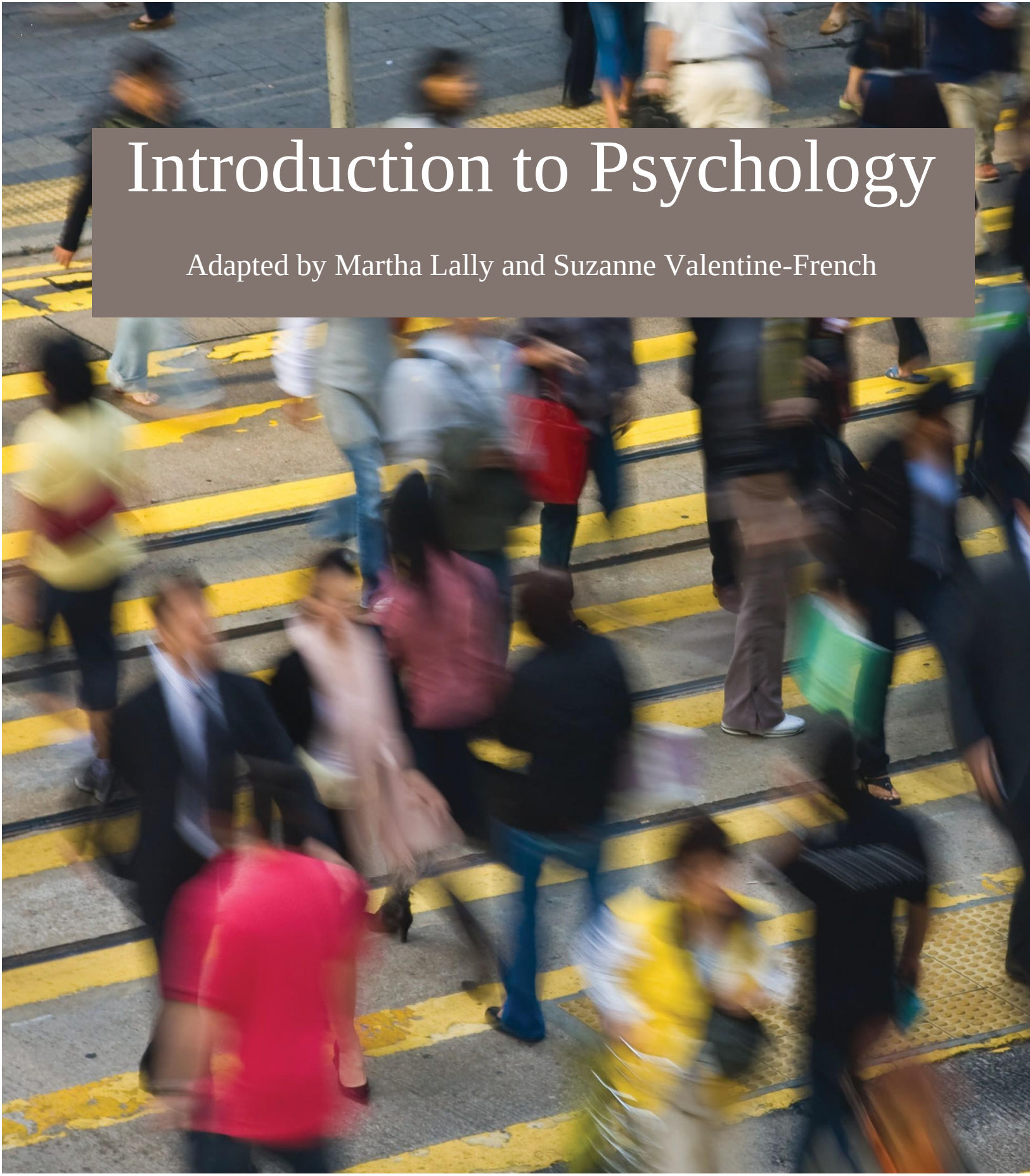

Introduction to Psychology

Adapted by Martha Lally and Suzanne Valentine-French

College of Lake County
Connect to Your Future

Introduction to Psychology

Adapted by: College of Lake County Faculty: Martha Lally and Suzanne Valentine-French

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Chapter 1 Introducing Psychology

Learning Objective

1. Define psychology.

Psychology is the *scientific study of mind (mental processes) and behavior*. The word "psychology" comes from the Greek words "psyche," meaning *life*, and "logos," meaning *explanation*.

Because we are frequently exposed to the work of psychologists in our everyday lives, we all have an idea about what psychology is and what psychologists do. In many ways your conceptions are correct. Psychologists do work in forensic fields, and they do provide counseling and therapy for people in distress. But there are hundreds of thousands of psychologists in the world, and many of them do other types of work

Figure 1.1
Psychology is in part the study of behavior. Why do you think these people are behaving the way they are?

Sources: "The Robot: It's not a dance, it's a lifestyle!" photo courtesy of Alla, http://www.flickr.com/photos/alla2/2481846545/. Other photos © Thinkstock.

Many psychologists work in research laboratories, hospitals, and other field settings where they study the behavior of humans and animals. Psychologists also work in schools and businesses, and they use a variety of methods, including observation, questionnaires, interviews, and laboratory studies, to help them understand behavior.

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

Psychology as a Science

Learning Objective

1. Describe the differences among opinions, values and facts, and explain how the scientific method is used to provide evidence for facts.

Despite the differences in their interests, areas of study, and approaches, all psychologists have one thing in common: They rely on the scientific method. Research psychologists use scientific methods to create new knowledge about the causes of behavior. Practitioners, such as clinical, counseling, industrial-organizational, and school psychologists, primarily use existing research to help solve problems.

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

The Problem of Intuition

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

Unfortunately, the way people collect and interpret data in their everyday lives is not always scientific. Often, when one explanation for an event seems "right," we adopt that explanation as the truth. However, this reasoning is more intuitive than scientific. **Intuition** *is thinking that is more experiential, emotional, automatic, and unconscious, and does not lead to careful analysis of all the variables in a situation* (Kahneman, 2011). Other explanations might be possible and and even more accurate. For example, eyewitnesses to violent crimes are often extremely confident in their identifications of criminals. But research finds that eyewitnesses are just as

confident when they are wrong as when they are right (Cutler & Wells, 2009; Wells & Hasel, 2008). People may also believe in extrasensory perception (ESP), or the predictions of astrology, when there is no evidence for either (Gilovich, 1993). Furthermore, psychologists have also found that there are a variety of biases that can influence our perceptions. These biases lead us to draw faulty conclusions (Fiske & Taylor, 2007; Hsee & Hastie, 2006). In addition, most individuals listen to people they know and trust to give them accurate information rather than doing research to determine what scientific studies show. In summary, accepting explanations for events without testing them thoroughly may lead us to think that we know the causes of things when we really do not.

Hindsight Bias

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

Why Psychologists Rely on Empirical Methods

All scientists, whether they are physicists, chemists, biologists, or psychologists, use *empirical research* to study the topics that interest them. We can label the **scientific method** as *the set of assumptions, rules, and procedures that scientists use to conduct empirical research*. Empirical research methods include collecting, analyzing, and interpreting data, reaching conclusions, and sharing information.

Figure 1.2

Psychologists use a variety of techniques to measure and understand human behavior.

Sources: Poster photo courtesy of Wesleyan University, http://newsletter.blogs.wesleyan.edu/files/2009/04/psychposter11.jpg. Language lab photo courtesy of Evansville University, http://psychology.evansville.edu/langlab.jpg. Other photo © Thinkstock.

Although scientific research is an important method of studying human behavior, not all questions can be answered using scientific approaches. Statements that cannot be objectively measured or objectively determined to be true or false are not within the domain of scientific inquiry. Scientists generally do not attempt to prove values, beliefs, or opinions to be true or false. **Values** *are personal statements* such as "Abortion should not be permitted in this country." Religious beliefs include statements such as "I will go to heaven when I die." Opinions are individual ideas such as "It is important to study psychology." **Facts** *are objective statements determined to be accurate through empirical study*. The following are two examples of facts. "There were more than 21,000 homicides in the United States in 2009." "Research demonstrates that individuals who are exposed to highly stressful situations over long periods of time develop more health problems than those who are not."

Because values cannot be either true or false, science cannot prove or disprove them. Nevertheless, as shown in Table 1.1, research can sometimes provide facts that can help people develop their values. For instance, scientists may be able to objectively measure the effect of capital punishment on the crime rate in the United States. This factual information can and should be made available to help people formulate their values about capital punishment. People also use values to decide which research is appropriate or important to conduct. For instance, the U.S. government has recently provided funding for research on HIV, AIDS, and terrorism, while denying funding for some research using human stem cells.

Table 1.1 Examples of Values and Facts in Scientific Research

Personal value	Scientific fact
The United States government should provide financial assistance to its citizens.	The U.S. government paid $32 billion in benefits in 2016.
Handguns should be outlawed.	There were 33,599 deaths caused by handguns in the United States in 2014.
Blue is my favorite color.	More than 35% of college students indicate that blue is their favorite color.
It is important to quit smoking.	Smoking increases the incidence of cancer and heart disease.

Scientific procedures do not necessarily guarantee that the answers to questions will be unbiased. However, since information from scientific research is shared, knowledge is continually challenged. New research follows, and scientific facts can be modified when new evidence is found. Particularly in fields involving human behavior, scientists may find it necessary to update their research on a regular basis. Norms for behavior 50 years ago may no longer be "facts" today. Cell phones and the internet are now part of everyday communications. Psychologists must update their research on relationships to include online dating, multitasking, and cyber bullying.

The Challenges of Studying Psychology

Psychological experiences are extremely complex. The questions psychologists pose are as difficult as those posed by other scientists, if not more so (Wilson, 1998). A major goal of psychology is to predict behavior by understanding its causes. Making predictions is difficult because people vary and respond differently in different situations. **Individual differences** are *the variations among people on physical or psychological dimensions.* For example, most people experience negative events at some time in their lives. Some individuals handle the challenges, while other people develop symptoms of a major depression. Other important individual differences, that we will discuss in the chapters to come, include differences in intelligence, self-esteem, anxiety, and aggression.

Because of individual differences, we cannot always predict who will become aggressive or who will perform best on the job. The predictions made by psychologists (and most other scientists) are only probabilities. We can say, for instance, that people who score higher on an intelligence test will, on average, do better at school. However, we cannot make very accurate predictions about exactly how any one person will perform.

There is an additional reason that predictions are difficult. Human behavior is influenced by more than one variable at a time, and these factors occur at different levels of explanation. For instance, depression is caused by genetic factors, personal factors, and cultural factors. You should always be skeptical about people who attempt to explain important human behaviors, such as violence or depression, in terms of a single cause.

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

Key Takeaways

- Psychology is the scientific study of mind and behavior.
- Though it is easy to think that everyday situations have commonsense answers, scientific studies have found that people are not always as good at predicting outcomes as they think they are.
- The hindsight bias leads us to think that we could have predicted events that we could not have predicted.
- People are frequently unaware of the causes of their own behaviors.
- Psychologists use the scientific method to collect, analyze, and interpret evidence.

- Employing the scientific method allows the scientist to collect empirical data objectively, which adds to the accumulation of scientific knowledge.
- Psychological phenomena are complex, and making predictions about them is difficult because of individual differences and because they are determined by multiple factors.

Exercises and Critical Thinking

1. Can you think of a time when you used your intuition to analyze an outcome, only to be surprised to find that your explanation was completely incorrect? Did this surprise help you understand how intuition may sometimes lead us astray?
2. Describe the scientific method in a way that someone who knows nothing about science could understand it.

Videos

If you would like to watch videos about the topics in this book, you can watch 26 free online, 30 minute programs at http://www.learner.org/resources/series138.html Most, but not all topics from the text will be illustrated and discussed. In addition, supplemental introductory level information on psychology is presented by Philip Zimbardo, past president of the American Psychological Association, researcher, lecturer, and text author.

The Evolution of Psychology: Central Questions, History, and Contemporary Perspectives

Learning Objectives

1. Identify the central questions in psychology.
2. Describe the historical roots of psychology.
3. Explain the major theoretical perspectives in the field.
4. Identify important women in the history of psychology.
5. Describe the subfields of psychology and related professions.

In this section, we will review the history of psychology with a focus on the important questions that psychologists ask and the major perspectives, or approaches, of psychological inquiry. The Psychological perspectives that we will review are summarized in Table 1.2.

The perspectives that psychologists have used to assess the issues that interest them have changed dramatically over the history of psychology. Perhaps most importantly, the field has moved steadily toward a more scientific approach as the technology available to study human behavior has improved (Benjamin & Baker, 2004).

Table 1.2 The Most Important Perspectives of Psychology

Psychological Perspectives	Description	Important contributors
Structuralism	Uses the method of introspection to identify the basic elements or "structures" of psychological experience	Wilhelm Wundt, Edward B. Titchener
Functionalism	Attempts to understand why animals and humans have developed the particular psychological aspects that they currently possess	William James
Psychodynamic	Focuses on the role of our unconscious thoughts, feelings, and memories, and our early childhood experiences in determining behavior	Sigmund Freud, Carl Jung, Alfred Adler, Erik Erickson, Karen Horney
Behaviorism	Based on the premise that it is not possible to objectively study the mind, and therefore that psychologists should limit their attention to the study of behavior itself	John B. Watson, B. F. Skinner
Biological	Focuses on the role of biology (genetics, neurotransmitters, hormones, and the brain) on human behavior and mental processes	Michael Gazzaniga
Humanistic	Emphasis is placed on the individual's potential for personal growth	Carl Rogers, Abraham Maslow
Cognitive	The study of mental processes, including perception, thinking, memory, and judgments	Hermann Ebbinghaus, Sir Frederic Bartlett, Jean Piaget
Social-cultural	The study of how the social situations and the cultures in which people find themselves influence thinking and behavior	Fritz Heider, Leon Festinger, Stanley Schachter
Evolutionary	Focuses on adaptation and survival as the basis of behavior and mental processes	Charles Darwin, David Buss, Richard Dawkins, Steven Pinker

Psychology's Central Questions

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

- **Nature versus nurture:** Are genes or environment most influential in determining the behavior of individuals and in accounting for differences among people? Most scientists now agree that both genes and environment play crucial roles in most human behaviors. Yet we still have much to learn about how **nature**, *our biological makeup*, and **nurture,** *the environment and experiences that we have during our lives*, work together (Harris, 1998; Pinker, 2002). *The proportion of differences that is due to genetics* is known as the **heritability** of the characteristic. We will see, for example, that the heritability of intelligence is very high (about .85 out of 1.0), but we will also see that nature and nurture interact in complex ways. Given this complex interaction, psychologists now consider the question of how they interact to produce behavior as more relevant than whether nature or nurture is more important.

