil. Initially, union leaders and European immigrants who spread socialist ideas among the urban poor were punished by the state and often deported. Eventually such repressive tactics proved insufficient to curtail the swelling disruptions caused by strikes and related actions by the unions. Faced with a new political reality, the elite co-opted the public rhetoric of the urban masses. Realizing the need to cast themselves as allies to the urban workforce, the elites ushered in a period of modest reform with more protection for workers.

During this period, and as an extension of their work-related activism, the middle class also clamored for expansions of the social services provided by the state. Pressure from the middle class for more social services for citizens unfortunately played into growing xenophobia (fear of foreigners) resulting from the immigration of so many foreigners *and* faulty ideas about racial superiority communicated through a growing discourse of nationalism. In some places, the elites aligned with the middle classes if

they saw it as politically advantageous. In other places, however, elites resisted incorporating the middle classes into the ruling structure and the elites' power ultimately was wrested away though military coups. While emerging leaders from the middle class continued relying on the export economic model, they directed a greater percentage of the profits back into social programs. Only after the stock market crash of the 1930s—and the resulting global recession—did those in power start to question the export model.

In the early part of the 1900s, Latin American countries largely supported free trade because they believed they had a competitive advantage. They believed that by producing the products their country/region was best suited to produce they would prosper on the world market. However, changing world circumstances meant that Latin American countries soon lost their advantage; average family size in industrialized countries began to decrease, lowering demand for Latin American commodities. When other countries with similar climates and topography began to grow the same crops, a global oversupply of agricultural products led to lower prices and worsened the decline of Latin America's financial status in the world market.

This economic downturn was amplified by the loss of British hegemony after World War II. Before the war, Great Britain and Latin America had enjoyed a stable exchange relationship with Latin America sending agricultural goods to Great Britain and the British sending manufactured goods to Latin America. As the U.S. rose in global power, Americans looked to Latin America as a new market for U.S. manufactured goods. In contrast to Great Britain though, the U.S. did not need to import Latin American agricultural goods because the U.S. produced enough of its own, production that was further protected by high import tariffs. Even if a consumer wanted to buy Latin American commodities, the commodities would be more expensive than domestic ones—even if actual costs were lower. Overall, Latin America sold its agricultural goods to Europe, including Great Britain, but Latin American exporters had to accept lower prices than ever before.

The United States' economic strategy toward Latin America was different than Great Britain's had been. For those commodities that could not be produced in the U.S., like bananas, U.S. companies went to Latin America so they could directly control the means of production. Although these commodities were grown and/or produced *in* Latin America, the profits were taken by foreign companies rather than local ones. This same process also happened with mining interests like tin and copper; U.S. companies purchased the mines in order to extract as much profit as possible. American companies were in a position to exploit the natural resources of these countries because the U.S. had the financial capital local communities lacked *and* the technological expertise needed to sustain these industries. This pattern curtailed the rate of economic growth throughout Latin America as well as in other regions where similar patterns developed.

The late 1920s through the 1950s saw many Latin American countries turning to nationalism—often through force—as both a cultural movement and an economic strategy. The middle classes were in a favor of curtailing the export economy that had been preferred by the elites, but did not have the political clout to win elections. Indeed, their agenda was regularly blocked by the elites who used their influence (i.e. with their clients) to press their interests, especially in the rural areas. With time, however, middle class men increasingly came to occupy military officer positions and used their newfound authority to put nationalist leaders in the presidencies. Nationalists argued that an over-dependence on agriculture had led to Latin America's vulnerable position in the international economy and called for a build-up of industry. They hoped to start producing the goods that they had been importing from the U.S. and Europe. Their goal: industrial self-sufficiency.

The state was instrumental in this economic reorganization, both helping people buy local goods and discouraging them from buying foreign goods. Doing this was far from as easy as it may sound. The state imposed high duties on goods destined for the export market in order to entice producers to sell their goods at home. At the same time, the state imposed high tariffs on the imports they wanted to replace with local products. With time (and struggle) these measures had their intended effects, making the locally produced goods comparatively more affordable—and therefore appealing—to local consumers.

As already noted, developing factories required capital and technological expertise from abroad, which in turn made the goods produced much more expensive. To help people afford such expensive goods, the state printed more money, generating massive inflation. In some places this inflation would eventually reach 2,000 percent! The combination of chronic inflation with high foreign debt emerged as an enduring problem in Latin America and other parts of the Global South. Countries crippled by high inflation and debt have turned to international institutions like the IMF and WB for relief and while the intentions may be good, borrowing money from these global institutions always comes with strings attached. When a country accepts a loan from the IMF or the WB, for instance, they must agree to a number of conditions such as privatizing state enterprises and cutting spending on social services like healthcare and education. Borrowing countries are also required to adopt a number of policies intended to encourage free trade, such as the reduction or elimination of tariffs on imported goods and subsidies for domestically produced goods. Policies are put into place to encourage foreign investment. Transnational corporations have now reached the point that

many of them rival nations in terms of revenue. In fact, as of 2009, “forty-four of the world’s hundred largest economies are corporations.” It is an understatement to note that the policies forced on countries by lenders are often disruptive—if not entirely destructive—of locally preferred lifeways and preferences. Although the IMF and WB measures are intended to spark economic growth, the populace often winds up suffering in the wake of these changes. Colonialism has given way to a neocolonialism in which economic force achieves what used to require military force with transnational corporations benefiting from the exploitation of poorer nations.

Responses to Globalization

Cultures are dynamic and respond to changes in both the social and physical environments in which they are embedded. While culture provides a template for action, people are also active agents who respond to challenges and opportunities in a variety of ways, some of which may be quite creative and novel. As such, it would be inaccurate to only see globalization as an impersonal force dictating the lives of people in their various localities. Rather, people regularly use a variety of strategies in responding to global forces. While a comprehensive catalog of these strategies is beyond the scope of this chapter, here we outline two key responses.

Syncretism

Syncretism refers to the combination of different beliefs—even those that are seemingly contradictory—into a new, harmonious whole. Though syncretism arises for a variety of reasons, in many cases it is as a response to globalization. In this section, we use the example of *Candomblé* as a way of demonstrating that syncretism is a form of agency used by people living under oppression.

Most often, anthropologists discuss syncretism within the context of religion. Anthropologists define religion as the cultural knowledge of the supernatural realm that humans use to cope with the ultimate problems of human existence. *Candomblé* is an Afro-Brazilian spirit-possession religion, in which initiates serve as conduits between the human and supernatural realm. It is also an excellent example of a syncretic religion. The many gods in *Candomblé*, known as *orixás*, are personified: they all have personalities; experience the full range of human emotions like love, hatred, jealousy, and anger; and have individual histories that are known to practitioners. Each *orixá* is associated with a particular color, and practitioners of the religion often wear bead necklaces that correspond to the specific deity with whom they feel a connection (see Figure 3). Unlike Christianity (a **monotheistic** religion), *Candomblé* does not stress the duality of good and evil (or heaven and hell). Although on the surface these two religious traditions may seem very different, in actual practice, many adherents of *Candomblé* also identify as Christians, specifically Catholics. So how can this be?



Figure 2: Candomblé practitioners, Embu das Artes, Brazil, 2012.

Much like the *orixás*, Catholic saints are personified and have unique roles within the Catholic tradition. This feature of Catholicism—more so than any other major Christian denomination—facilitated a fairly seamless overlay with *orixá* worship. For example, *Iemanja*, the *orixá* who rules over the seas and is associated with fertility, is syncretized with Our Lady of Conception. *Ogum*, whose domain is war and whose ritual implements are the sword and shield, is syncretized with Saint Anthony.