- **Free will versus determinism:** This question concerns the extent to which people have control over their own actions. Are we the products of our environment, guided by forces out of our control, or are we able to choose the behaviors we engage in? Most of us like to believe that we are able to do what we want. Our legal system is based on the concept of free will. We punish criminals because we believe that they have choice over their behaviors and freely choose to disobey the law. But as we will discuss later in the research focus in this section, recent research has suggested that we may have less control over our own behavior than we think we do (Wegner, 2002).

- **Conscious versus unconscious processing:** To what extent are we conscious of our own actions and the causes of them? Many of the major theories of psychology, ranging from the Freudian psychodynamic theories to cognitive psychology, argue that much of our behavior is determined by variables of which we are not aware.

- **Differences versus similarities:** To what extent are we all similar, and to what extent are we different? For instance, are there basic psychological and personality differences between men and women, or are men and women by-and-large similar? What about people from different ethnicities and cultures? Are people around the world generally the same, or are they influenced by their backgrounds and environments in different ways? Personality, social, and cross-cultural psychologists attempt to answer these classic questions.

- **Accuracy versus inaccuracy:** To what extent are humans good information processors? It appears that people are "good enough" to make sense of the world around them and to make decent decisions (Fiske, 2003). But human judgment is sometimes compromised by inaccuracies in our thinking styles and by our motivations and emotions. For instance, our judgment may be affected by emotional responses to events in our environment.

Figure 1.3
President Barack Obama and Vice President Joe Biden (left photo) meet with BP executives to discuss the disastrous oil spill in the Gulf of Mexico (right photo). Psychologists study the causes of poor judgments such as those made by these executives.
Sources: Source

Early Philosophy as the Foundation for Psychology

The earliest psychologists that we know about are the Greek philosophers Plato (428–347 BC) and Aristotle (384–322 BC) (see Figure 1.4). These philosophers asked many of the same questions that today's psychologists ask. They questioned the distinction between nature and nurture and the existence of free will. Plato argued on the nature side, believing that certain kinds of knowledge are innate or inborn, whereas Aristotle was more on the nurture side, believing that each child is born as an "empty slate" in Latin a tabula rasa, and that knowledge is primarily acquired through learning and experience.

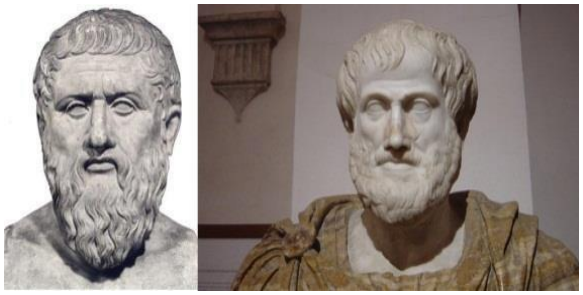


Figure 1.4
Plato (left) believed that much knowledge was innate, whereas Aristotle (right) thought that each child was born as an "empty slate" and that knowledge was primarily acquired through learning and experience.
Sources: Source

European philosophers continued to ask these fundamental questions during the Renaissance Period. For instance, the French philosopher René Descartes (1596–1650) also argued in favor of free will. He believed that the mind controls the body through the pineal gland in the brain, an idea that made some sense at the time but was later proved incorrect. Descartes also believed in the existence of inborn natural abilities. A scientist as well as a philosopher, Descartes dissected animals and was among the first to understand that the nerves controlled the muscles. He also addressed the relationship between mind, the mental aspects of life, and body, the physical aspects of life. Descartes believed in the principle of **dualism**; that is, *the mind is fundamentally different from the mechanical body*. Other European philosophers, including Thomas Hobbes (1588–1679), John Locke (1632–1704), and Jean-Jacques Rousseau (1712–1778), also weighed in on these issues.

The fundamental problem that these philosophers faced was that they had few methods for settling their claims. Most philosophers did not conduct any research on these questions, in part

because they did not yet know how to do it, and in part because they were not sure it was even possible to objectively study human experience. But dramatic changes came during the 1800s with the help of the first two research psychologists: The German psychologist Wilhelm Wundt (1832–1920), who developed a psychology laboratory in Leipzig, Germany in 1879, and the American psychologist, William James (1842–1910), who founded a psychology laboratory at Harvard University.

Early Psychology: Stucturalism and Functionalism

Structuralism: Wilhelm Wundt is considered to have created the first psychology lab in Leipzig, Germany in1879. Wundt's research focused on the nature of consciousness itself. Wundt and his students believed that it was possible to analyze the basic elements of the mind and to classify our conscious experiences scientifically. Wundt began the field known as **structuralism**, *a school of psychology whose goal was to identify the basic elements or "structures" of psychological experience*. Its goal was to create a periodic table of the elements of sensations, similar to the periodic table of elements that had recently been created in chemistry.

Figure 1.5
Wilhelm Wundt (seated at left) and Edward Titchener (right) helped create the structuralist school of psychology. Their goal was to classify the elements of sensation through introspection.
Sources: Source

Structuralists used the method of introspection to attempt to create a map of the elements of consciousness. **Introspection** involves *asking research participants to describe exactly what they experience as they work on mental tasks*, such as viewing colors, reading a page in a book, or performing a math problem. A participant who is reading a book might report, for instance, that he saw some black and colored straight and curved marks on a white background. In other studies, the structuralists used newly invented reaction time instruments to systematically assess not only what the participants were thinking but how long it took them to do so. Wundt discovered that it took people longer to report what sound they had just heard than to simply respond that they had heard the sound. These studies marked the first time researchers realized that there is a difference between the sensation of a stimulus and the perception of that stimulus, and the idea of using reaction times to study mental events has now become a mainstay of cognitive psychology.

Perhaps the best known of the structuralists was Edward Bradford Titchener (1867–1927). Titchener was a student of Wundt who came to the United States in the late 1800s and founded a laboratory at Cornell University. In his research using introspection, Titchener and his students claimed to have identified more than 40,000 sensations, including those relating to vision, hearing, and taste.

The structuralist approach marked the beginning of psychology as a science, because it demonstrated that mental events could be quantified, but the structuralists also discovered the

limitations of introspection. Even highly trained research participants were often unable to report on their subjective experiences. When the participants were asked to do simple math problems, they could easily do them, but they could not easily answer how they did them. Thus, the structuralists were the first to realize the importance of unconscious processes, that many important aspects of human psychology occur outside our conscious awareness, and that psychologists cannot expect research participants to be able to accurately report on all their experiences. Consequently, the structuralist approach is no longer used.

Functionalism: William James was a member of the school of functionalism. The goal of **functionalism** was *to understand why animals and humans have developed the mental processes that they currently possess* (Hunt, 1993). For James, one's thinking was relevant only to one's behavior. As he put it in his psychology textbook, "My thinking is first and last and always for the sake of my doing" (James, 1890).

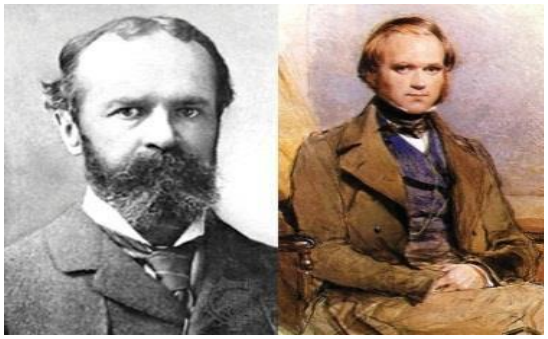


Figure 1.6
The functionalist school of psychology, founded by the American psychologist William James (left), was influenced by the work of Charles Darwin (right).
Source: Source

James and the other members of the functionalist school were influenced by Charles Darwin's (1809–1882) theory of natural selection, which proposed that the physical characteristics of animals and humans evolved because they were useful, or functional. The functionalists believed that Darwin's theory applied to psychological characteristics too. Just as some animals have developed strong muscles to allow them to run fast, the functionalists thought the human brain must have adapted to serve a particular function in human survival. Although functionalism no longer exists as a school of psychology, its basic principles have been absorbed into psychology and continue to influence it in many ways.

Contemporary Perspectives

Psychodynamic Perspective: Perhaps the psychological perspective that is most familiar to the public is the psychodynamic approach, which was initiated by Sigmund Freud (1856–1939) and modernized by his followers. The **Psychodynamic Perspective** is an *approach to understanding human behavior that focuses on early childhood experiences and the role of unconscious thoughts, feelings, and memories*. Freud believed that many of the problems that his patients experienced, including anxiety, depression, and sexual dysfunction, were the result of the effects of painful childhood experiences that the person could no longer remember. The terms psychoanalytic and psychodynamic have both been used to describe Freud's theory, however, **psychoanalytic** *refers specifically to Freud's original theory*. **Psychodynamic** *refers to all the theories derived from Freud's work*, and this approach continues to evolve today (Hansell, Ehrlich, Katz, Lerner, & Minter, 2008). Today's psychodynamic theory differs significantly from Freud's original idea, and consequently, we will use the term psychodynamic throughout the book. Theorists who contributed to the psychodynamic approach include: Carl Jung (1875–1961), Alfred Adler (1870–1937), Karen Horney (1855–1952), and Erik Erikson (1902–1994).

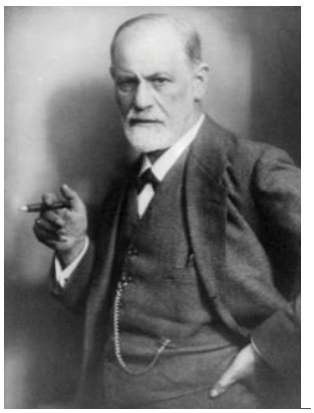


Figure 1.7

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

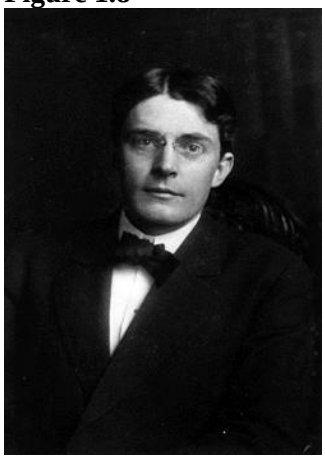
Source: Photo courtesy of Max Halberstadt,

Because the founders of the psychodynamic perspective were primarily practitioners who worked with individuals to help them with their psychological symptoms, they did not conduct much research on their ideas. Later, more sophisticated tests of their theories have not supported many of their ideas. For example, cognitive psychology explains how many of the processes involved in memory are "behind the scenes in the cognitive unconscious" (Reisberg, 2016, p. 564). Even when our thinking is conscious, we are influenced by unconscious processing and guides that affect our thoughts. Personality is better explained by one's executive control, which corresponds to the individual's ability to balance urges and motivations and choose the appropriate course of action, and not a balance among one's id, ego, and superego as Freud indicated. Additionally, the psychosexual stages of development, the idea of sex and death driving behavior, and the significance of dreams have not been supported (Vazire, 2014).

The current psychodynamic perspective focuses on the importance of human development from birth on, and early child development is seen as critical for later adult functioning (Hansell et al., 2008). Parents and other "loved figures" are considered crucial role models for children, and children will develop mental models of how relationships work based on their personal experiences with family members. The psychodynamic theories of object relations and attachment focus on the child-caregiver relationship and assume that basic human motivation is for interpersonal connection. This idea that early childhood experiences are critical and the concept of therapy as a way of improving human lives, are both derived from current psychodynamic perspective and remain important to psychology (Moore & Fine, 1995).

Behavioral Perspective: Although they differed in approach, both structuralism and functionalism were essentially studies of the mind. The psychologists associated with behaviorism, on the other hand, were reacting in part to the difficulties psychologists encountered when they tried to use introspection to understand behavior. **Behaviorism** *is based on the premise that it is not possible to objectively study the mind, and therefore psychologists should limit their attention to the study of behavior itself*. Behaviorists believe that the human mind is a black box into which stimuli are sent and from which responses are received. They argue that there is no point in trying to determine what happens in the box because we can successfully predict behavior without knowing what happens inside the mind. Furthermore, behaviorists believe that it is possible to develop laws of learning that can explain all behaviors.

Figure 1.8



John Broadus Watson

http://en.wikipedia.org/wiki/John_B._Watson#mediaviewer/File:John_Broadus_Watson.JPGjpg

The first behaviorist was the American psychologist John B. Watson (1878–1958). Watson was influenced in large part by the work of the Russian physiologist Ivan Pavlov (1849–1936), who had discovered that dogs would salivate at the sound of a tone that had previously been associated with the presentation of food. Watson and the other behaviorists began to use these ideas to explain how *events that people and other organisms experienced in their environment,* called **stimuli,** could produce *specific behaviors* called **responses**. For instance, in Pavlov's research the stimulus, either the food or tone, would produce the response of salivation in the dogs.

In his research, Watson found that systematically exposing a child to fearful stimuli in the presence of objects that did not themselves elicit fear could lead the child to respond with a fearful behavior to the presence of the stimulus (Watson & Rayner, 1920; Beck, Levinson, & Irons, 2009). In the best known of his studies, an 8-month-old boy named Little Albert was used as the subject. Here is a summary of the findings:

> *The boy was placed in the middle of a room; a white laboratory rat was placed near him and he was allowed to play with it. The child showed no fear of the rat. In later trials, the researchers made a loud sound behind Albert's back by striking a steel bar with a hammer whenever the baby touched the rat. The child cried when he heard the noise. After several such pairings of the two stimuli, the child was again shown the rat. Now, however, he cried and tried to move away from the rat.*

In line with the behaviorist perspective, the boy had learned to associate the white rat with the loud noise, resulting in crying.

The most famous behaviorist was Burrhus Frederick (B. F.) Skinner (1904–1990), who expanded the principles of behaviorism and also brought them to the attention of the public at large. Skinner used the ideas of stimulus and response, along with the application of rewards or reinforcements, to train pigeons and other animals. Additionally, he used the general principles of behaviorism to develop theories about how best to teach children and how to create societies that were peaceful and productive (Skinner, 1957, 1968, 1972).