Just to be clear, syncretism is in no way unique to Brazil or the African Diaspora; it frequently occurs when one group is confronted with and influenced by another (and typically one with more power). The reason syncretism is particularly common within Latin American religious systems is due to 1) the tenacity with which enslaved Africans and Indigenous populations clung to their traditional beliefs; 2) the fervor of the Spanish and Portuguese belief that enslaved population *should* receive instruction in Catholicism, and 3) the realities of colonial life in which religious instruction for enslaved persons was haphazard at best. This created the perfect climate within which enslaved Africans and colonized Indigenous communities could hide their traditional religious practices in plain sight.

Syncretism serves as a response to globalization insofar as it mediates overlapping frameworks. It would be unnecessary if people lived in a world where boundaries were clearly defined with no ideological exchanges taking place across those boundaries. Since that is far from the lived reality for most people though, syncretism often serves as what James C. Scott (1985) categorizes as a "weapon of the weak" – a concept referring to the ways in which marginalized peoples can resist without directly challenging their oppressors, which could incite retaliation. Examples might include mocking the elite behind their backs, subtle subversion, sabotage, or participation in alternative economies that bypass the elite. In the classroom, it can be rolling one's eyes behind the professor's back, or thinking that you are "getting away with something" when texting in class. So too in the case of Candomblé. Syncretism allowed the enslaved Africans and their descendants, who continue the tradition today, to create a façade of compliance with mandated worship within the Catholic tradition, while still continuing to pay homage to their own beliefs—and thus perpetuate their own ethnic identity—behind closed doors.

Participation in Alternative Markets

As discussed earlier, structural adjustments mandated by international bodies like the IMF and WB have left farmers in developing nations particularly vulnerable to the whims of global markets. Within this framework, "fair trade" has emerged as a way for socially-conscious consumers to support small farmers and artisans who have been affected by these policies. To be certified as fair trade, vendors must agree to a "fair" price, which will be adjusted upwards if the world market price rises above the fair-trade threshold. If the world market price drops, fair-trade farmers still make a decent living, which allows them to continue farming rather than abandon their fields for wage labor. While admirable in its intent and unassailably beneficial to many, anthropological research reminds us that every situation is complex and that there is never a "one size fits all" perfect solution.

As you have seen demonstrated throughout this text, anthropologists focus on the lived experience of people closest to the phenomenon they are studying. In the case of fair trade, then, anthropologists focus primarily on the farmers or artisans, although an anthropologist could also study the consumers or people who import fair trade goods or facilitate their sale. Looked at from farmers' perspectives, setting and maintaining fair wages for commodities like coffee or bananas ensures that farmers will not abandon farming when the world market prices drop. On the plus side, this helps ensure at least some stability for producers and consumers alike. One of the key features of fair trade is the social premium generated by fair trade contracts: the commitment that a certain percentage of the profit goes back into beneficial community projects such as education, infrastructure development, and healthcare. But, in order for this to be successful, it is the local community and not an outside entity (however well intentioned) that must get to decide how these premiums are used.

Although fair trade is very appealing, it bears remembering that not everyone benefits from fair trade in the same way. Individuals in leadership positions within fair trade cooperatives tend to have stronger relationships with the vendors than do average members, leading them to have more positive associations with the whole business of fair trade (Lyon and Moberg 2010). Similarly, people with more cultural and social capital will have more access to the benefits of fair trade. A cacao farmer in Belize, for example, pointed out that farmers with less education will always be taken advantage of by predatory traders, which is why they need the assistance of a well-structured growers' association when entering the free-trade market. Also of concern is that in some communities fair trade disrupts traditional roles and relationships. For example in a Maya village in Guatemala, traditional gender roles were compromised, with men becoming even more dominant because their commodity (coffee) had a fair trade market whereas the women's main commodity (weaving) did not.

In addition to the challenge of finding a market for one's goods, there are additional barriers to becoming involved in fair trade. For example, it used to be that farmers could sell relatively low quality coffee to fair-trade organizations interested in social justice. Now, however, fair-trade coffee must be of exceptional quality to compete with specialty coffees. In and of itself this is not a bad thing, but remember that some of the elite coffee producers of today were once the low quality producers of old. In other words, the first generation of fair-trade coffee farmers benefited from the many ways in which fair-trade companies invested in their farms, their processing equipment, and their education in a way that newer participants cannot replicate. Indeed, once these initial farmers achieved a high quality coffee bean, there was less incentive for fair-trade vendors to invest in new farms. Now that the bar has been set so high, it is much more difficult for new farmers to break into the fair-trade market because they lack the equipment, experience, knowledge, and networks of farmers who have more longstanding relationships with fair-trade companies.

Also worth noting are the many situations in which global standards conflict with local norms of decision making. To be labeled as fair trade within the European Union banana market, for example, bananas must be of an exceptionally high quality. Banana farms must conform to a number of other guidelines such as avoiding pesticides and creating a buffer zone between the banana trees and water sources. While this all may make sense in theory, it can be problematic in practice, such as in parts of the Caribbean where land is customarily passed from one generation to the next without being subdivided into individual parcels. In these cases,

decisions about land use have to be made collectively. If some of the landowners want to farm according to fair-trade guidelines but other individuals refuse to meet these globally mandated standards, the whole family is blocked from entering the fair trade market.

Implications for Anthropology

As has been argued throughout this text, culture is dynamic. So too is anthropology as the field of study dedicated to culture. Although many students of anthropology (let alone the public at large) may have romantic visions of the lone ethnographer immersing her or himself in the rich community life of a rural village in a remote land, this is not the reality for most anthropologists today. An increasing number of anthropologists find themselves working in applied settings, but even many of the more strictly identified "academic" anthropologists—those employed at colleges and universities—have begun working in settings that might well be familiar to the average person. Now that anthropologists understand the importance of global flows of money, people, and ideas the importance of doing research everywhere that these issues play out—at home (wherever that may be) as much as abroad—is clear.

Globalization has become a powerful buzzword in contemporary society and it would be difficult to find anyone who has not been affected by it in at least some small way. The widespread influence of globalization on daily life around the world—whether directly (such as through multinational businesses) or indirectly (such as via climate change)—raises a number of questions that anthropologists have begun to ask. For example, an anthropologist might investigate the effects of global policies on people in different regions of the world. Why is it that the monetary policies of the International Monetary Fund and World Bank typically result in rich countries getting richer and the poor countries getting poorer? In her book *Beautiful Flowers of the Maquiladora* (1997), for example, Norma Iglesias Prieto gives an up-close portrait of the lives of Mexican women working in factories in the infamous border zone of Tijuana. Although the working conditions in these factories are dangerous and the women are subjected to invasive scrutiny by male supervisors, many of the women profiled in the book nonetheless appreciate the little luxuries afforded by their work. Others value the opportunity to support their household or gain a small degree of financial independence from the male figures in their life. Unable to offer any artificially flat answer concerning whether globalization has been "good" or "bad" for such individuals, anthropologists focus on the lived experience of the people most affected by these global forces. What is it like to live in such environments? How has it changed over time? What have been the costs and benefits?

Especially amidst the overlapping flows of people and ideas, questions concerning mobility, transnationalism, and identity have all become increasingly important to the field of anthropology. Although some exceptions exist, the general trend is for globalization to result in urbanization. With neoliberalism comes the loss of state-funded programs and jobs, the unsustainability of small farms, and the need for economic alternatives that are most commonly found in urban areas. While anthropologists have long studied cities and urban life, the concentration of populations in urban centers has added increasing importance to anthropologies of the city/metropolis in recent years. Indeed, the term **urban anthropology** came into use to describe experiences of living in cities and the relationships of city life to broader social, political, and economic contexts including issues of globalization, poverty, and neoliberalism. The heightened focus on the city in global context has also heightened awareness of and attention to issues of transnationalism: the understanding that people's lives may be lived and/or significantly influenced by events that cross the geopolitical borders of nation states.

Changes in How—and "Where"—We Conduct Research

Globalization has thus changed not only what anthropologists research, but also how they approach those topics. Foregrounding the links between global processes and local settings, **multi-sited ethnography** examines specific topics and issues across different geographic field sites (Falzon 2012). Multi-sited ethnography may be conducted when the subject of one's study involve and/or impact multiple locations and can be best understood by accounting for those multiple geographic contexts. For example, in her study of yoga, *Positioning Yoga: Balancing Acts Across Cultures*, Sarah Strauss (2005) found that her study would be incomplete if she focused only on Indians studying yoga. To understand this transnational phenomenon, she recognized the importance of also focusing on non-Indian practitioners of yoga who had gone to study yoga in its homeland. Work such as that of Swedish anthropologist Ulf Hannerz (2003), who studies news media correspondents, highlights the ways that people can be on the move, creating a community of study that is both multi-sited and multilocal. Further work has expanded on these models, highlighting various *translocal* fieldsites: "locations" that cannot be geographically defined. Such models include calls for an activity-based anthropology (where it is the activity itself that is the "site" of the culture and/or the basis of the community) and **digital anthropology** (where the field site exists online).

Conclusion

The term “globalization” is not simply a verbal shortcut for talking about contact, transmission, and transportation on the global scale. This chapter has shown that contact has existed across disparate locations throughout much of human history. As it is used and understood today, however, globalization is about much more than the total scope of contact; it references the speed and scale of such contact. Understood in this way, globalization *is* a modern phenomenon; it is not just how many places are connected, but in how many ways and with what frequency.

Where people once had to rely on horses or sail-driven ships to bring them to new locations, mass transportation (especially air travel) makes such commutes a part of many people’s daily lives, and someone who had never seen a TV one week might end up visiting Jakarta, Cairo, or Toronto the next. News, which might have raced ahead via carrier pigeons can now be transmitted in a virtual instant, and information once confined to physical libraries can now be accessed on the smart phones carried by peoples around the world. Neither “good” nor “bad,” globalization is a fact of life today. Whether a business woman flies between international hubs on a weekly basis or a man tends his garden on a remote plateau, both of their lives may be equally influenced by how a specific crop is received on the world market. Providing both opportunities and constraints, globalization now serves as the background—if not the stage—for how life gets lived, on the ground, by us all.

Terms You Should Know

Digital Anthropology

Ethnoscape

Financescape

Global North

Global South

Globalization

Glocalization

Habitus

Heterogenization of culture

Homogenization of culture

Ideoscape

Mediascape

Multi-sited ethnography

Neoliberalism

Syncretism

Technoscape

Urban Anthropology

Study Questions

1. In his research, Kelsey Timmerman discovered that the average American is wearing clothes made in many different countries. This demonstrates how everyday items can involve all five of Arjun Appadurai’s scapes. Choose another product that is part of your everyday life. How many scapes can you connect it to?
2. Globalization makes new forms of consumption possible, but the effects of globalization on an individual’s lifestyle vary based on many factors including socioeconomic status. In what ways is globalization experienced differently by people from wealthy countries compared to people in developing countries? How are producers of commodities like clothing or food affected differently by globalization than consumers?
3. In Latin America, globalization and neoliberalism have led to the development of policies that reduce local control over important resources. In what ways is globalization a “double-edged” sword that brings both benefits and problems to developing countries?

4. Globalization presents the possibility of engaging in activity-based anthropology, where it is the activity itself that is the '"site"' studied, or digital anthropology, where the field site exists online. What kinds of activities or digital environments do you think would be interesting to study using this approach?

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Glossary

absolute dating methods | Ascertaining the age of an object with reference to a fixed and specific time scale (e.g. calendar years or radiocarbon years), as opposed to relative dating. [Wikipedia]

acculturation | loss of a minority group's cultural distinctiveness in relation to the dominant culture

acephalous | A group of people without an official leader.

Acheulean | Tool industry first made by Homo erectus, characterized by teardrop-shaped stone handaxes flaked on both sides.

Activated melanogenesis | Increase in melanin production in response to ultraviolet radiation (UV) exposure.

activity pattern | Refers to the time of day an animal is typically active.

adaptation | A fit between the organism and environment.

aerial reconnaissance | A survey method in archaeology that identifies archaeological sites using imagery gathered from above (e.g. planes, satellites, drones).

African American Vernacular English | A dialect of American English developed by African Americans and spoken in many African American communities today, marked by its own grammatical rules.

African multiregionalism | The idea that modern Homo sapiens evolved as a complex web of small regional populations in Africa, with sporadic gene flow among them.

agency | the ability to make decisions and take action

agricultural sites | An archaeological site devoted to agriculture, the systematic and controlled use of other forms of life.

Agriculture | The cultivation of domesticated plants and animals using technologies such as irrigation, draft animals, mechanization, and inputs such as fertilizers and pesticides that allow for intensive and continuous use of land resources.

all-encompassing | A characteristic of culture. It means that culture involves all aspects of human life.

allele | A genetic variant.

Allen's Rule | Due to thermal adaptation, homeothermic animals have body volume-to-surface ratios that vary inversely with the average temperature of their environment. In cold climates, the anticipated ratio is high; in warm climates, it is low.

Amalgamation | interactions between members of distinct ethnic and cultural groups that reduce barriers between the groups over time

amino acids | Organic molecules that are the building blocks of protein. Each of the 20 different amino acids have their own unique chemical property. Amino acids are chained together to form proteins.

analogical change | Language changes that are modeled on common patterns from elsewhere in the language.

animal kill sites | Place where one or more animals were killed by hunters.

animatism | belief in an impersonal supernatural force, such as mana

animism | Religions based on the idea that plants, animals, inanimate objects, and even natural phenomena like weather have a spiritual or supernatural element

Anthropocene | The geological time period defined by the global effects of human activities on the environment and geochemical cycles of the Earth.

anthropological perspective | The viewpoint of anthropologists, seeking to eliminate ethnocentrism, to value different cultures, and to understand those cultures from the perspective of those inside.

anthropology | Anthropology is the study of what makes us human.

anthropomorphic | non-human beings that have human characteristics

applied anthropology | the field of anthropology that focuses on the practical application of anthropological theories, methods, and findings to solve real-world problems.

Aquatic foragers | a specialized subsistence activity that centers on fish and/or marine mammal hunting.

arbitrariness | The feature of language that means there is no obvious connection between the symbol (e.g. the word 'dog' or 'perro' or 'mbwa') and what it refers to (your pet labrador).

arboreal | An organism that spends most of its time in trees.

archaeological context | The position of an archaeological find in relation to other finds on the site, including its associations, provenience, and matrix as well as what has happened to it since it was buried or placed on the ground.

archaeological record | The material remains of past human activity, which includes sites, artifacts, food remains, and refuse, which form the database with which to study the human past.

archaeological stratification | The use of stratigraphy to determine the relative ages of human cultural contexts and layers containing artifacts.

Archaeology | the field of anthropology that relies on the excavation of artifacts and fossils to explore how environmental and historical conditions have produced a diversity of human cultures.

Archival collections | Groups of published, re-created, or original manuscripts, such as books, maps, drawings, notes, letters, and other papers, that are deemed significant enough to be placed in conditions designed to preserve them against damage or loss

Aridity Hypothesis | The hypothesis that long-term aridification and expansion of savannah biomes were drivers in diversification in early hominin evolution.

artifacts | Portable objects made, used, or modified by humans.

asexual | not engaging in sexual thoughts or activities.

assemblage | All the artifacts and data collected from an archaeological site.