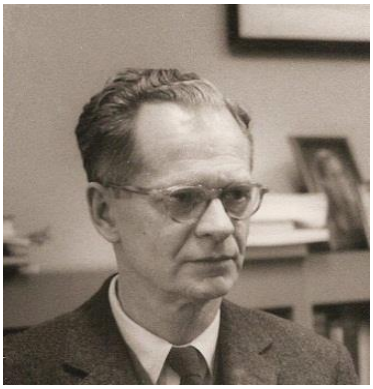


Figure 1.9
B. F. Skinner was a member of the behaviorist school of psychology. He argued that free will is an illusion and that all behavior is determined by environmental factors.
Source:

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

Humanistic Perspective: Another perspective which focuses on thinking and emotions is humanism**. Humanism** *embraces the concepts of self, self-esteem, self-actualization, and free will.* The humanistic perspective, popularized in the 1950s, was referred to as the "Third Force" in psychology (Moore, 1989). This perspective was seen as an alternative to the deterministic and pessimistic approach of the psychoanalytic perspective. The humanistic perspective believes that individuals possess personal choice and can rise above the unconscious desires suggested by Freud and his followers. Additionally, the humanistic perspective counters the blank slate belief and constraints imposed by the environment, as suggested by the behaviorist perspective.

Figure 1.10
Abraham Maslow Carl Rogers

Sources:
Maslow**https://www.flickr.com/photos/46950057@N00/2281515623/in/photolist**
Rogers **https://www.flickr.com/photos/18413451@N07/4374695574/in/photolist**

Unlike the psychoanalytic and behavioral perspectives, humanistic psychologists are more likely to talk about the self-concept. Humanists, such as Carl Rogers (1902-1987) and Abraham Maslow (1908-1970), believed that each individual strives to reach their full potential. Rogers and Maslow stressed **self-actualization**, which is "*the inherent tendency of an organism to develop all of its capacities in ways which serve to maintain or enhance the organism,"* (Rogers, 1959, p. 196). They also viewed individuals as basically trustworthy, possessing dignity and worth, and desiring to be in harmony with others.

Rogers developed person-centered, also known as client-centered, therapy which believes that clients should guide the direction of therapy as they are capable of choosing a healthy direction for their lives. The therapist should provide an empathic and nonjudgmental alliance and provide unconditional positive regard towards the client. Person-centered therapy will be discussed further in the chapter on treating psychological disorders. Maslow conceptualized personality in terms of a "Hierarchy of Needs". Shaped as a pyramid, the base consists of the lower level motivations, including those for hunger and thirst, while the higher level needs of self-esteem and eventually self-actualization occur at the top. Maslow's hierarchy of needs is further described in the chapter on personality.

The tenants of humanism are alive and well today in **positive psychology**, which emphasizes promoting mental health rather than just treating mental illness. Psychologists from this approach strive to understand the variables that promote resilience, self-acceptance, and personal growth. They also examine how social institutions and systems can foster such growth.

Biological Perspective: The **biological perspective** *focuses on the interaction between biology and emotions, thoughts, and behaviors.* According to Carlson (2013), scientists who study the importance of the biological perspective combine the understanding of physiology with the experimental methods of psychology. Such scientists, often called *neuroscientists*, believe that all thoughts, emotions, and behaviors have a physical basis. Neuroscientists study a variety of human processes including perceptions, eating, reproduction, sleeping, learning, memory, and

language. Additionally, neuroscientists focus on societal issues of addiction, neurological, and psychological disorders.

Some researchers from the biological perspective might examine the role of genes in influencing our personality, intelligence, or tendency to develop psychological disorders. For example, genes may be the source of anatomical, chemical or physiological defects, but may also cause a susceptibility to develop a variety of behavioral problems (Kolb & Whishaw, 2011). Some neuroscientists may focus on the functions of the nervous system, including the effects of neurotransmitters, brain trauma and disease on individual behavior. Others may compare different species to better understand human behavior. For example, sleep has very old evolutionary roots. Even simple animals such as fruit flies (Huber et al., 2005) and cockroaches (Tobler & Neuner-Jehle, 1992) display sleep-like behavior. Huber and colleagues also found that fruit flies display learning and memory deficits when deprived of sleep. Examining how other animals react to stimuli may provide insight into the human experience. However, using animals for research is a controversial topic and will be discussed further in the next chapter.

Cognitive Perspective and Cognitive Neuroscience: Science is always influenced by the technology that surrounds it, and psychology is no exception. Thus, it is no surprise that beginning in the 1960s, growing numbers of psychologists began to think about the brain and about human behavior in terms of the computer, which was being developed and becoming publicly available at that time. The analogy between the brain and the computer, although by no means perfect, provided part of the impetus for a new school of psychology called cognitive psychology. The **Cognitive perspective** *studies mental processes, including perception, thinking, memory, and judgment*. These actions correspond well to the processes that computers perform.

Figure 1.11
Cognitive psychologists, such as Jean Piaget, worked to understand how people learn, remember, and make judgments about the world around them.
Source

Although cognitive psychology began in earnest in the 1960s, earlier psychologists had also taken a cognitive orientation. Some of the important contributors to cognitive psychology include the German psychologist Hermann Ebbinghaus (1850–1909), who studied the ability of people to remember lists of words under different conditions, and the English psychologist Sir Frederic Bartlett (1886–1969), who studied the cognitive and social processes of remembering. Bartlett created short stories that were in some ways logical but also contained some very unusual and unexpected events. Bartlett discovered that people found it very difficult to recall the stories exactly, even after being allowed to study them repeatedly, and he hypothesized that the stories were difficult to remember because they did not fit the participants' expectations about how stories should go. The idea that our memory is influenced by what we already know was also a major idea behind the cognitive-developmental stage model of Swiss psychologist Jean Piaget (1896–1980).

With its argument that our thinking has a powerful influence on behavior, the cognitive approach provides a distinct alternative to behaviorism. These psychologists contend that people interpret, as well as, respond to the stimuli they experience. It is essential to take the mind into account to fully understand the actions of humans in response to environmental stimuli. For instance, when a boy turns to a girl on a date and says, "You are so beautiful," a behaviorist would probably see that as a reinforcing (positive) stimulus. Yet, the girl might not be so easily fooled. She might try to understand why the boy is making this statement at this particular time, and wonder if he might be attempting to influence her through the comment. Cognitive psychologists maintain that when we take into consideration how stimuli are evaluated and interpreted, we understand behavior more deeply.

As previously noted, one model of information processing used by early cognitive theorists was the computer. **Information-processing theory** *describes the human mind as receiving input, processing theinformation based on programs, or schemas, and using the results of this processing to produce output*. For example, someone asks you a question in Spanish. If you have a program for that language, you process the question and respond. If you only have a program for English, the input is not useful. Psychologists now recognize that the human brain is much more complex than a computer.

Cognitive psychology remains enormously influential today, and it has guided research in such varied fields as language, problem solving, memory, intelligence, education, human development, social psychology, and psychotherapy. The cognitive revolution has been given even more life over the past decade as the result of recent advances in our ability to see the brain in action using neuroimaging techniques. **Neuroimaging** is *the use of various techniques to provide pictures of the structure and function of the living brain* (Ilardi & Feldman, 2001). These images are used to diagnose brain disease and injury, but they also allow researchers to view information processing as it occurs in the brain, because the processing causes the involved area of the brain to increase metabolism and show up on the scan. We will discuss the use of neuroimaging techniques in many areas of psychology in the chapters to follow.

Evolutinary Perspective: The work of the early functionalists developed into the field of **evolutionary psychology**, *a branch of psychology that applies the Darwinian theory of natural selection to human and animal behavior* (Dennett, 1995; Tooby & Cosmides, 1992). Evolutionary psychology accepts the functionalists' basic assumption, namely that many human psychological systems, including memory, emotion, and personality, serve key adaptive functions. As we will see in the chapters to come, evolutionary psychologists use evolutionary theory to understand many different behaviors including romantic attraction, stereotypes and prejudice, and even the causes of some psychological disorders.

A key component of the ideas of evolutionary psychology is **fitness,** which refers to *the extent that having a given characteristic helps the individual organism survive and reproduce at a higher rate than do other members of the species who do not have the characteristic*. Fitter organisms pass on their genes more successfully to later generations, making the characteristics that produce fitness more likely to become part of the organism's nature than characteristics that do not produce fitness. For example, it has been argued that the emotion of jealousy has survived over time in men because men who experience jealousy are more likely to pass on the genes for

that jealousy than men who do not get jealous. According to this idea, the experience of jealously leads men to be more likely to protect their mates and guard against rivals, which increases their reproductive success (Buss, 2000).

Despite its importance in psychological theorizing, evolutionary psychology also has some limitations. One problem is that many of its predictions are extremely difficult to test. Unlike the fossils that are used to learn about the physical evolution of species, we cannot know which psychological characteristics our ancestors possessed or did not possess; we can only make guesses about this. Because it is difficult to directly test evolutionary theories, it is always possible that the explanations we apply are made up after the fact to account for observed data (Gould & Lewontin, 1979). Nevertheless, the evolutionary approach is important to psychology because it provides logical explanations for why we have many psychological characteristics.

Most psychologists use the theory of evolution to explain the existence of our species. They rely on the theory to explain the foundation for motivation, emotion, instincts, reflexes, language, and other psychological traits. For example, learning theorists use reflexes to explain the development of phobias. Psychoanalytic theorists use sexual motivation to explain art and music. Evolutionary theory also provides the rationale for doing psychological research on species which share a similar genetic background.

Social-Cultural Perspective: A final perspective, which has had substantial impact on psychology, can be broadly referred to as the **social-cultural or sociocultural perspective**, which is *the study of how the social situations and the cultures in which people find themselves influence thinking and behavior*. Social-cultural psychologists are particularly concerned with how people perceive themselves and others, and how people influence each other's behavior. For instance, social psychologists have found that we are attracted to others who are similar to us in terms of attitudes and interests (Byrne, 1969), that we develop our own beliefs and attitudes by comparing our opinions to those of others (Festinger, 1954), and that we frequently change our beliefs and behaviors to be similar to those of the people we care about, a process known as conformity.

Figure 1.12
In Western cultures norms promote a focus on the self, or individualism, whereas in Eastern cultures the focus is more on families and social groups, or collectivism.©Thinkstock

An important aspect of social-cultural psychology are **social norms** defined as *the ways of thinking, feeling, or behaving that are shared by group members and perceived by them as appropriate* (Asch, 1952; Cialdini, 1993). Norms include customs, traditions, standards, and rules, as well as the general values of the group. Many of the most important social norms are determined by the culture in which we live, and these cultures are studied by cross-cultural psychologists. A **culture** represents *the common set of social norms,*

including religious and family values and other moral beliefs, shared by the people who live in a geographical region (Fiske, Kitayama, Markus, & Nisbett, 1998; Markus, Kitayama, & Heiman, 1996; Matsumoto, 2001). This definition can be extended to include people whose origins are from that region as well.

Cultures influence every aspect of our lives, and it is not inappropriate to say that our culture defines our lives just as much as does our evolutionary experience (Mesoudi, 2009). Psychologists have found that there is a fundamental difference in social norms between Western cultures, including those in the United States, Canada, Western Europe, Australia, and New Zealand, and East Asian cultures, including those in China, Japan, Taiwan, Korea, India, and Southeast Asia. Norms in Western cultures are primarily oriented toward **individualism**, *which is about valuing the self and one's independence from others.* Children in Western cultures are taught to develop and to value a sense of their personal self, and to see themselves in large part as separate from the other people around them. Children in Western cultures feel special about themselves; they enjoy getting gold stars on their projects and the best grade in the class. Adults in Western cultures are oriented toward promoting their own individual success, frequently in comparison to, or even at the expense of, others.

Figure 1.13

Norms in the East Asian culture, on the other hand, are *oriented toward interdependence* or **collectivism**. In these cultures, children are taught to focus on developing harmonious social relationships with others. The predominant norms relate to group togetherness and connectedness, and duty and responsibility to one's family and other groups. When asked to describe themselves, the members of East Asian cultures are more likely than those from Western cultures to indicate that they are particularly concerned about the interests of others, including their close friends and their colleagues.

Another important cultural difference is the extent to which people in different cultures are bound by social norms and customs, rather than being free to express their own individuality without considering social norms (Chan, Gelfand, Triandis, & Tzeng, 1996). Cultures also differ in terms of personal space, such as how closely individuals stand to each other when talking, as well as the communication styles they employ.

It is important to be aware of cultures and cultural differences because people with different cultural backgrounds increasingly interact with each other due to increased travel and immigration, the development of the Internet, and other forms of communication. In the United States, for instance, there are many different ethnic groups, and the proportion of the population that comes from minority groups is increasing from year to year. The social-cultural perspective to understanding behavior reminds us again of the difficulty of making broad generalizations about human nature. People experience things differently, and their experience vary depending on their culture.

The Women of Psychology

Although most of the earliest psychologists were men, women also studied psychology, but often faced discrimantion based on their sex. For example, they were not able to receive degress they earned because the institutions were unwilling to grant them. They often taught at all women's colleges and did not have access to graduate students or laboratories (Crawford, 2012). Despite this discrimination, many female psychologists still made important theoretical and research contributions to the field. For example, the first female president of the American Psychological Association (APA) in 1905 was Mary Whiton Calkins (1863–1930). Calkins made significant contributions to the study of memory and the self-concept, despite having her degree withheld from Harvard University.

Figure 1.14 Mary Whiton Calkins

Calkins photo courtesy of Vlad Sfichi, http://www.flickr.com/photos/2411080_0@N08/2779490726.

Margaret Floy Washburn (1871-1939) was the first women to earn a doctorate in psychology from Cornell University and she was the second female president of APA in 1921. Her research focused on animal behavior, and she wrote *The Animal Mind* in 1908, which for the next 25 years, was the standard text for comparative psychology (Stewart, 2008). Leta Stetter Hollingworth (1886-1939) focused her research on women and child development. Hollingworth's research disproved the prevailing belief at the time that female abilities were inferior to those of males, and that female abilities declined during menstruation. Anna Freud (1895-1982), the daughter of Sigmund Freud, developed the basic concepts in the theoretical and practical approach to child psychoanalysis.

There are many important recent female psychologists that we will be discussing in this book. Karen Horney (1885-1952) founded a neoFreudian school of psychoanalysis and focused on the social and cultural factors that affect personality (Stewart, 2008). Mamie Phipps Clark (1917-1983) was a prominent African American psychologist who was instrumental in the Brown versus Board of Education case of Topeka, Kansas. Working with her husband, she demonstrated that black children often preferred white dolls over black dolls because they viewed white as good and pretty. The Clarks demonstrated that feeling inferior resulted in academic underachievement for black children. In the field of memory, Elizabeth Loftus (1944-present) made ground breaking research regarding eye witness testimony (Hock, 2009). She exposed the bias that individuals demonstrate when they attempt to recall events, and she showed how easy it was for people to create false memories. Using the strange situation technique developed with a colleague, Mary Ainsworth (1913-1999) demonstrated the types of attachment toddlers had with their caregivers, and Diana Baumrind (1927-present) researched parenting styles.