Assimilation | pressure placed on minority groups to adopt the customs and traditions of the dominant culture

Assimilation model | Current theory of modern human origins stating that the species evolved first in Africa and interbred with archaic humans of Europe and Asia.

association | The relationship and position of an archaeological find to other artifacts and features that are in the same archaeological level at the site.

band | the smallest unit of political organization, consisting of only a few families and no formal leadership positions.

Basal melanogenesis | Genetically mediated, non-environmentally influenced base melanin level.

base pairs | Chemical bonding between nucleotides. In DNA, adenine (A) pairs with thymine (T) and cytosine (C) pairs with guanine (G); in RNA, adenine (A) always pairs with uracil (U).

Bergmann's Rule | For a broadly distributed monophyletic group, species and populations of smaller size tend to be found in environments with warmer climates and those of larger size tend to be found in ones that are colder.

Beringia | Prehistoric landmass that connected Siberia and Alaska. The ancestors of Native Americans would have crossed this area to reach the Americas.

Big men | a form of temporary or situational leadership; influence results from acquiring followers.

bilophodont molars | Molar pattern of cercopithecoid monkeys in which there are usually four cusps that are arranged in a square pattern and connected by two ridges.

Biological anthropology | the field of anthropology that focuses on the earliest processes in the biological and sociocultural development of human beings as well as the biological diversity of contemporary humans. Biological anthropologists study the origins, evolution, and diversity of our species.

biomedical | The approach to health and wellness in the United States and the West, where illnesses are the result of specific scientifically identifiable agents and health is the absence of disease.

bipedalism | Walking on two legs.

bisexual | engaging in sexual thoughts or activities involving persons of one's own sex/gender category as well as a different sex/gender category (or multiple other such categories).

borrowing | A kind of language change when languages in contact take linguistic material (words, sounds, etc.) from one another.

brachiation | A form of locomotion in which the organism swings below branches using the forelimbs.

breccia | Hard, calcareous sedimentary rock; encases and preserves many hominin fossils in South Africa.

bride service | a transfer of wealth from the groom's to the bride's family through labor, usually the contracted labor of the groom, either before or after the marriage.

Bride wealth | the transfer of material and symbolic value from the groom's to the bride's family

burial sites | Archaeological sites where people were buried, such as cemeteries.

butchering sites | An archaeological site where animals were butchered and processed.

Carbohydrates | Molecules composed of carbon and hydrogen atoms that can be broken down to supply energy.

cell cycle | A cycle the cell undergoes with checkpoints between phases to ensure that DNA replication and cell division occur properly.

Chiefdoms | large political units in which the chief, who usually is determined by heredity, holds a formal position of power.

chiefs | the inherited office of leadership in a chiefdom, combining coercive forms of economic, political, judicial, military, and religious authority.

chromosome | A DNA molecule that is wrapped around protein complexes, including histones.

cisgender | gender identity constructed on the sex assigned at birth

clade | A grouping based on ancestral relationships; a branch of the evolutionary tree.

cline | A pattern of gradual and continuous variation in a physical trait across a geographic area

closed habitats | A phrase typically referring to a woodland, or tree-filled, environment.

Clovis points | fluted projectile points associated with the New World Clovis culture, a Paleo-American culture.

Coastal Route model | Theory that the first Paleoindians crossed to the Americas by following the southern coast of Beringia.

code-switch | When one person switches between different language varieties in conversation, drawing on the social meanings associated with each variety.

Colonialism | the political, social, economic, and cultural domination of a territory and its people by a foreign power for an extended period of time

commercial sites | Archaeological sites with evidence of human commercial activity, such as stores and markets.

communitas | An intense feeling of community spirit and social solidarity, often brought on by religious ritual

comparative method | The best method for doing language reconstruction, relying on the regularity of sound change.

context |

In archaeology or paleoanthropology, information relating to where an artifact or fossil was found and what it was found in association with.

In single context excavation, a well-defined stratigraphic unit relating to a single depositional event, used as the primary unit for recording and analysis.

convergent evolution | Evolutionary process whereby organisms that are not closely related independently evolve similar traits as a product of adaptation to similar evolutionary parameters.

Cooperative Principle | A way of analyzing implicatures in conversation following the assumption that participants are acting in ways to accomplish conversational goals.

cores | The remains of a rock that has been flaked or knapped. The rock from which a flake is removed.

cosmology | an explanation for the origin, history, and nature of the world

Creole (language) | A pidgin language that has expanded its scope and structure and acquired native speakers.

Cultural anthropology | the field of anthropology devoted to describing and understanding the wide variety of human cultures. Cultural anthropologists focus on such things as social thought, action, ritual, values, and institutions.

cultural formation processes | Human activities that move material culture from its original in situ depositional location to another context.

cultural relativism | the idea that we should seek to understand another person's beliefs and behaviors from the perspective of their own culture and not our own.

cultural resource management | The survey and documentation of archaeological sites that need to be recorded before they are potentially damaged or destroyed.

culture | a set of beliefs, practices, symbols and patterns of behavior that are learned and commonly shared within a particular population of people.

deductive approach | a type of research in which the researcher starts with a theory, hypothesis, or generalization and then tests it through observations and data collection.

delayed return system | techniques for obtaining food that require an investment of work over a period of time before the food becomes available for consumption. Farming is a delayed return system due to the passage of time between planting and harvest.

dendrochronology | An absolute dating method in archaeology that involves measuring tree rings.

dental formula | The number of each type of tooth in one quadrant of the mouth, written as number of incisors: canines: premolars: molars.

deoxyribonucleic acid (DNA) | A molecule that carries the hereditary information passed down from parents to offspring. DNA can be described as a "double helix"' shape. It includes two chains of nucleotides held together by hydrogen bonds with a sugar phosphate backbone.

Derived trait | Physical trait of a taxon that has more recently evolved, and can be used to distinguish narrower taxonomic groupings.

descent with modification | Darwin's term for what we now call "evolution," in which animals and plants derive from but look different from their ancestors.

dialect | A subordinate variety of a language, and the common assumption is that speakers of dialects of the same language can understand one another.

diastema | A space between the teeth, usually for large canines to fit when the mouth is closed.

digital anthropology | anthropology of the internet and internet communities, where the field site exists entirely or primarily online.

division of labor | the separation of the tasks in any economic system or organization so that participants may specialize (specialization).

DNA polymerases | Enzymes that add nucleotides to existing nucleic acid strands during DNA replication. These enzymes can be distinguished by their processivity (e.g., DNA replication).

DNA replication | Cellular process in which DNA is copied and doubled.

DNA sequence | The order of nucleotide bases. A DNA sequence can be short, long, or representative of entire chromosomes or organismal genomes.

domestic sites | Archaeological sites with the remains of human habitation

Dowry | material value carried by the bride into her own marriage to provide her with symbolic leverage within her husband's lineage

dry nose | The nose and upper lip are separated and the upper lip can move independently; sometimes referred to as a "hairy" or "mobile" upper lip.

dynamic | A characteristic of culture. It means that culture is constantly changing.

Early Stone Age | The earliest described archaeological period in which we start seeing stone tool technology.

Earthworks | artificial changes in land level, typically made from piles of artificially placed or sculpted rocks and soil.

Eastern African Rift System |

This term is often used to refer to the Rift Valley, expanding from Malawi to Ethiopia.

This active geological structure is responsible for much of the visibility of the paleoanthropological record in East Africa.

ecofacts | An object not modified by humans but brought to the site by past human activity, including both organic and inorganic materials.

egalitarian | societies in which there is no great difference in status or power between individuals and there are as many valued status positions in the societies as there are persons able to fill them.

encephalization | The expansion of the brain; a biological process observed over the course of human evolution.

enculturation | The process of learning cultural practices, beliefs, and symbols from other members of a culture.

endogamy | a term describing expectations that individuals must marry within a particular group.

Environmental anthropology | A field of anthropology that studies the reciprocal relationship between human societies and the natural world.

enzymes | Proteins responsible for catalyzing (accelerating) various biochemical reactions in cells.

essentialism | a sense that some trait is so profoundly deep and consequential that it creates a common identity for everyone who has that trait

ethnic group | A group that claims a distinct identity based on cultural characteristics and a shared ancestry that are believed to give its members a unique sense of peoplehood or heritage

Ethnicity | the degree to which a person identifies with and feels an attachment to a particular ethnic group

ethnocentrism | the tendency to view one's own culture as most important and correct and as the stick by which to measure all other cultures.

ethnogenesis | the emergence of new ethnicities in response to changing social circumstances

ethnography | the in-depth study of the everyday practices and lives of a people.

ethnology | an academic field & discipline that compares and analyzes the characteristics of different peoples and the relationships between them.

Ethnomedicine | The comparative study of cultural ideas about wellness, illness, and healing.

Ethnoscape | the flow of people across boundaries as part of globalization

evolutionary | A characteristic of culture. It means that culture has both shaped, and is shaped by, the evolutionary history of our species.

evolutionary trade-off | When an organism, which is limited in the time and energy it can put into aspects of its biology and behavior, is shaped by natural selection to invest in one adaptation at the expense of another.

excavation | a method in archaeology of careful digging to uncover material remains while recording their context

fallback foods | Foods that may not be preferred by an animal (e.g., foods that are not nutritionally dense) but that are essential for survival in times of stress or scarcity.

faunal assemblages | Collections of fossils of non-human animals found at a site.

feature | A non-portable human-made material remains such as a fire pit, hearth, storage pit, house, or structure that cannot be moved from the site.

Field notes | detailed descriptions of everything the ethnographer observes and experiences.

fieldwork | an anthropological research method that that takes place away from the laboratory, office, or classroom.

Financescape | the flow of money across boundaries as part of globalization

flakes | The piece knocked off of a stone core during the manufacture of a tool, which may be used as a stone tool.

focal vocabulary | A set of words in a language that are connected with important aspects of the culture of the speakers.

folic acid | Form of B complex vitamin necessary for proper fetal development.

folivores | Having a diet consisting primarily of leaves.

Folsom Point | projectile points associated with the Folsom tradition of North America. The points are bifacially worked and have a symmetrical, leaf-like shape with a concave base and wide, shallow grooves running almost the entire length of the point.

foodways | the cultural norms and attitudes surrounding food and eating.

Foraging | a mode of subsistence defined by its reliance on wild plant and animal food resources already available in the environment rather than on domesticated species that have been altered by human intervention.

foramen magnum | The large hole (foramen) at the base of the cranium, through which the spinal cord enters the skull.

formal interviews | an interview with a rigorous set of questions which does not allow one to divert from the prearranged questions.

fossils | The remains or impression of an organism from the past.

frugivores | Having a diet consisting primarily of fruit.

gay | people whose enduring physical, romantic, and/or emotional attractions are to people of the same sex or gender; usually refers to men who are attracted to other men, but may include women who are attracted to other women.

gender | cultural roles based on, but not determined by, the biological categories of sex

gender ideology | a coordinated set of ideas about gender categories, relations, behaviors, norms, and ideals.

Gender inequality | the social phenomenon in which people are not treated equally on the basis of gender.

Gender nonbinary | a person who rejects strict male and female gender categories in favor of a more flexible and contextual expression of gender

gene | A stretch of DNA with an identifiable function (sometimes broadened to include any DNA with recognizable structural features as well).

gene flow | The geographical movement of genes, due to the contact of populations.

gene pool | The hypothetical summation of the entire genetic composition of a population or species.

genealogical (kinship) method | an ethnographic method for identify all-important links of kinship determined by marriage and descent.

Generalized trait | A trait that is useful for a wide range of tasks.

Genetic drift | Random, short-term perturbations to the gene pool, with nonadaptive effects

genotype | The genetic constitution of an individual organism

geoglyphs | A large-scale drawing or image made on the ground by arranging lines of stones, scratching the earth, etc., and often only fully visible from a distance or the air.

Geographic Information System | A geographic information system (GIS) is a system that creates, manages, analyzes & maps all types of data.

gesture-call system | The communication systems of great apes and other non-human primates, relying on sound and body language.

Global North | Refers to the wealthier countries of the world. The definition includes countries that are sometimes called “First World” or “Highly Developed Economies”

Global South | Refers to the poorer countries of the world. The definition includes countries that are sometimes called “Third World” or “Least Developed Economies"

Globalization | The movement of people, circulation of goods, and exchange of ideas around the world.

Globular | Having a rounded appearance. Increased globularity of the braincase is a trait of modern Homo sapiens.

glocalization | the adaptation of global ideas into locally palatable forms

Gloger’s Rule | For mammals of the same species, those with more darkly pigmented forms tend to be found closer to the equator and those with lighter forms are found in regions further from the equator.

gracile | Having a smooth and slender quality; the opposite of robust.

gracile australopithecines | Australopithecine species characterized by slender, less rugged, or pronounced features.

grooming claw | A claw present on the second pedal digit in strepsirrhines.

Ground Penetrating Radar | A type of remote sensing that works by transmitting tiny pulses of high-frequency radio waves into the ground and recording the time it takes for those signals to reflect off objects or contrasting layers in the soil and return to the antenna.

ground reconnaissance | Archaeological survey that involves systematically walking over and physically exploring the area to be studied.

gummivores | Having a diet consisting primarily of gums and saps.

habitation | A general term for any area that has evidence of a domestic activity, such as food preparation.

habitus | the embodied dispositions that arise from one’s enculturation in a specific social setting

Hawthorne effect | people changing their behavior because they know they are being watched as part of a study

helicase | A protein that breaks the hydrogen bonds that hold double-stranded DNA together.

heterodont | An organism having different types of teeth

heterogenization of culture | Trends associated with globalization that aid in the maintenance of cultural differences

heteronormativity | the notion that heterosexuality is the most natural and normal form of sexuality

heterosexual | engaging in sexual thoughts or activities involving persons of a different sex/gender category.

hierarchical classification scheme | A system of grouping organisms according to a hierarchy, or levels.

historical linguistics | The study of how languages change and the cultural and historical implications of those changes.

holism | how the elements of human life are bound together to form distinctive cultures.

Holocene | The epoch of the Cenozoic Era starting around 12,000 years ago and lasting arguably through the present.

holotype | A single specimen from which a species or taxon is described or named.

hominins | Modern humans and any extinct relatives more closely related to us than to chimpanzees.

homogenization of culture | Cultures becoming more similar through globalization

homology | The study of physical correspondences among diverse kinds of creatures; necessary for creating taxonomies

hunting blinds | A construction that camouflages the hunter and allows the animal to come into view.

hypodescent | a socially constructed racial classification system in which a person of mixed racial heritage is automatically categorized as a member of the less (or least) privileged group

Ice-Free Corridor model | Theory that the first prehistoric Native Americans crossed to the Americas through a passage between glaciers.