Since the early years in psychology, females have studied psychology and currently they earn more bachelor's (76.7% overall) and doctorate (73.5% overall) degress in psychology than males (National Science Foundation, 2017).

Figure 1.15 presents a timeline of some of the most important psychologists, beginning with the early Greek philosophers and extending to the present day. Although it cannot capture every important psychologist, this timeline shows some of the most important contributors to the history of psychology.

Figure 1.15 Timeline Showing Some of the Most Important Psychologists

Date	Psychologist(s)	Description
428–347 BC	Plato	Greek philosopher who argued for the role of nature in psychological development.
384–322 BC	Aristotle	Greek philosopher who argued for the role of nurture in psychological development.
1588–1679	Thomas Hobbes	English philosopher.
1596–1650	René Descartes	French philosopher.
1632–1704	John Locke	English philosopher.
1712–1778	Jean-Jacques Rousseau	French philosopher.
1801–1887	Gustav Fechner	German experimental psychologist who developed the idea of the just noticeable difference (JND), which is considered to be the first empirical psychological measurement.
1809–1882	Charles Darwin	British naturalist whose theory of natural selection influenced the functionalist school and the field of evolutionary psychology.
1832–1920	Wilhelm Wundt	German psychologist who opened one of the first psychology laboratories and helped develop the field of structuralism.
1842–1910	William James	American psychologist who opened one of the first psychology laboratories and helped develop the field of functionalism.
1849–1936	Ivan Pavlov	Russian physiologist whose experiments on learning led to the principles of classical conditioning.
1850–1909	Hermann Ebbinghaus	German psychologist who studied the ability of people to remember lists of nonsense syllables under different conditions.
1856–1939	Sigmund Freud	Austrian psychologist who founded the field of psychodynamic psychology.
1867–1927	Edward Bradford Titchener	American psychologist who contributed to the field of structuralism.
1878–1958	John B. Watson	American psychologist who contributed to the field of behaviorism.
1886–1969	Sir Frederic Bartlett	British psychologist who studied the cognitive and social processes of remembering.
1896–1980	Jean Piaget	Swiss psychologist who developed an important theory of cognitive development in children.
1904–1990	B. F. Skinner	American psychologist who contributed to the school of behaviorism.
1926–1993	Donald Broadbent	British cognitive psychologist who was a pioneer in the study of attention.
20th and 21st centuries	Linda Bartoshuk; Daniel Kahneman; Elizabeth Loftus; George Miller	American psychologists who contributed to the cognitive school of psychology by studying learning, memory, and judgment. An important contribution is the advancement of the field of neuroscience. Daniel Kahneman won the Nobel Prize in Economics for his work on psychological decision making.
20th and 21st centuries	Mahzarin Banaji; Marilynn Brewer; Susan Fiske; Fritz Heider; Kurt Lewin; Stanley Schachter; Claude Steele; Harry Triandis	American psychologists who contributed to the social-cultural school of psychology. Their contributions have included an understanding of how people develop and are influenced by social norms.

The Many Disciplines of Psychology

Psychology is not one discipline, but rather a collection of many sub disciplines that all share at least some common approaches and that work together and exchange knowledge to form a coherent discipline (Yang & Chiu, 2009). Because the field of psychology is so broad, students may wonder which areas are most suitable for their interests and which types of careers might be available to them. Table 1.3 will help you consider the answers to these questions. A **psychologist** *has generally been trained to understand research and earned a doctoral degree in psychology (Ph.D. or Psy.D)* Psychologists who do testing and therapy are usually licensed by the state.

Psychology, psychiatry, counseling, and social work are related disciplines. These disciplines may share research and sometimes work as members of a team. **Psychiatrists** *go to medical school to earn an MD and then receive special training in how to treat mental illness.* Like other physicians, they frequently prescribe medication or use other physiological tests and treatments.

Social workers and counselors generally have at least a master's degree. They generally work for institutions or agencies. Some practice independently and specialize in treating a specific type of problem (e.g. substance abuse or family problems).

Table 1.3 Some Career Paths in Psychology

Psychology field	Description	Career opportunities
Biopsychology and neuroscience	This field examines the physiological bases of behavior in animals and humans by studying the functioning of different brain areas and the effects of hormones and neurotransmitters on behavior.	Most biopsychologists work in research settings, for instance, at universities, for the federal government, and in private research labs.
Clinical and counseling psychology	These are the largest fields of psychology. The focus is on the assessment, diagnosis, causes, and treatment of mental disorders.	Clinical and counseling psychologists provide therapy to patients with the goal of improving their life experiences. They work in hospitals, schools, social agencies, and in private practice. Because the demand for this career is high, entry to academic programs is highly competitive.
Cognitive psychology	This field uses sophisticated research methods, including reaction time and brain imaging to study memory, language, and thinking.	Cognitive psychologists work primarily in research settings, although some, including those who specialize in human-computer interactions, consult for businesses.
Developmental psychology	These psychologists conduct research on the cognitive, emotional, and social changes that occur across the lifespan.	Many work in research settings, although others work in schools and community agencies to help improve and evaluate the effectiveness of intervention programs such as Head Start.

Psychological field	Description	Career Opportunities
Forensic psychology	Forensic psychologists apply psychological principles to understand the behavior of judges, attorneys, courtroom juries, and others in the criminal justice system.	Forensic psychologists work in the criminal justice system. They may testify in court and provide information about the reliability of eyewitness testimony and jury selection.
Health psychology	Health psychologists are concerned with understanding how biology, behavior, and the social situation influence health and illness.	Health psychologists work with medical professionals in clinical settings to promote better health, conduct research, and teach at universities.
Community psychology	These psychologist study how individuals relate to their community, and the reciprocal effect of communities on individuals.	Community psychologist focus on how community members might share a particular mental disorder or social problem that affects the community as a whole.
Industrial-organizational (I/O) and environmental psychology	Industrial-organizational psychology applies psychology to the workplace with the goal of improving the performance and well-being of employees.	There are a wide variety of career opportunities working in businesses. These psychologists help select employees, evaluate employee performance, and examine the effects of different working conditions on behavior. They may also work to design equipment and environments that improve employee performance and reduce accidents.
Personality psychology	These psychologists study people and the differences among them. The goal is to develop theories that explain the psychological processes of individuals, and to focus on individual differences.	Most work in academic settings, but the skills of personality psychologists are also in demand in advertising and marketing. PhD programs in personality psychology are often connected with programs in social psychology.
School and educational psychology	This field studies how people learn in school, the effectiveness of school programs, and the psychology of teaching.	School psychologists work in elementary and secondary schools or school district offices with students, teachers, parents, and administrators. They may assess children's psychological and learning problems and develop programs to minimize the impact of these problems.
Social and cross-cultural psychology	This field examines people's interactions with other people. Topics of study include conformity, group behavior, leadership, attitudes, and person perception.	Many social psychologists work in marketing, advertising, organizational, systems design, and other applied psychology fields.
Sports psychology	This field studies the psychological aspects of sports behavior. The goal is to understand the factors that influence performance in sports, including exercise and team interactions.	Sports psychologists work in gyms, schools, professional sports teams, and other areas where sports are practiced.

Psychology in Everyday Life: How to Effectively Learn and Remember

One way that the findings of psychological research may be particularly helpful to you is in terms of improving your learning and study skills. Psychological research has provided a substantial amount of knowledge about the principles of learning and memory. This information can help you do better in this and other courses, and can also help you to improve your learning of new concepts and techniques in other areas of your life.

The most important thing you can learn in college is how to become more efficient at studying, learning, and remembering. These skills will help you throughout your life, as you learn new jobs and take on other responsibilities. There are substantial individual differences in learning and memory, such that some people learn faster than others. However, even if it takes you longer to learn, the extra time you put into studying is well worth the effort. Learning to effectively study and to remember information is just like learning any other skill, such as playing a sport or a video game.

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

Psychologists have studied the ways that best allow people to acquire new information, to retain it over time, and to retrieve information that has been stored in our memories. One important finding is that learning is an active process. To acquire information most effectively, we must actively manipulate it. One active approach is **rehearsal**, *which is repeating the information that is to be learned over-and-over again.*

Although simple repetition does help us learn, psychological research has found that we acquire information most effectively with **elaboration,** which is when we actively think about its meaning and relate the material to something we already know. If you want to remember the different persepectives of psychology, for instance, try to think about how each of the perspectives is different from the others. As you make the comparisons, determine what is most important about each one and then relate it to the features of the other perspectives. In an important study showing the effectiveness of elaborative encoding, Rogers, Kuiper, and Kirker (1977) found that students learned information best when they related it to aspects of themselves, a phenomenon known as the self-reference effect. This research suggests that imagining how the material relates to your own interests and goals will help you learn it.

An approach known as the **method of loci** *involves linking each of the pieces of information that you need to remember to places with which you are familiar*. You might think about the house that you grew up in and the rooms in it. Then you could put the behaviorists in the bedroom, the humanists in the living room, and the social-culturists in the kitchen. Then when you need to

remember the information, you retrieve the mental image of your house and should be able to see the theorists in each of the areas.

One of the most fundamental principles of memory is known as the **spacing effect or distributed practice**, *which is studying material in several shorter study periods, rather than just once for a long period-of-time.* Both humans and animals more easily remember and learn material when they study the material over several shorter periods. Cramming for an exam is a particularly ineffective way to learn.

Psychologists have also found that performance is improved when people set difficult, yet realistic goals for themselves (Locke & Latham, 2006). You can use these goals to help you learn. For example, set realistic goals for the time you are going to spend studying and what you are going to learn, and try to stick to those goals. Do a small amount every day, and by the end of the week you should have accomplished your goals.

When studying for a test, do not just go over your notes again and again. Instead, make a list of questions you think will be on the test and then see if you can answer them. Study the information, and then test yourself again after a few minutes. If you made any mistakes, study again and keep testing yourself until you are successful. Testing yourself by attempting to retrieve information in an active manner is better than simply studying the material, because it will help you determine if you know it.

In summary, everyone can learn more efficiently. Learning is an important skill, and following the previously mentioned ideas, will likely help you improve your memory.

Key Takeaways

- Some basic questions asked by psychologists include those about nature versus nurture, free will versus determinism, conscious versus unconscious processing, differences versus similarities, and accuracy versus inaccuracy.
- The first psychologists were philosophers, but the field became more empirical and objective as more sophisticated scientific approaches were developed and employed.
- The structuralists attempted to analyze the nature of consciousness using introspection.
- The functionalists based their ideas on the work of Darwin, and their approaches led to the field of evolutionary psychology.
- Psychodynamic perspective focuses on unconscious drives and the potential to improve lives through psychoanalysis and psychotherapy.
- The behaviorists explained behavior in terms of stimulus, response, and reinforcement, while denying the presence of free will.
- Humanism examines the self-concept and free will.
- The biological perspective focuses on the role of physiological processes on behavior and thought.
- The cognitive perspective studies how people perceive, process, and remember information.

- The evolutionary perspective examines human behavior and mental processes in terms of their adaptive value for our survival.
- The social-cultural perspective focuses on the social situation, including how cultures and social norms influence our behavior.
- Women have played an active role in the history of psychology, but often did not receive the recognition they deserved.
- Psychiatry, counseling, and social work are professions related to psychology.

Exercises and Critical Thinking

- What type of questions can psychologists answer that philosophers might not be able to answer as completely or as accurately? Explain why you think psychologists can answer these questions better than philosophers can.
- Choose one of the major questions of psychology and provide some evidence from your own experience that supports one side or the other.
- Choose two of the perspectives of psychology discussed in this section, and explain how they differ in their approaches to understanding behavior and mental processes.

Activities

You can learn more about the different fields of psychology and the careers associated with them at http://www.apa.org/careers/psyccareers/

Chapter Summary

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

Employing the scientific method allows psychologists to objectively and systematically study human behavior.

Psychological phenomena are complex, and making predictions about them is difficult because there are many factors that influence humans. Research has found that people are frequently unaware of the causes of their own behaviors.

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

The first psychologists were philosophers, but the field became more objective as more sophisticated scientific approaches were developed and employed. Some of the most important historical schools of psychology include: Structuralism and functionalism. Contemporary perspectives include: Psychodynamic, behavioral, humanistic, biological, cognitive, evolutionary, and social-cultural.

Women have played an active role in the history of psychology, but often did not receive the recognition they deserved.

Psychiatry, counseling, and social work are disciplines related to psychology. Psychologists generally have a Ph.D. or Psy.D. Psychiatrists are physicians with an MD. Counselors and social workers usually have a master's degree and may treat clients with specific problems.

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

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Chapter 2 Psychological Science

Learning Objective

1. Differentiate between basic and applied research.

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

Basic vs. Applied Research

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

Figure 2.1

Source: https://www.flickr.com/help/photos/#2265887

Basic research and applied research complement each other, and advances in science occur more rapidly when each type of research is conducted (Lewin, 1999). For instance, research concerning the role of practice on memory for lists of words is basic in orientation, but the

results could potentially be applied to help children learn to read. Correspondingly, psychologist-practitioners who wish to reduce the spread of AIDS frequently base their programs on the findings of basic research. This basic AIDS research is applied to help change people's attitudes and behaviors.

The results of psychological research are reported primarily in research articles published in scientific journals. *The research reported in scientific journals has been evaluated, critiqued, and improved by scientists in the field through the process of* **peer review**. In this book, there are many citations to original research articles, and you are e ncouraged to read those reports when you find a topic interesting. Most of these papers are readily available online through our college library. It is only by reading the original reports that you will see how the research process works.

In this chapter, you will learn how psychologists develop and test their research ideas, how they measure the thoughts, feelings, and behavior of individuals, and how they analyze and interpret the data they collect. To understand psychology, you must understand how and why the research you are reading about was conducted and what the collected data mean. Learning about the principles and practices of psychological research will allow you to critically read, interpret, and evaluate research.

In addition to helping you learn the material in this course, the ability to interpret and conduct research is also useful in many of the careers that you might choose. For instance, advertising and marketing researchers study how to make advertising more effective. Health and medical researchers study how behaviors, such as drug use and smoking, influence illness. Computer scientists study how people interact with computers. Furthermore, even if you are not planning a career as a researcher, jobs in almost any area of social, medical, or mental health science require that a worker be informed about psychological research.

Psychologists Use the Scientific Method to Guide Their Research

Learning Objectives

1. Describe the principles of the scientific method and explain its importance in conducting and interpreting research.
2. Explain what is meant by a research hypothesis.
3. Discuss the procedures that researchers use to ensure that their research with humans and with animals is ethical.

Psychologists are not the only people who seek to understand human behavior and solve social problems. Philosophers, religious leaders, politicians and others also strive to provide explanations for human behavior. But psychologists believe that research is the best tool for understanding human beings and their relationships with others. Rather than accepting the claim of a philosopher that people have free will, a psychologist would collect data to empirically test whether people are able to actively control their own behavior. Rather than accepting a politician's contention that creating a new center for mental health will improve the lives of

individuals, a psychologist would empirically assess the effects of receiving mental health treatment on the quality of life of the recipients. The statements made by psychologists are **empirical**, which means they are *based on systematic collection and analysis of data*.

The Scientific Method

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

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

Most research is designed to repeat, add to, or modify previous research findings. The scientific method, therefore, results in the accumulation and continuous refinement or revision of scientific knowledge.

Laws and Theories as Organizing Principles

One goal of research is to organize information into meaningful statements that can be applied in many situations. *Principles that are so general as to apply to all situations in a given domain of inquiry* are known as **laws.**

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

Good theories have four important characteristics. First, good theories are **general,** meaning they *summarize many different outcomes*. Second, they are **parsimonious**, meaning *they provide the simplest possible account of those outcomes*. The stage theory of cognitive development meets

both of these requirements. It can account for developmental changes in behavior across a wide variety of domains, and it does so parsimoniously by hypothesizing a simple set of cognitive stages. Third, good theories are **generative,** that is they *provide ideas for future research.* The stage theory of cognitive development has been applied not only to learning about cognitive skills, but also to the study of children's moral (Kohlberg, 1966) and gender development (Ruble & Martin, 1998).

Finally, good theories are **falsifiable,** which means *the variables of interest can be adequately measured and the predicted relationships between the variables can be shown through research to be incorrect* (Popper, 1959). The stage theory of cognitive development is falsifiable because the stages of cognitive reasoning can be measured. Additionally, if research discovers that children learn new tasks before the theory says they should, then the theory will be shown to be incorrect. Research can lead to new theories, but most psychologists use existing theories and develop hypotheses that match the theory they are using.

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

The Research Hypothesis

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

The term **operational definition** refers to *a precise statement of how a variable is measured or manipulated by the researcher.* For example, depression might be operationally defined by the score on a checklist, or intelligence might be operationally defined as the results of an IQ test. When an operational definition is used, then everyone knows precisely what a researcher means by an otherwise vague term like depression or intelligence.

Table 2.1 lists some potential operational definitions of variables that have been used in psychological research. As you read through this list, note that the variables are very specific. This specificity is important for two reasons. First, more specific definitions mean that there is less danger that the collected data will be misunderstood by others. Second, specific definitions will enable future researchers to replicate the research.

Table 2.1 Examples of the Operational Definitions of Conceptual Variables That Have Been Used in Psychological Research

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

Conducting Ethical Research

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

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

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

Characteristics of an Ethical Research Project Using Human Participants

This list presents some of the most important factors that psychologists take into consideration when designing their research:

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

American Psychological Association Code of Ethics

No Harm is he most direct ethical concern of the researcher and *prevents harm to the research participants*. One example that potentially violated this principle is the well-known research of Stanley Milgram (1974), who investigated obedience to authority. In his studies, participants were instructed by an experimenter to administer electric shocks to another person so that Milgram could study the extent to which they would obey the demands of an authority figure. Although no shocks were actually administered, the participants thought they had, and as a result, evidenced high levels of stress. They also experienced psychological conflict between following the experiemnter's instructions to deliver the shocks and what they wanted to do, which was not to administer the shocks. Studies, such as those by Milgram, are no longer conducted because the scientific community is more sensitized to the potential of such procedures creating emotional discomfort or harm.

Informed consent is *conducted before a participant begins a research session, and is designed to explain the research procedures and inform the participant of his or her rights during the investigation*. The informed consent explains as much as possible about the true nature of the study, particularly everything that might be expected to influence willingness to participate, but it may in some cases withhold some information that allows the study to work.
A goal of ethical research is to guarantee that participants have free choice regarding whether they wish to participate in research. Students in psychology classes may be allowed, or even required, to participate in research, but they are also always given an option to choose a different

study to be in, or to perform other activities instead. Once an experiment begins, the research participant is always free to leave the experiment if he or she wishes to. Concerns with free choice also occur in institutional settings, such as in schools, hospitals, corporations, and prisons, when individuals are required by the institutions to take certain tests, or when employees are told or asked to participate in research.

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

Deception *occurs whenever research participants are not completely and fully informed about the nature of the research project before participating in it*. This is perhaps the most widespread ethical concern to the participants in behavioral research. Deception may occur in an active way, such as when the researcher tells the participants that a study is about learning when in fact the experiment really measures obedience to authority. In other cases, the deception is more passive, such as when participants are not told about the hypothesis being studied or the potential use of the data being collected.

Some researchers have argued that no deception should ever be used in any research (Baumrind, 1985). They argue that participants should always be told the complete truth about the nature of the research they are in, and that when participants are deceived there will be negative consequences, such as the possibility that participants may arrive at other studies already expecting to be deceived. Other psychologists defend the use of deception on the grounds that it is needed to get participants to act naturally and to enable the study of psychological phenomena that might not otherwise get investigated. They argue that it would be impossible to study topics such as altruism, aggression, obedience, and stereotyping without using deception because if participants were informed ahead of time what the study involved, this knowledge would certainly change their behavior. The codes of ethics of the American Psychological Association and other organizations allow researchers to use deception, but these codes also require them to explicitly consider how their research might be conducted without the use of deception.

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

Ensuring That Research Is Ethical

Making decisions about the ethics of research involves weighing the costs and benefits of conducting versus not conducting a given research project (Rosenthal, 1994). The costs involve potential harm to the research participants and to the field, whereas the benefits include the

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

One example of this risk-benefit analysis can be found in clinical drug trials. Researchers must weigh the potential good of a new drug against the possible harm. Few drugs are without side effects, and the drugs used to treat mental illness are no exception. However, for a severely depressed patient who has not responded to approved forms of treatment, the side effects of a new drug must be weighed against the likelihood of prolonged suffering and the risk of suicide.

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

Research with Animals

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

APA Guidelines on Humane Care and Use of Animals in Research

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

- Psychologists acquire, care for, use, and dispose of animals in compliance with current federal, state, and local laws and regulations, and with professional standards.
  Psychologists trained in research methods and experienced in the care of laboratory animals supervise all procedures involving animals and are responsible for ensuring appropriate consideration of their comfort, health, and humane treatment.
- Psychologists ensure that all individuals under their supervision who are using animals have received instruction in research methods and in the care, maintenance, and handling of the species being used, to the extent appropriate to their role.

- Psychologists make reasonable efforts to minimize the discomfort, infection, illness, and pain of animal subjects.
- Psychologists use a procedure subjecting animals to pain, stress, or privation only when an alternative procedure is unavailable and the goal is justified by its prospective scientific, educational, or applied value.
- Psychologists perform surgical procedures under appropriate anesthesia and follow techniques to avoid infection and minimize pain during and after surgery.
- When it is appropriate that an animal's life be terminated, psychologists proceed rapidly, with an effort to minimize pain and in accordance with accepted procedures. (American Psychological Association, 2012)

Figure 2.2

Psychologists may use animals in their research, but they make reasonable efforts to minimize the discomfort the animals experience.© Thinkstock

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

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

Key Takeaways

- Psychologists use the scientific method to generate, accumulate, and report scientific knowledge.
- Basic research, which answers questions about behavior, and applied research, which finds solutions to everyday problems, inform each other and work together to advance science.
  Research reports describing scientific studies are published in scientific journals so that other scientists and laypersons may review the empirical findings.
- Organizing principles, including laws, theories and research hypotheses, give structure and uniformity to scientific methods.
- Concerns for conducting ethical research are paramount. Researchers assure that participants are given free choice to participate and that their privacy is protected. Informed consent and debriefing help provide humane treatment of participants.

- A cost-benefit analysis is used to determine what research should and should not be allowed to proceed.

Exercises and Critical Thinking

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

Psychologists Use Descriptive, Correlational, and Experimental Research Designs to Understand Behavior

Learning Objectives

1. Differentiate between the goals of descriptive, correlational, and experimental research designs and explain the advantages and disadvantages of each.
2. Explain how descriptive research is conducted.
3. Summarize the uses of correlational research and describe the difference between correlation and causation.
4. Review the procedures of experimental research and explain how it can be used to draw causal inferences.
5. Define representative sample, independent variable, dependent variable.

Psychologists agree that if their ideas and theories about human behavior are to be taken seriously, they must be supported by data. However, the research of different psychologists is designed with different goals in mind, and the different goals require different approaches. These varying approaches, summarized in Table 2.2, are known as **research designs,** *which are the specific methods a researcher uses to collect, analyze, and interpret data*. Psychologists use three major types of research designs in their research, and each provides an essential avenue for scientific investigation. **Descriptive research** is *research that observes specific behaviors and records the observation.* **Correlational research** is *research designed to discover relationships among variables and to allow the prediction of future events from present knowledge*. **Experimental research** is *research in which initial equivalence among research participants in more than one group is created, followed by a manipulation of a given experience for these groups and a measurement of the influence of the manipulation*. Each of the three research designs varies according to its strengths and limitations.

Table 2.2 Characteristics of the Three Research Designs

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

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

Descriptive Research

Descriptive research is designed to create a snapshot of the current thoughts, feelings, or behavior of individuals. This section reviews three types of descriptive research: Case studies, surveys, and observations.

Case Study: Sometimes the data in a descriptive research project are based on only a small set of individuals, often only one person or a single small group. These research designs are known as **case studies** or *descriptive records of one or more individual's experiences and behavior*. Sometimes case studies involve ordinary individuals. Developmental psychologist Jean Piaget observed his own children. More frequently, case studies are conducted on individuals who have unusual or abnormal experiences. The assumption is that by carefully studying these individuals, we can learn something about human nature.

A well-known case study is Phineas Gage, a man whose thoughts and emotions were extensively studied after a tamping iron was blasted through his skull in an accident. Although there is a question about the interpretation of this case study (Kotowicz, 2007), it did provide early evidence that the brain's frontal lobe is involved in emotion and morality (Damasio et al., 2005).

Survey: In other studies, the data from descriptive research projects come in the form of a **survey,** *questions administered through either an interview or a written questionnaire to get a picture of the beliefs or behaviors of a sample of people of interest*. The following categories are used for individuals involved in a survey:

Figure 2.3
Political polls reported in newspapers and on the Internet are descriptive research designs that provide snapshots of the likely voting behavior of a population. © Thinkstock

- **Population** *is all the people that the researcher wishes to know about*.
- **Sample** *is the people chosen from the population to participate in the research.*
- **Representative sample** *reflects the population on key variables such as gender, ethnicity, and socio-economic status, and it is necessary to draw valid conclusions about the population.*

In election polls, for instance, a sample is taken from the population of all "likely voters" in the upcoming elections. A representative sample of likely voters would include the same percentages of males, females, age groups, ethnic groups, and socio-economic groups as the larger population.

Observations: A final type of descriptive research is known as observation. When using **naturalistic observation**, *psychologists observe and record behavior that occurs in everyday settings*. For instance, a developmental psychologist might watch children on a playground and describe what they say to each other. **Laboratory observation** is *conducted in a setting created by the researcher*. This permits the researcher to control more aspects of the situation. One example of laboratory observation involves a systematic procedure known as the strange situation. This research is used to get a picture of how adults and young children interact.

Descriptive Statistics

The results of descriptive research projects are analyzed using **descriptive statistics**; that is, *numbers that summarize the distribution of scores on a measured variable*. Most variables have distributions where most of the scores are located near the center of the distribution and the distribution is symmetrical and bell-shaped. *A data distribution that is shaped liked a bell in known as a* **normal distribution**.

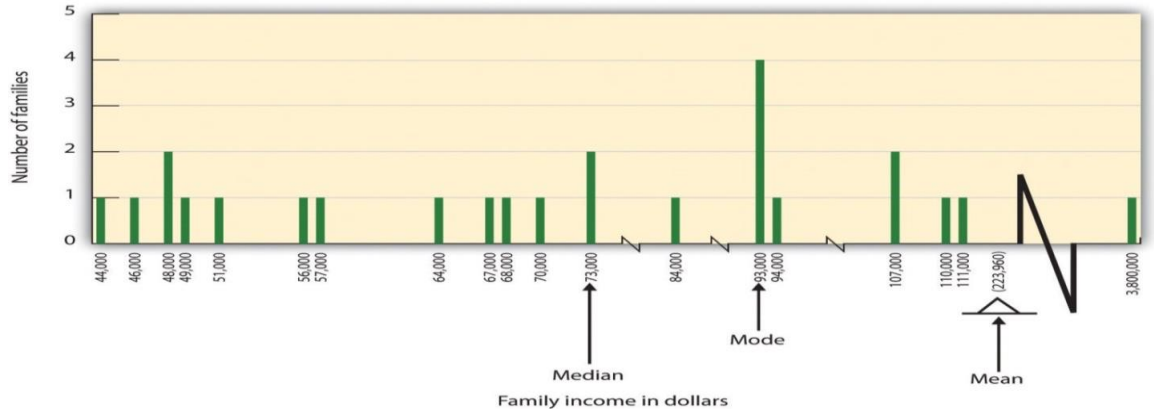
A distribution can be described in terms of its **central tendency**; that is, *the point in the distribution around which the data are centered*. There are three measures of central tendency. They include: The **mean** or *arithmetic average is the most commonly used measure of central tendency*. It is computed by calculating the sum of all the scores of the variable and dividing this sum by the number of participants in the distribution. In some cases, however, the data distribution is not symmetrical. This occurs when there are *one or more extreme scores, known as* **outliers**, at one end of the distribution. Consider, for instance, the variable of family income

(see Figure 2.4), which includes an outlier of $3,800,000. In this case the mean is not a good measure of central tendency. Although it appears from Figure 2.4 that the central tendency of the family income variable should be around $70,000, the mean family income is actually $223,960. The single very extreme income has a disproportionate impact on the mean, resulting in a value that does not well represent the central tendency of the data.