Ideoscape | the flow of ideas across boundaries as part of globalization

immediate return system | the food acquired can be immediately consumed. Foraging is an immediate return system.

implementation phase | The phase of archaeological research where archaeologists procure funds, sort logistics, and obtain permits and permissions for their research.

implicature | A meaning suggested by a word or sentence, based on the context in which it is uttered.

in situ | When an archaeological find is left in the original place that it was found.

incest taboo | a cultural norm that prohibits sexual relations among close kin; what counts as 'close' is culturally defined however.

inductive approach | a method of developing theories or generalizations based on specific observations or data.

industrial sites | Archaeological sites with evidence of industrial activity by humans

Informed consent | the informant’s agreement to take part in the study

inheritance of acquired characteristics | The idea that you pass on the features that developed during your lifetime, not just your genes; also known as Lamarckian inheritance.

insectivores | Having a diet consisting primarily of insects.

institutional review board | a committee that applies research ethics by reviewing the methods proposed for research to ensure that they are ethical.

insular dwarfing | A form of dwarfism that occurs when a limited geographic region, such as an island, causes a large-bodied animal to be selected for a smaller body size.

integrated | A characteristic of culture. It means that the different aspects of culture shape and influence one another, and cannot be studied in isolation.

international development | A field dedicated to improving the lives of people world-wide, by making interventions in health, education, the economy and more.

interrelated with biology | A characteristic of culture. It means that while we are biological beings with natural needs, culture satisfies those needs in particular ways, and so can impact our biology, growth, and development.

intersectionality | the recognition that gender, race, class, ethnicity, age, sexuality, and physical ability all intersect to make the experiences of a person in any category diverse and complex

Intersex | A person born with differences in sex characteristics or chromosomes that do not fall within typical conceptions of male or female.

introgression | The uneven mixing of DNA over time in which a small amount of outside genetic material is incorporated into a larger genome.

irrigation | the supply of water to land or crops to help growth, typically by means of channels.

ischial callosities | Modified seat bones of the pelvis that are flattened and over which calluses form; function as seat pads for sitting and resting atop branches.

Jim Crow | a term used to describe laws passed by state and local governments in the United States during the early twentieth century to enforce racial segregation of public and private places

key informants | individuals who are more knowledgeable about their culture than others and who are particularly helpful to the anthropologist.

knapping | The fracturing of rocks for the manufacture of tools.

knuckle-walking | A form of quadrupedal movement used by gorillas and chimpanzees when on the ground, wherein the front limbs are supported on the knuckles of the hands.

lactase persistence | Genetic mutation permitting the continued production of lactase-phlorizin hydrolase enzyme in the small intestine past the weaning period.

language | The idealized “standard” of a variety of speech with a name, usually considered to be incomprehensible to speakers of a different language.

language death | When a language does not have any living speakers.

language endangerment | When a language is deemed to be at risk of losing its speakers and experiencing language death.

language modality | The form of communication (e.g. spoken, signed) used by a language and its speakers.

language reclamation | The agency of communities to preserve and (re)integrate their heritage languages into their cultural practices, even if they also speak other languages.

language reconstruction | The process where historical linguists determine the features (phonology, morphology, lexicon, etc.) of a language from the past

language revitalization | Efforts to reverse declining numbers of speakers of endangered languages or to revive "extinct" languages.

language shift | When a community stops using one language and moves to use another language as its native language.

Large Cutting Tools | A tool that is shaped to have functional edges.

Later Stone Age | Time period following the Middle Stone Age with a diversification in tool types, starting around 50,000 years ago.

law of superposition | states that in stratigraphic sequences, the oldest strata will lie at the bottom of the sequence, while newer material stacks upon the surface to form new deposits over time.

learned | A characteristic of culture. It means that cultural behaviors are not genetically inherited from generation to generation but must be passed down from older members of a society to new members.

lesbian | a woman whose enduring physical, romantic, and/or emotional attraction is to other women.

lexicon | The vocabulary of a language

LiDAR | a detection system which works on the principle of radar, but uses light from a laser.

life history | a personal narrative of someone’s life

life-history | a personal narrative of someone’s life

lifestyle | The creative and reflexive ways in which individuals perform their various social identities.

linguistic anthropology | the field of anthropology that explores the central role of language in human cultural life. Linguistic anthropologists study the origins of language, how language shapes thought, and how language operates as a tool of power.

linguistic profiling | Discrimination faced by individuals on account of their speaking a racially or ethnically associated language or dialect.

linguistic relativity | The idea that the language one speaks will influence the way they see the world and how they behave.

linguistic universals | Aspects of human language common to all languages and based upon our biological and cognitive capacities for language.

Linguistics | The study of human language

lipids | Fatty acid molecules that serve various purposes in the cell, including energy storage, cell signaling, and structure.

lithics | stone artifacts that have been purposefully modified, or worked, by human hands.

loanword | a type of borrowing where a language takes a word from another language and makes it part of its own vocabulary

locomotion | How an organism moves around.

magic | practices intended to bring supernatural forces under one’s personal control

manuport | An object brought to the site by humans but not modified by them.

Margaret Mead | an American cultural anthropologist and writer.

Marriage | the formation of a new, socially sanctioned family as it is defined across cultures and societies.

marriage compensation | the transfer of some form of wealth from one family to another to legitimize the marriage as a creation of a new social and economic household

material culture | Objects produced or modified by humans such as tools, art, buildings, clothing, etc.

matriarchy | a society ruled by senior women

matrix | The natural materials such as sediments surrounding and enclosing the object in place.

Maxim of Manner | In a conversation, be as clear, brief, and as orderly as possible when you make your contributions

Maxim of Quality | In a conversation, you say what you believe to be true, and only say what you have sufficient evidence for.

Maxim of Quantity | In a conversation, don’t be more informative than is needed by the purpose of the conversation, and don’t be less informative than is needed by the purpose of the conversation.

Maxim of Relation | In a conversation, speakers should make their contributions to the conversation relevant to what is being discussed.

Mediascape | the flow of media across boundaries as part of globalization

Medical anthropology | An anthropological subfield that studies human health and health care in comparative perspective.

megafauna | Large ancient animals that may have been hunted to extinction by people around the world.

mental grammar | The things you know, consciously or unconsciously, when you know a language.

messenger RNA (mRNA) | RNA molecule that is transcribed from DNA. Its tri-nucleotide codons are “read” by a ribosome to build a protein.

microliths | Small stone tool found in the Later Stone Age; also called a bladelet.

Middle Stone Age | Time period known for Mousterian-style lithics, and which connects African archaic to modern Homo sapiens temporally.

military sites | Archaeological sites where armed conflict occurred or where there was a military occupation

minimal pair | Two words differing in only one sound, thereby showing that the two sounds that differ carry meaning in the language.

modes of exchange | the ways that goods and services are exchanged in different cultures.

modes of production | the social relations through which human labor is used to transform energy from nature using tools, skills, organization, and knowledge.

modes of subsistence | the techniques used by the members of a society to obtain food. Anthropologists classify subsistence into four broad categories: foraging, pastoralism, horticulture, and agriculture.

molecular phylogeny | The study of the evolutionary relationships between groups of organisms using genetic evidence.

Monogamy | the socially sanctioned union of two adults

monogenism | The idea that all people share a common single origin.

Monotheistic | religions that recognize a single supreme God

morphology | The study of the pieces of meaning within a given language. For many languages (but not all!), how words are put together.

mosaic | Composed from a mix or composite of traits.

mosaic evolution | The concept that evolutionary change does not occur homogeneously throughout the body in organisms.

Mousterian tools | Stone tools made and used by Neanderthals. These tools were made using the prepared-core technique, were of high quality, and were saved and reused.

multi-sited ethnography | uses traditional methodology in various locations both spatially and temporally.

Multiculturalism | maintenance (and frequently celebration) of multiple cultural traditions in a single society

Multilingualism | The use of more than one language among members of a community.

multiple gender | a gender system that goes beyond male and female

Multiregionalism | Theory that modern Homo sapiens evolved simultaneously in Africa, Asia, and Europe from archaic populations.

mutations | An alteration to the base sequence of DNA.

National Historic Preservation Act | A 1966 law that ensures that federal agencies identify and take actions to protect and preserve historic sites and archaeological locations in the United States.