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

A final measure of central tendency, known as the **mode**, represents *the value that occurs most frequently in the distribution*. You can see from Figure 2.4, the mode for the family income variable is $93,000 as it occurs four times. In addition to summarizing the central tendency of a distribution, descriptive statistics convey information about how the scores of the variable are spread around the central tendency. The distribution of family incomes is likely to be nonsymmetrical because some incomes can be very large in comparison to most incomes. In this case the median or the mode is a better indicator of central tendency than is the mean.

Figure 2.4 Family Income Distribution



Dispersion *refers to the extent to which the scores are all tightly clustered around the central tendency*. Figures 2.5 and 2.6 demonstrate the dispersion of scores. In Figure 2.5 the scores are clustered together indicating little dispersion or variation in the scores, while in Figure 2.6 the scores are spread out indicating greater dispersion or variation.

Figure 2.5

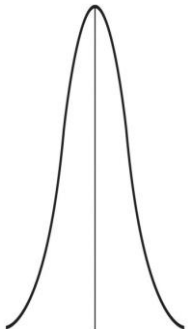


Figure 2.6

One simple measure of dispersion is to find the **range,** which is the *maximum observed score minus the minimum observed score*. However, the **standard deviation**, *which is the measure of the approximate average amount scores in a distribution deviate from the mean*, is the most commonly used measure of dispersion. Distributions with a larger standard deviation have more spread.

Advantages and Disadvantages of Descriptive Research

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

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

Correlational Research

In contrast to descriptive research, which is designed primarily to provide static pictures, **correlational research** *involves the measurement of two or more relevant variables and an assessment of the relationship among those variables.* For instance, the variables of height and weight are correlated because taller people generally weigh more than shorter people. In the same way, study time and memory errors are also correlated, because the more time a person is given to study a list of words, the fewer errors he or she will make.

When variables change in the same direction, the relationship is said to be a **positive correlation**. Examples of positive correlations include those between height and weight, education and income, and age and mathematical abilities in children. In each case, people who score higher on one of the variables also score higher on the other variable. In contrast, a **negative correlation** occurs when values for one variable change in the opposite direction for the other variable. Examples of negative correlations include those between the age of a child and the number of diapers the child uses, and between amount of time studying and the number of errors made on a test. In these cases, people who score higher on one of the variables score lower on the other variable.

One way of organizing the data from a correlational study with two variables is to graph the values of each of the measured variables using a **scatter plot,** *a visual image of the relationship between two variables.* As you can see in Figure 2.7, a point represents the intersection of a subject's scores for two variables. *When the association between the variables on the scatter plot can be easily approximated with a straight line*, as in parts (a) and (b) of Figure 2.7, *the variables are said to have a* **linear relationship.**

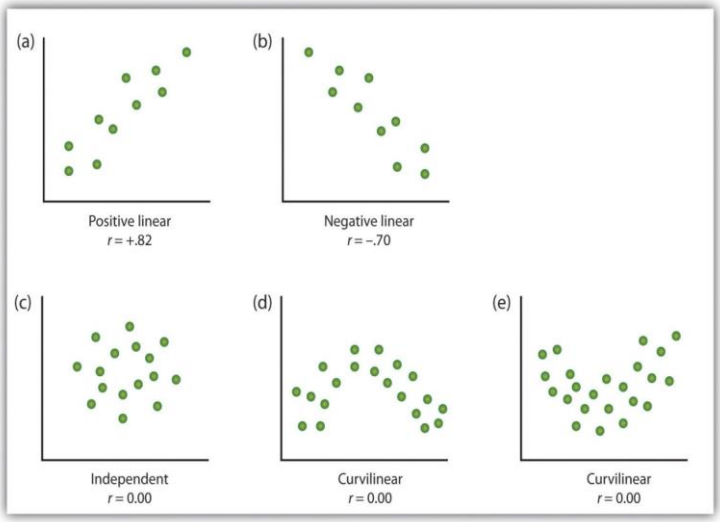


Figure 2.7 Examples of Scatter Plots
Some examples of relationships between two variables as shown in scatter plots. Note that the Pearson correlation coefficient (*r*) between variables that have curvilinear relationships will likely be close to zero.

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

The **Pearson Correlation Coefficient,** *symbolized by the letter r, is the most common statistical measure of the strength of linear relationships among variables*. The value of the correlation coefficient ranges from $r = -1.00$ to $r = +1.00$. The direction of the linear relationship is indicated by the sign of the correlation coefficient. Positive values of *r* (such as $r = .54$ or $r = .67$) indicate that the relationship is positive linear (i.e., the pattern of the dots on the scatter plot runs from the lower left to the upper right), whereas negative values of *r* (such as $r = -.30$ or $r = -.72$) indicate negative linear relationships (i.e., the dots run from the upper left to the lower right). The strength of the linear relationship is indexed by the distance of the correlation coefficient from zero. For instance, $r = -.54$ is a stronger relationship than $r = .30$, and $r = .72$ is a stronger relationship than $r = -.57$.

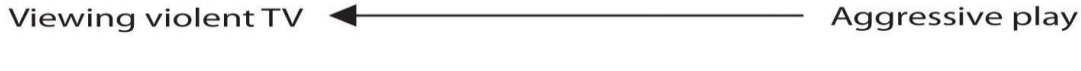
Relationships between variables that cannot be described with a straight line are known as **nonlinear relationships**. Examples of nonlinear relationships include independent and curvilinear. Part (c) of Figure 2.7 shows a common pattern in which the distribution of the points is essentially random. In this example, there is *no relationship at all between the two variables,* and they are said to be **independent.** Parts (d) and (e) show patterns of association in which, although there is an association, the points are not well described by a single straight line. For instance, part (d) shows the type of relationship that frequently occurs between anxiety and performance. Increases in anxiety from low to moderate levels are associated with performance increases, whereas increases in anxiety from moderate to high levels are associated with decreases in performance. *Relationships that change in direction and thus are not described by a single straight line are called* **curvilinear relationships.**

An important limitation of correlational research designs is that they cannot be used to draw conclusions about the causal relationships among the measured variables. Consider, for instance, a researcher who has hypothesized that viewing violent behavior will cause increased aggressive play in children. He has collected, from a sample of fourth-grade children, a measure of how much violent television each child views during the week, as well as a measure of how aggressively each child plays on the school playground. From his collected data, the researcher discovers a positive correlation between the two measured variables. Although this positive correlation appears to support the researcher's hypothesis, it cannot be taken to indicate that viewing violent television causes aggressive behavior.

Figure 2.8

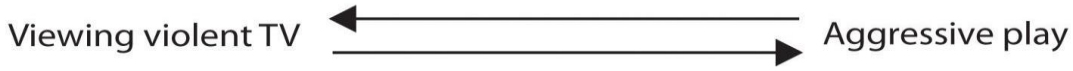
Although the researcher is tempted to assume that viewing violent television causes aggressive play (see Figure 2.8) there are other possibilities. One alternate possibility is that the causal direction is exactly opposite from what has been hypothesized (see Figure 2.9). Perhaps children who have behaved aggressively at school develop residual excitement that leads them to want to watch violent television shows at home:

Figure 2.9



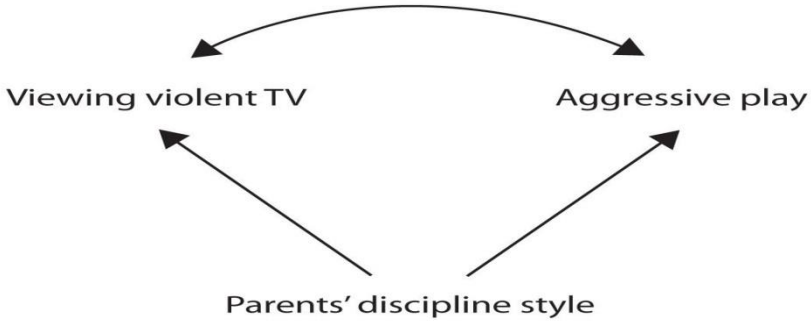
Although this possibility may seem less likely, there is no way to rule out the possibility of such reverse causation on the basis of this observed correlation. It is also possible that both causal directions are operating and that the two variables cause each other (see Figure 2.10):

Figure 2.10



Third Variables: Still another possible explanation for the observed correlation is that it has been produced by the presence of a third variable. A **third variable** is *a variable that is not part of the research hypothesis but produces the observed correlation between them*. In our example a potential third variable is the discipline style of the children's parents (see Figure 2.11). Parents who use a harsh and punitive discipline style may produce children who both like to watch violent television and who behave aggressively in comparison to children whose parents use less harsh discipline:

Figure 2.11



In this case, television viewing and aggressive play would be positively correlated, as indicated by the curved arrow between them, even though neither one caused the other but they were both caused by the discipline style of the parents, the straight arrows. *When the variables are both caused by a third variable, the observed relationship is said to be* **spurious.** If effects of the third variable were taken away, or controlled for, the relationship between the variables would disappear. In the example the relationship between aggression and television viewing might be spurious because by controlling for the effect of the parents' disciplining style, the relationship between television viewing and aggressive behavior might go away.

Third variables in correlational research designs can be thought of as mystery variables because, as they have not been measured, and their presence and identity are usually unknown to the researcher. Since it is not possible to measure every variable that could cause both the variables, the existence of an unknown third variable is always a possibility. For this reason, we are left

with the basic limitation of correlational research: **Correlation does not demonstrate causation**. It is important that when you read about correlational research projects, you keep in mind the possibility of spurious relationships, and be sure to interpret the findings appropriately. Although correlational research is sometimes reported as demonstrating causality without any mention being made of the possibility of reverse causation or third variables, informed consumers of research, like you, are aware of these interpretational problems.

Advantages and Disadvantages of Correlational Research

In sum, correlational research designs have both advantages and disadvantages. One strength is that they can be used when experimental research is not possible because the variables cannot be manipulated. Correlational designs also have the advantage of allowing the researcher to study behavior as it occurs in everyday life. Additionally, we can also use correlational designs to make predictions, for instance, to predict from the scores on their battery of tests the success of job trainees during a training session. However, we cannot use such correlational information to determine whether the training caused better job performance. For that, researchers rely on experiments.

Experimental Research

The goal of the **experimental research** *is to provide more definitive conclusions about the causal relationships among the variables in the research hypothesis than is available from correlational research*. In the experimental research design, the variables of interest are called the independent variable and the dependent variable. The **independent variable** *in an experiment is the causing variable that is created or manipulated by the experimenter*. The **dependent variable** *in an experiment is a measured variable that is expected to be influenced by the experimental manipulation.* In other words, this variable is dependent on the experimental manipulation. The research hypothesis suggests that the manipulated independent variable will cause changes in the measured dependent variable.

A good experiment has at least two groups that are compared. The **experimental group** *receives the experimenters' manipulation*. For example, the experimental group might receive a new medication for depression. The comparison group, often called the **control group**, *receives either no manipulation or nothing out of the ordinary.* For example, the control group might receive their current medication for depression or a **placebo**, *which is often just a sugar pill*. The research hypothesis suggests that the manipulated independent variable or variables will cause changes in the measured dependent variables. Specifically, the new drug for depression will cause a decrease in depressive symptions in the experimental group when compared to the control group. To ensure that the participants in the experimental group and control group are equal in terms of demographic characterisitcs (e.g., gender, age, race, socioeconomic status, symptoms), they must be randomly assigned to the groups. When using **random assignment,** *each participant is assigned to a group through a random process, such as drawing numbers or using a random number table.*

Research Focus: Video Games and Aggression

Consider an experiment conducted by Anderson and Dill (2000). The study was designed to test the hypothesis that viewing violent video games would increase aggressive behavior. In this research, male and female undergraduates from Iowa State University were given a chance to play with either a violent video game (Wolfenstein 3D) or a nonviolent video game (Myst). During the experimental session, the participants played their assigned video games for 15 minutes. Then, after the play, each participant played a competitive game with an opponent in which the participant could deliver blasts of white noise through the earphones of the opponent. The operational definition of the dependent variable (aggressive behavior) was the level and duration of noise delivered to the opponent. The design of the experiment is shown in Figure 2.12

Figure 2.12 An Experimental Research Design

Anderson and Dill first randomly assigned about 100 participants to each of their two groups (Group A and Group B). Because they used random assignment to conditions, they could be confident that, before the experimental manipulation occurred, the students in Group A were, on average, equivalent to the students in Group B on every possible variable, including variables that are likely to be related to aggression, such as parental discipline style, peer relationships, hormone levels, diet, and in fact everything else.

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

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

Advantages and Disadvantages of Experimental Research

Experimental designs have two very nice features. For one, they guarantee that the independent variable occurs prior to the measurement of the dependent variable. This eliminates the possibility of reverse causation. Second, the influence of third variables is controlled, and thus eliminated, by creating initial equivalence through randomly assigning the participants in each of the study groups before the manipulation occurs.

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

Key Takeaways

- Descriptive, correlational, and experimental research designs are used to collect and analyze data.
- Descriptive designs include case studies, surveys, and observations. The goal of these designs is to get a picture of the current thoughts, feelings, or behaviors in a given group of people. Descriptive research is summarized using descriptive statistics.
- Correlational research designs measure two or more relevant variables and assess a relationship between or among them. The Pearson Correlation Coefficient (r) is a measure of the strength of linear relationship between two variables.
- The possibility of third variables makes it impossible to draw causal conclusions from correlational research designs.
- Experimental research involves the manipulation of an independent variable and the measurement of a dependent variable. Random assignment to conditions (e.g. experimental group or control group) is normally used to create initial equivalence between the groups, allowing researchers to draw causal conclusions.

Exercises and Critical Thinking

1. There is a negative correlation between the row that a student sits in in a large class (when the rows are numbered from front to back) and his or her final grade in the class. Do you think this represents a causal relationship or a third variable, and why?

2. Think of two variables, other than those mentioned in this book, that are likely to be correlated, but in which the correlation is probably spurious. What is the likely third variable that is producing the relationship?
3. Imagine a researcher wants to test the hypothesis that participating in psychotherapy will cause a decrease in reported anxiety. Describe the type of research design the investigator might use to draw this conclusion. What would be the independent and dependent variables in the research?

Factors that Contribute to Credible Research

Learning Objectives

1. Explain how a double-blind experiment is used to overcome experimenter bias and participant expectancy effects.
2. Define placebo and explain how placebos are used to prevent expectations from leading to faulty conclusions.

Validity: Good research is **valid** research *meaning the conclusions drawn by the researcher are legitimate*. For instance, if a researcher concludes that participating in psychotherapy reduces anxiety, the research is valid only if the therapy works. Unfortunately, there are many threats to the validity of research, and these threats may sometimes lead to unwarranted conclusions. Often, and despite researchers' best intentions, some of the research reported on websites as well as in newspapers, magazines, and even scientific journals is invalid. Validity is not an all-or-nothing proposition, which means that some research is more valid than other research.

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

Reliability: One threat to valid research is that the measured variables are not **reliable** *or consistent.* For example, a bathroom scale is usually reliable because if we step on and off, the scale will consistently measure the same weight every time. Other measures, including some psychological tests that will be discussed later in later chapters, may be less reliable and thus less valid.

Statistical Significance: The statistical methods that scientists use to test their research hypotheses are based on probability estimates. You will see statements in research reports indicating that the results were statistically significant or not statistically significant. **Statistical significance** refers to *the confidence with which a scientist can conclude that data are not due to chance or random error*. When a researcher concludes that a result is statistically significant, he

or she has determined that the observed data was very unlikely to have been caused by chance factors alone. Hence, there is likely a real relationship between or among the variables in the research design. Otherwise, the researcher concludes that the results were not statistically significant. Normally, we can assume that the researchers have done their best to ensure the statistical conclusion validity of a research design, but we must always keep in mind that inferences about data are probabilistic and never certain, this is why research never proves a theory.

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

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

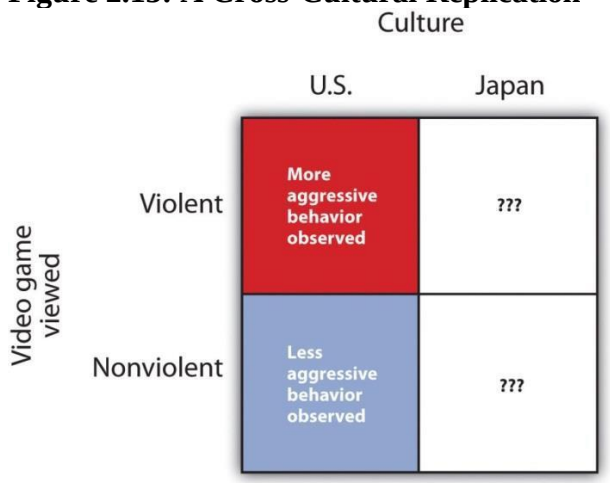
Replication: Any single test of a research hypothesis will always be limited in terms of what it can show, and consequently, important advances in science are never the result of a single research project. Advances occur through the accumulation of knowledge that comes from many different tests of the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

Generalization refers to *the extent to which relationships among conceptual variables can be demonstrated in a wide variety of people and a wide variety of manipulated or measured variables*. Psychologists who use college students as participants in their research may be concerned about generalization, wondering if their research will generalize to people who are not

college students. Likewise, researchers who study the behaviors of employees in one company may wonder whether the same findings would translate to other companies. Whenever there is reason to suspect that a result found for one sample of participants would not hold up for another sample, then research may be conducted with these other populations to test for generalization.

Recently, many psychologists have been interested in testing hypotheses about the extent to which a result will duplicate the original results for people from different cultures (Heine, 2010). For instance, a researcher might test whether the effects on aggression of viewing violent video games are the same for Japanese children as they are for American children by showing violent and nonviolent films to a sample of both Japanese and American schoolchildren. If the results are the same in both cultures, then we say that the results have generalized, but if they are different, then we have learned a limiting condition of the effect (see Figure 2.13).

Figure 2.13: A Cross-Cultural Replication



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

Unless the researcher has a specific reason to believe that generalization will not hold, it is appropriate to assume that a result found in one population, even if that population is college students, will generalize to other populations. Because the investigator can never demonstrate that the research results generalize to all populations, it is not expected that the researcher will attempt to do so. Rather, the burden of proof rests on those who claim that a result will not generalize. Remember: research results apply to populations. Individual differences within populations also exist, and rates of individual variation may also be generalized.

Critically Evaluating the Validity of Websites

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

Although peer reviewed research articles are the gold standard for validity, you may also need to get information from other sources. The Internet is a vast source of information from which you can learn about almost anything, including psychology. Wikipedia may be a good starting point

to find general information about a subject, but most professors will not accept this source as a reference for college-level work. Search engines, such as Google or Yahoo!, bring hundreds or thousands of hits on a topic. GoogleScholar is a more academic source than Google, and is a better place to start your search. You can also try our library's databases for access to sources that have been organized by discipline.

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

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

Also, ask whether the authors themselves appear to be a trustworthy source of information. Do they hold positions in an academic institution? Do they have peer-reviewed publications in scientific journals? Many useful web pages appear as part of organizational sites and reflect the work of that organization. You can be more certain of the validity of the information if it is sponsored by a professional organization, such as the American Psychological Association (APA) or the American Psychological Society.

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

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

Key Takeaways

- Research is said to be valid when the conclusions drawn by the researcher are legitimate. Because all research has the potential to be invalid, no research ever "proves" a theory or research hypothesis.
- Reliability, or consistency, is important for research to be valid.
- Statistical significance refers to the confidence with which a scientist can conclude that the research data are not due to chance or random error.
- Replication, or repeating previous research, is important to ensure research results are accurate.
- Research using a double-blind method helps control for experimenter bias and participant expectations.
- Internet research is more likely to produce valid results if consumers use websites that are established by organizations such as the American Psychological Association or if they limit their searches to websites that are .edu (educational instructions) or .gov (government).

Exercises and Critical Thinking

1. The Pepsi Cola Corporation, now PepsiCo Inc., conducted the "Pepsi Challenge" by randomly assigning individuals to taste either a Pepsi or a Coke. The researchers labeled the glasses with only an "M" (for Pepsi) or a "Q" (for Coke) and asked the participants to rate how much they liked the beverage. The research showed that subjects overwhelmingly preferred glass "M" over glass "Q," and the researchers concluded that Pepsi was preferred to Coke. Can you tell what confounding variable is present in this research design? How would you redesign the research to eliminate the confounding variable?
2. Go to the website for the American Psychological Association http://www.apa.org/ and explore the resources provided for consumers, students, and professionals.

Videos and Activities

1. Placebo effect in Scientific American Frontiers episode on the Wonder drug in season 13. http://www.chedd-angier.com/frontiers/season13.html
2. If you are interested in learning to work with correlations, you can try the following activity: http://psych.hanover.edu/JavaTest/NeuroAnim/stats/Correl1_instr.html
3. Google Scholar can be accessed at: http://scholar.google.com/

Chapter Summary

Psychologists study the behavior of both humans and animals. The main purpose of this research is to help us understand people and to improve the quality of human lives.

Psychological research may be either basic or applied. Basic research and applied research complement each other, and advances in science occur more rapidly when each type of research is conducted.

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

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

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

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

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

Decisions about whether psychological research using human and animals is ethical are made using established ethical codes developed by scientific organizations and on the basis of judgments made by the local Institutional Review Board. These decisions are made through a cost-benefit analysis. If the potential costs of the research appear to outweigh any potential benefits that might come from it, then the research should not proceed.

Descriptive research is designed to observe and record behaviors. A representative sample of individuals from the population is studied. Descriptive research allows the development of questions for further study, but does not assess relationships among variables. The results of descriptive research projects are analyzed using descriptive statistics. Types of descriptive research include observations, case studies, and surveys.

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

The goal of experimental research is to assess the causal impact of one or more experimental manipulations on a dependent variable. Important terms to learn include independent variable,

dependent variable, random assignment, experimental group, control group, and placebo. Experimental designs are not always possible because many important variables cannot be experimentally manipulated.

Because all research has the potential for invalidity, research never proves a theory or hypothesis. Research can provide evidence to support or not support a theory.

Informed consumers are aware of the strengths and limitations of research. Research using a double-blind method helps control for experimenter bias and participant expectations. Placebos may also be used to control for participant expectations.

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Chapter 3 Brain and Behavior

Learning Objectives

1. Describe the nervous system and the endocrine system.

Every behavior begins with biology. Our behaviors, as well as our thoughts and feelings, are produced by the actions of our brains, nerves, muscles, and glands. In this chapter we will begin our journey into the world of psychology by considering the biological makeup of the human being, including the most remarkable of human organs, the brain. We'll consider the structure of the brain and also the methods that psychologists use to study the brain and to understand how it works.

We will see that the body is controlled by an information highway known as the **nervous system**, *a collection of hundreds of billions of specialized and interconnected cells through which messages are sent between the brain and the rest of the body*. The nervous system consists of the **central nervous system** (CNS), *made up of the brain and the spinal cord*, and the **peripheral nervous system** (PNS), *the neurons that link the CNS to our skin, muscles, and glands*. We will see that our behavior is also influenced in large part by the **endocrine system**, *the chemical regulator of the body that consists of glands that secrete hormones*.

An understanding of the biology underlying psychological processes is an important cornerstone of understanding psychology. We will consider throughout the chapter how our biology influences important human behaviors, including our mental and physical health, our reactions to drugs, as well as our aggressive responses and our perceptions of other people. This chapter is particularly important for contemporary psychology because the ability to measure biological aspects of behavior, including the structure and function of the human brain, is progressing rapidly, and understanding the biological foundations of behavior is an increasingly important line of psychological study.

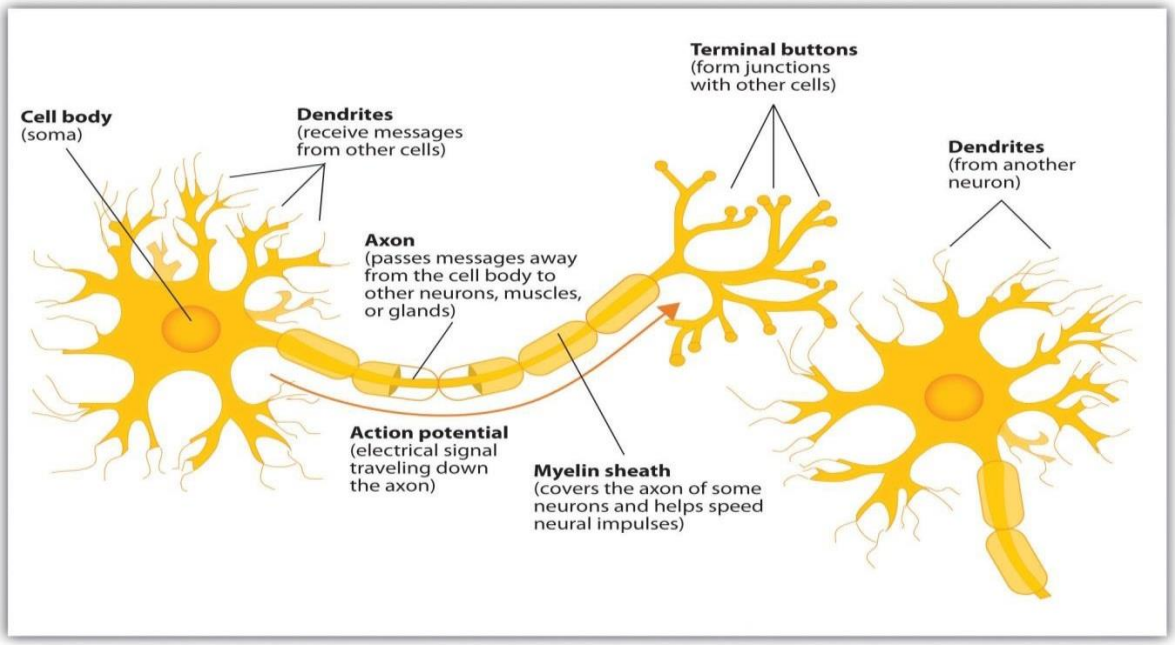
The Neuron Is the Building Block of the Nervous System

Learning Objectives

1. Describe the structure and functions of the neuron.
2. Define the terms action potential and resting potential, and explain the process of activation in a neuron.
3. Define the terms synapse and neurotransmitter.
4. Describe the effect of neurotransmitters on behavior.
5. List the major neurotransmitters and explain their functions.

The nervous system is composed of approximately 86 billion cells known as *neurons* Jarrett, 2015). A **neuron** is *a cell in the nervous system whose function it is to receive and transmit information*. As you can see in Figure 3.1, neurons are made up of three major parts: a **cell body, or soma**, which *contains the nucleus of the cell and keeps the cell alive*; a branching treelike fiber known as the **dendrite**, which *collects information from other cells and sends the information to the soma*; and a long, segmented fiber known as the **axon**, which *transmits information away from the cell body toward other neurons or to the muscles and glands*.

Figure 3.1 Components of the Neuron



Some neurons have hundreds or even thousands of dendrites, and these dendrites may themselves be branched to allow the cell to receive information from thousands of other cells. The axons are also specialized, and some, such as those that send messages from the spinal cord to the muscles in the hands or feet, may be very long, even up to several feet in length. To improve the speed of their communication, and to keep their electrical charges from shorting out with other neurons, axons are often surrounded by a myelin sheath. The **myelin sheath** is *a layer of fatty tissue surrounding the axon of a neuron that both acts as an insulator and allows faster transmission of the electrical signal*. Axons branch out toward their ends, and at the tip of each branch is a **terminal button,** *which forms junctions with other neurons.*

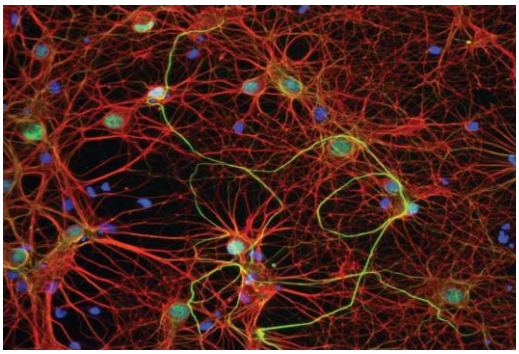


Figure 3.2
The nervous system, including the brain, is made up of billions of interlinked neurons. This vast interconnected web is responsible for all human thinking, feeling, and behavior.
Source: Photo courtesy of GE Healthcare, http://www.flickr.com/photos/gehealthcare/4253587827/.

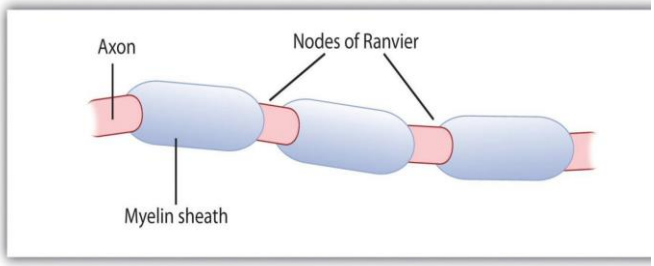
Supporting all these neurons are billions more **glial cells (glia)**, *cells that surround and link to the neurons, protecting them, providing them with nutrients, and absorbing unused neurotransmitters*. Glial cells come in different forms and have different functions. For instance, the myelin sheath surrounding the axon of many neurons is a type of glial cell. The myelin sheath acts as insulation and speeds transmission of the electrical impulse in the neuron. Glia are also necessary for the development of the synapses, where chemical transmission of impulses occurs (Ullian, Sapperstein, Christopherson & Barres, 2001). The glia are essential partners of neurons, without which the neurons could not survive or function (Miller, 2005).