Native American Graves Protection and Repatriation Act | A 1990 law that gives legal protection to Native America gravesites and grave goods, and enables them to pursue repatriation of human remains and cultural property previously collected from such sites.

natural formation processes | Natural events that move material culture from its original in situ depositional location to another context.

natural selection | A consistent bias in survival and fertility, leading to the over-representation of certain features in future generations and an improved fit between an average member of the population and the environment.

Natural shelter sites | A natural cavity enclosed by one or more rock walls and an overhang that provides protection from the elements.

neoliberalism | the ideology of free-market capitalism emphasizing privatization and unregulated markets

Neolithic Revolution | a period of rapid innovation in subsistence technologies that began 10,000 years ago and led to the emergence of agriculture. Neolithic means “new stone age,” a name referring to the stone tools produced during this time period.

nomadic | Describes populations that move through the landscape without a singular home.

non-intrusive tools | An archaeological technique where artifacts are not disturbed when collecting information.

nonconcordant | So-called "racial" traits are inherited independently rather than as a package, so they produce different classification boundaries

not bound | A characteristic of culture. It means that individuals can choose to conform to cultural norms and expectations, or to challenge them.

nucleic acids | Complex structures (like DNA or RNA) that carry genetic information about a living organism.

obligate bipedalism | Where the primary form of locomotion for an organism is bipedal, and other forms of locomotion are difficult and inefficient.

ochre | A natural clay pigment mixed with ferric oxide and clay and sand. Ranges in color from brown to red to orange. Found in Neanderthal burials.

Oldowan | Lower Paleolithic, the earliest stone tool culture.

one-drop rule | The idea in the United States that any non-white ancestry prevented a person from being classified as "white"

open-air site | An archaeological site that is open to the elements.

opposable digits | Having thumbs and/or toes that go in a different direction from the rest of the fingers and/or toes, allows for grasping with hands and feet.

orthognathic | The face below the eyes is relatively flat and does not jut out anteriorly.

Out of Africa model | Theory that modern Homo sapiens expanded from Africa to cover the rest of the world by replacing and without interacting with archaic humans.

paleoanthropologists | Researchers that study human evolution.

paleoenvironment | An environment from a period in the Earth’s geological past.

pansexual | engaging in sexual thoughts or activities with others without regard to biological sex, gender identity, or sexual orientation.

Participant Observation | a type of observation in which the anthropologist observes while participating in the same activities in which her informants are engaged.

participant-observation | a type of observation in which the anthropologist observes while participating in the same activities in which her informants are engaged.

Pastoralism | a subsistence system in which people raise herds of domesticated livestock.

Patriarchy | a widespread gender ideology that positions men as rulers of private and public life

pedestrian foragers | people whose subsistence pattern involves diversified hunting and gathering on foot.

pentadactyly | Having five digits (fingers and toes)

petrogylphs | an image created by removing part of a rock surface by incising, picking, carving, or abrading, as a form of rock art.

phenotype | The observable manifestation of a genetic constitution, expressed in a particular set of circumstances; an organism's physical appearance.

Phonology | The use of specific sounds or signs to encode messages within a given language.

pictographs | a pictorial symbol for a word or phrase.

Pidgin | A contact language that develops in intense contact scenarios among speakers who have no language in common.

pigmentocracy | a society characterized by a strong correlation between a person’s skin color and their social class

Pleistocene | Geological epoch dating from 2.6 million years ago to about 11,000 years ago. When the Homo genus evolved.

polyandry | the marriage of one woman to more than one man

Polygamy | the socially sanctioned union of more than two adults at the same time

polygenism | The idea that different peoples are fundamentally different, with different origins, and have always been so.

Polygyny | the marriage of one man to more than one woman

polymorphic color vision | A system in which individuals of a species vary in their abilities to see color. In primates, it refers to males being dichromatic and females being either trichromatic or dichromatic.

Polytheistic | religions that recognize several gods

postcranium | The skeleton below the head.

postmarital residence rules | the social rules that determine where a newly married couple will reside following marriage

postorbital bar | A bony ring that surrounds the eye socket, open at the back; this is a derived trait of all primates.

potassium-argon dating | A radiometric dating method based on measurement of the product of the radioactive decay of an isotope of potassium (K) into argon (Ar).

potlatch | a gift-giving feast practiced by Indigenous peoples of the Pacific Northwest Coast of Canada and the United States,[1] among whom it is traditionally the primary governmental institution, legislative body, and economic system.

pragmatics | The study of how context effects meaning within a language.

prehensile tails | A tail that is able to hold the full body weight of an organism, which often has a tactile pad on the underside of the tip for improved grip.

Priests | full-time religious practitioners

Primitive trait | Physical trait that a taxon has because it has inherited the trait from a distant ancestor.

processing sites | An archaeological site where humans prepared plants or animals for consumption.

productivity | The fact that each language could creatively produce an infinite number of new words and sentences (even if they don't actually do so).

profane | objects or ideas that are ordinary and can be disregarded

prognathic | In reference to the face, the area below the eyes juts anteriorly.

prophet | a person who claims to have direct communication with the supernatural realm and who can communicate divine messages to others

protein synthesis | A multi-step process by which amino acids are strung together by RNA machinery read from a DNA template.

Proteins | Chains of amino acids that fold into a three-dimensional structure that allow a cell to function in a variety of ways.

provenance | Detailed, specific information about where artifacts or human remains were found.

provenience | The location, horizontally and vertically, that the archaeological find was positioned on the site. Sometimes referred to as provenance.

Quadrupedalism | Moving around on all fours.

qualitative data | information that is descriptive in nature, expressed in terms of language rather than numerical values.

Qualitative research | a type of research that aims to gather and analyze non-numerical (descriptive) data in order to gain an understanding of individuals' social reality, including understanding their attitudes, beliefs, and motivation.

Quantitative data | any information that can be quantified, counted or measured, and given a numerical value.

quantitative research | a research strategy that focuses on quantifying the collection and analysis of data.

queer | originally a pejorative term in American culture for people who did not conform to the rigid norms of heterosexuality; now used as a term of pride among many members of the LGBTQIA+ community to highlight the fluid, constantly changing, and contextual nature of gender and sexuality

queer anthropology | a subfield of anthropology that focuses on areas of sociocultural activity distinguished from the presumed norms of heterosexuality and gender identities

Race | a way of classifying humans incorrectly assumed to have a basis in biology, rather than historical and cultural circumstance

racial formation | the process of defining and redefining racial categories in a society

Radiocarbon dating | An absolute dating technique used to determine the age of organic materials less than 50,000 years old. Age is determined by examining the loss of the unstable carbon-14 isotope, which is absorbed by all living organisms during their lifespan. The rate of decay of this unstable isotope after the organism has died is assumed to be constant, and is measured in half-lives of 5730 + 40 years, meaning that the amount of carbon-14 is reduced to half the amount after about 5730 years. Dates generated by radiocarbon dating have to be calibrated using dates derived from other absolute dating methods, such as dendrochronology and ice cores. [Wikipedia]

ranked societies | societies in which there are substantial differences in the wealth and social status of individuals; there are a limited number of positions of power or status, and only a few can occupy them.

register | A variety of a language used for a particular purpose or in a particular situation.

reified | To make an abstract (often inaccurate) concept more concrete or real through promotion and circulation of that idea.

Reincarnation | the idea that a living being can begin another life in a new body after death

relative dating | A method of dating that places objects or events in the order in which they occurred and establishes if something is younger or older than other things at a site.

religion | the means by which human society and culture is extended to include the nonhuman

remote sensing | The ability to collect information about places or objects at or under the surface of the ground, usually without having to disturb the ground.

Repatriation | process of restoring human remains and/or objects of religious or cultural importance to the peoples from whom they originated.

research design | a systematic plan to execute the research.

Revitalization rituals | ambitious rituals to resolve serious problems, such as war, famine, or poverty through a spiritual or supernatural intervention

ribonucleic acid (RNA) | Single-stranded nucleic acid molecule. There are different RNAs found within cells and they perform a variety of functions, such as cell signaling and involvement in protein synthesis.

ribosome | An organelle in the cell found in the cytoplasm or endoplasmic reticulum. It is responsible for reading mRNA and protein assemblage.

rite of intensification | a ritual designed to bring a community together, often following a period of crisis

rite of passage | a ritual designed to transition individuals between life stages

ritual | practices or ceremonies that serve a religious purpose and are usually supervised by religious specialists

robust australopithecines | Australopithecine species with rugged or exaggerated features, especially related to teeth and the masticatory system (i.e. chewing).

rock art | human-made markings placed on natural surfaces.

Sacred | objects or ideas that are set apart from the ordinary and treated with great respect

sagittal crest | A bony ridge along the top/middle of the skull, used for attachment of chewing muscles.

Samuel George Morton | a 19th century American physician and anthropologist known for founding the field of craniometry and for his scientifically racist theories.

scientific hypothesis | an idea that proposes a tentative explanation about a phenomenon or a narrow set of phenomena observed in the natural world.

scientific method | A process by which scientists ask questions, collect data, test hypotheses, and gain knowledge about the natural world.

Semantics | The study of the meaning of words and phrases within a language.

semi-structured interview | an interview where questions are prepared ahead of time but also left open to going in new directions, allowing new ideas to be brought up during the interview as a result of what the interviewee says.

Serial monogamy | a form of monogamy in which adults have a series of two-person monogamous marriages over a lifetime

Seriation | a relative dating method in which artifacts are placed in chronological order once they are determined to be of the same culture

sex | the biological categories of male and female (and potentially other biological categories) based on genetics and anatomical features.

sexual dimorphism | The size difference between males and females of any species

Sexual orientation | sociocultural identities associated with specific forms of sexuality

sexuality | erotic thoughts, desires, and practices and the sociocultural identities associated with them

shaman | a part-time religious practitioner

shared | A characteristic of culture. It means that people have culture as part of a group that understands the meanings ascribed to things and actions within that culture.

shifting cultivation | a form of agriculture in which an area of ground is cleared of vegetation and cultivated for a few years and then abandoned for a new area until its fertility has been naturally restored.

shovel test pits | Small excavations used during archaeological survey and reconnaissance used to identify buried sites and their material culture.

Sickle cell disease | A group of genetically inherited blood disorders characterized by an abnormality in the shape of the hemoglobin within erythrocytes (red blood cells).

site | A spatial cluster of archaeological evidence of human activity such as objects, features, and ecofacts.

slash-and-burn | relating to or denoting a method of agriculture in which existing vegetation is cut down and burned off before new seeds are sown, typically used as a method for clearing forest land for farming.

social control | Elements of culture that restrict individuals' behavior to maintain social norms; the exercise of power

Sociolinguistics | The study of the relationship between language and social factors such as gender, race, ethnicity, class, age, etc.

Sorcerers | individuals who seek to use magic for their own purposes

Sound Changes | Changes in the pronunciation of a language.

Space Archaeology | Archaeological reconnaissance done using satellite imagery.

special purpose sites | Archaeological site where a specific type of human activity took place, such as churches, hospitals, or schools.

Specialized traits | A trait that has been developed for a specific purpose.

splicing | The process by which mature mRNAs are produced during protein synthesis. Introns are removed (spliced) and exons are joined together.

stable variation | A multilingual situation where two or more variants are present, but none is replacing the others

standard dialect | The variant of a language given special prestige because of its association with the people with the most power and wealth in a society.

state historic preservation officer | An official at the state level in charge of the protection and preservation of historic sites within that state.

States | the most complex form of political organization characterized by a central government that has a monopoly over legitimate uses of physical force, a sizeable bureaucracy, a system of formal laws, and a standing military force.

storage sites | An archaeological site where food is stored for extended periods of time.

stratified | societies in which there are large differences in the wealth, status, and power of individuals based on unequal access to resources and positions of power.

stratigraphy | the study of layers of soil; and important part of archaeological excavation.

structural borrowing | A language change where a language takes an aspect of phonology, morphology, or syntax from another language and incorporates it into its own grammar.

subsistence system | the set of skills, practices, and technologies used by members of a society to acquire and distribute food.

subsurface detection tools | Tools that allow archaeologists to conduct reconnaissance below the surface of the ground without excavating.

supernatural | a realm beyond direct human experience

symbolic | A characteristic of culture. It means that people within a culture create, interpret and share meanings for things within that culture.

Syncretism | the combination of different beliefs, even those that are seemingly contradictory, into a new, harmonious whole

Syntax | The study of how to show the relationship between words and construct meaningful sentences within a language.

Synthetic Theory of Evolution | Explains the evolution of life in terms of genetic changes occurring in the population that leads to the formation of new species.

tactile pads | Sensitive skin at the fingertips for sense of touch. Animals with a prehensile tail have a tactile pad on the underside of the tail as well.

tapetum lucidum | Reflecting layer at the back of the eye that magnifies light.

taphonomy | The study of the fate of the remains of organisms after they die, especially the study of fossilization.

taxa | Plural for taxon; a taxonomic group of any rank, such as species, family, or class.

taxonomy | How groups of species are organized and classified based on how they look and how they are related to each other.

techno-complex | A term encompassing multiple assemblages that share similar traits in terms of artifact production and morphology.

Technoscape | the flow of technology across boundaries as part of globalization

terracing | method of growing crops on sides of hills or mountains by planting on graduated terraces built into the slope.

terrestrial | An organism that spends most of its time on the ground.

the double bind | The idea that women (especially in Western culture) are socialized to use both standard language as well as powerless and tentative language

theory | analytical tools for understanding, explaining, and making predictions about a given subject matter.

Thermoregulation | Maintaining body temperature through physiologically cooling or warming the body.

Three-dimensional collections | Sets of material culture, such as pottery or lithics, stored in museums separately from manuscript collections.

tooth comb | A trait of the front, lower teeth of strepsirrhines in which, typically, the four incisors and canines are long and thin and protrude outward. Also known as dental comb.

Transgender | a person who transitions from a gender category ascribed at birth to a chosen gender identity

tribal historic preservation officer | A tribal official in charge of the protection and preservation of historic sites on tribal lands.

Tribes | political units organized around family ties that have fluid or shifting systems of temporary leadership.

trichromatic color vision | Being able to distinguish yellows and reds in addition to blues and greens; this is a trait shared by many primates.

two-spirit | a term coined by Native American LGBT people to refer to individuals with both male and female spirits, referencing the history of variant gender individuals in Native American cultures.

typological sequences | An archaeological method that compares created objects to other objects of similar appearance with the goal of determining how they are related

typology | Classification of objects according to their physical characteristics such as shape, form, and use.

unstructured interview | a non-directive interview where questions are not prearranged and the conversation is spontaneous.

Uranium–uranium dating | A radiometric dating technique which compares isotopes of uranium.

urban anthropology | anthropology that describes experiences of living in cities and the relationships of city life to broader social, political, and economic contexts.

variant gender | a category of gender other than male or female.

vernacular dialects | Non-standard varieties of a language, usually distinguished by their use of stigmatized grammatical forms.

Vertical clinging and leaping | A locomotor pattern in which animals are oriented upright while clinging to vertical branches, push off with hind legs, and land oriented upright on another vertical branch.

Younger Dryas | The rapid change in global climate, especially a cooling of the Northern Hemisphere, 13,000 years ago.

zoonotic disease | A type of infectious disease naturally transmitted between animals and humans.

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