Neurons Communicate Using Electricity and Chemicals

The nervous system operates using an **electrochemical process,** *which occurs when an electrical charge moves through the neuron itself and chemicals are used to transmit information between neurons*. Within the neuron, when a signal is received by the dendrites, it is transmitted to the soma in the form of an electrical signal, and, if the signal is strong enough, it may then be passed on to the axon and then to the terminal buttons. If the signal reaches the terminal buttons, they are signaled to emit chemicals known as **neurotransmitters**, which communicate with other neurons by crossing the **synapse,** *or space between the cells.*

The electrical signal moves through the neuron as a result of changes in the electrical charge of the axon. Normally, the axon remains in the **resting potential**, *a state in which the interior of the neuron contains a greater number of negatively charged ions than does the area outside the cell*. When the segment of the axon that is closest to the cell body is stimulated by an electrical signal from the dendrites, and *if this electrical signal is strong enough that it passes a certain level* or **threshold**, the cell membrane in this first segment opens its gates, allowing positively charged sodium ions that were previously kept out to enter. This *change in electrical charge that occurs in a neuron when a nerve impulse is transmitted* is known as the **action potential**. Once the action potential occurs, the number of positive ions exceeds the number of negative ions in this segment, and the segment temporarily becomes positively charged.

Figure 3.3
The Myelin Sheath and the Nodes of Ranvier



The myelin sheath wraps around the axon but also leaves small gaps called the nodes of Ranvier. The action potential jumps from node to node as it travels down the axon.

As you can see in Figure 3.3, the axon is segmented by a series of *breaks between the sausage-like segments of the myelin sheath*. Each of these gaps is a **node of Ranvier**. The electrical charge moves down the axon from segment to segment, in a set of small jumps, moving from node to node. When the action potential occurs in the first segment of the axon, it quickly creates a similar change in the next segment, which then stimulates the next segment and so forth as the positive electrical impulse continues all the way down to the end of the axon. As each new segment becomes positive, the membrane in the prior segment closes up again, and the segment returns to its negative resting potential. In this way, the action potential is transmitted along the axon, toward the terminal buttons. The entire response along the length of the axon is very fast as it can happen up to 1,000 times each second.

An important aspect of the action potential is that it operates in an **all or nothing** manner, and this means that *the neuron either fires completely, such that the action potential moves all the way down the axon, or it does not fire at all*. Thus, neurons can provide more energy to the neurons down the line by firing faster but not by firing more strongly. Furthermore, the neuron is prevented from repeated firing by the presence of a **refractory period**, which is *a brief time after the firing of the axon in which the axon cannot fire again because the neuron has not yet returned to its resting potential.*

Neurotransmitters: The Body's Chemical Messengers

Not only do the neural signals travel via electrical charges within the neuron, but they also travel via chemical transmission between the neurons. Neurons are separated by junction areas known as **synapses**, *areas where the terminal buttons at the end of the axon of one neuron nearly, but do not quite, touch the dendrites of another*. The synapses provide a remarkable function because they allow each axon to communicate with many dendrites in neighboring cells. Because a neuron may have synaptic connections with thousands of other neurons, the communication links among the neurons in the nervous system allow for a highly sophisticated communication system (see Figure 3.4).

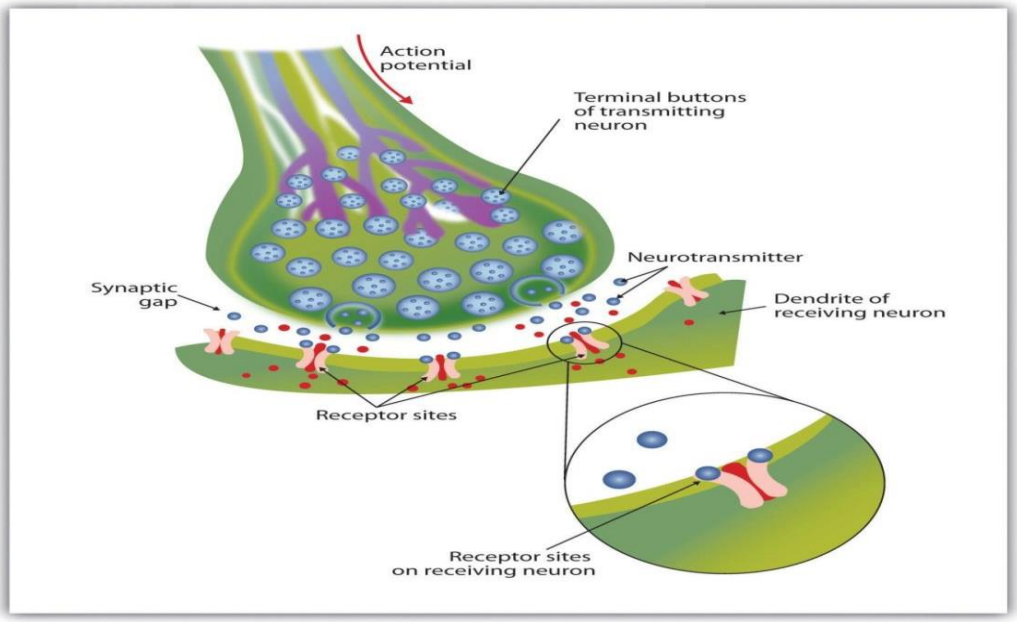


Figure 3.4 The Synapse
When the nerve impulse reaches the terminal button, it triggers the release of neurotransmitters into the synapse. The neurotransmitters fit into receptors on the receiving dendrites in the manner of a lock and key.

When the electrical impulse from the action potential reaches the end of the axon, it signals the terminal buttons to release neurotransmitters into the synapse. A **neurotransmitter** is *a chemical that relays signals across the synapses between neurons*. Neurotransmitters travel across the synaptic space between the terminal button of one neuron and the dendrites of other neurons,

where they bind to the dendrites in the neighboring neurons. Furthermore, different terminal buttons release different neurotransmitters, and different dendrites are particularly sensitive to different neurotransmitters. The dendrites will admit the neurotransmitters only if they are the right shape to fit in the receptor sites on the receiving neuron. For this reason, the receptor sites and neurotransmitters are often compared to a lock and key.

When neurotransmitters are accepted by the receptors on the receiving neurons their effect may be either **excitatory** in that they make the cell more likely to fire, or **inhibitory,** making the cell less likely to fire. Furthermore, if the receiving neuron is able to accept more than one neurotransmitter, then it will be influenced by the excitatory and inhibitory processes of each. If the excitatory effects of the neurotransmitters are greater than the inhibitory influences of the neurotransmitters, the neuron moves closer to its firing threshold, and if it reaches the threshold, the action potential and the process of transferring information through the neuron begins.

Neurotransmitters that are not accepted by the receptor sites must be removed from the synapse in order for the next potential stimulation of the neuron to happen. This process occurs in part *through the breaking down of the neurotransmitters by enzymes*, called **inactivation**, and in part through **reuptake**, *a process in which neurotransmitters that are in the synapse are reabsorbed into the transmitting terminal buttons, ready to again be released after the neuron fires*.

More than 100 chemical substances produced in the body have been identified as neurotransmitters, and these substances have a wide and profound effect on emotion, cognition, and behavior. Neurotransmitters regulate our appetite, our memory, our emotions, as well as our muscle action and movement. As can be seen in Table 3.1, some neurotransmitters are also associated with psychological and physical diseases.

Some of these neurotransmitters will be discussed again later in the text when psychological problems are explained. Dopamine, is involved in motivation and emotion, and is linked to schizophrenia. Serotonin, is involved in mood, sleep, and aggression, and is linked to depression. Acetylcholine, is involved in memory, and is linked to Alzheimer's disease. On a more positive note, endorphins, neurotransmitters released by vigorous exercise, are the body's natural pain relievers.

Some chemicals in the body can occur either as neurotransmitters or **hormones,** which are *chemicals in the bloodstream that affect behavior*. Norepinephrine, also known as noradrenaline, is one of these chemicals with a dual role. As a neurotransmitter, norepinephrine increases arousal and plays a role in learning and memory. Norepinephrine produced by the sympathetic nervous system also stimulates the biological responses associated with fear and anxiety. As both a neurotransmitter and a hormone, norepinephrine is part of the fight-flight response that elevates heart rate, causes the release of blood glucose, and increases blood flow to the muscles in preparation for emergency action.

Table 3.1 The Major Neurotransmitters and Their Functions

Neurotransmitter	Description and function	Notes
Acetylcholine (ACh)	*A common neurotransmitter used in the spinal cord and motor neurons to stimulate muscle contractions. It's also used in the brain to regulate memory, sleeping, and dreaming.*	Alzheimer's disease is associated with an undersupply of acetylcholine. Nicotine is an agonist that acts like acetylcholine.
Dopamine	*Involved in movement, motivation, and emotion, Dopamine produces feelings of pleasure when released by the brain's reward system, and it is also involved in learning.*	Schizophrenia is linked to increases in dopamine activity, whereas Parkinson's disease is linked to reductions in dopamine.
Endorphins	*Released in response to behaviors such as vigorous exercise, orgasm, and eating spicy foods.*	Endorphins are natural pain relievers. They are related to the compounds found in drugs such as opium, morphine, and heroin. The release of endorphins creates the runner's high that is experienced after intense physical exertion.
GABA (gamma-aminobutyric acid)	*The major inhibitory neurotransmitter in the brain.*	A lack of GABA can lead to involuntary motor actions, including tremors and seizures. Alcohol stimulates the release of GABA, which inhibits the nervous system and makes us feel drunk. Low levels of GABA can produce anxiety, and GABA agonists are used to reduce anxiety.
Glutamate	*The most common neurotransmitter, it is released in more than 90% of the brain's synapses. Glutamate is found in the food additive MSG (monosodium glutamate).*	Excess glutamate can cause overstimulation, migraines and seizures.
Serotonin	*Involved in many functions, including mood, appetite, sleep, and aggression.*	Low levels of serotonin are associated with depression, and some drugs designed to treat depression are known as selective serotonin reuptake inhibitors, or SSRIs. They serve to prevent their reuptake.

Drugs that we might ingest, either for medical reasons or recreationally, can act like neurotransmitters to influence our thoughts, feelings, and behavior. An **agonist** is *a drug that has chemical properties similar to a particular neurotransmitter and thus mimics the effects of the neurotransmitter or increases the activity of a neurotransmitter.* When an agonist is ingested, it binds to the receptor sites in the dendrites to excite the neuron, acting as if more of the neurotransmitter had been present. Still other agonists work by blocking the reuptake of the

neurotransmitter itself. When reuptake is reduced by the drug, more neurotransmitter remains in the synapse, increasing its action. As an example, cocaine is an agonist for the neurotransmitter dopamine. Cocaine blocks the reuptake of dopamine thus increasing its effect. An **antagonist** is *a drug that reduces or stops the normal effects of a neurotransmitter*. When an antagonist is ingested, it binds to the receptor sites in the dendrite, thereby blocking the neurotransmitter. As an example, the poison curare is an antagonist for the neurotransmitter acetylcholine. When the poison enters the body, it binds to the dendrites, stops communication among the neurons, and usually causes death.

Key Takeaways

- The central nervous system (CNS) is the collection of neurons that make up the brain and the spinal cord.
- The peripheral nervous system (PNS) is the collection of neurons that link the CNS to our skin, muscles, and glands.
- Neurons are specialized cells, found in the nervous system, which transmit information. Neurons contain dendrites, a soma, and an axon.
- Some axons are covered with a fatty substance known as the myelin sheath, which surrounds the axon, acting as an insulator and allowing faster transmission of the electrical signal.
- The dendrite is a treelike extension that receives information from other neurons and transmits electrical stimulation to the soma.
- The axon is an elongated fiber that transfers information from the soma to the terminal buttons.
- Neurotransmitters relay information chemically from the terminal buttons and across the synapses to the receiving dendrites using a type of lock and key system.
- The many different neurotransmitters work together to influence cognition, memory, and behavior.
- Agonists are drugs that mimic the actions of neurotransmitters, whereas antagonists are drugs that block the action of neurotransmitters.

Exercises and Critical Thinking

1. Draw a picture of a neuron and label its main parts.
2. Imagine an action that you engage in every day and explain how neurons and neurotransmitters might work together to help you engage in that action.

Videos

1. The electrochemical action of the neuron : https://www.youtube.com/watch?v=OZG8M_ldA1M
2. Journey through the neuron and synapse : http://epsych.msstate.edu/biological/neuron/index.html (click "Next" for feedback)

The Brain

Learning Objectives

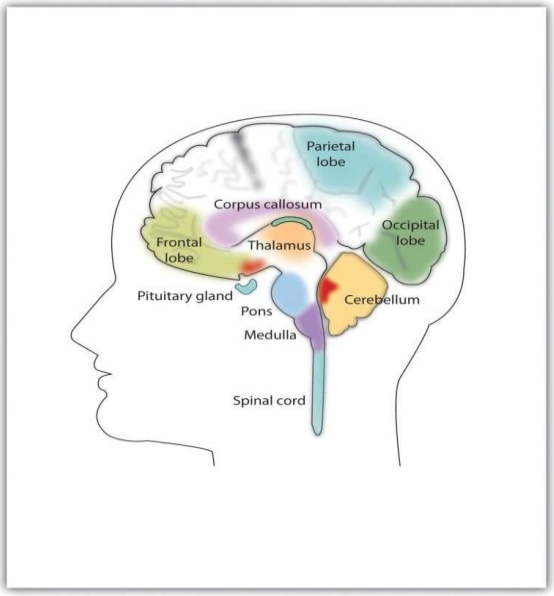
1. Describe the structures and functions of the oldest parts of the brain, including the brain stem and cerebellum, and their influence on behavior.
2. Describe the location and functions of the thalamus, limbic system, and cerebrum.
3. Explain the hemispheric structure of the brain and the function of the corpus callosum.
4. Identify the location and functions of the four lobes and association areas.
5. Define Broca's and Wernickes's areas.
6. Define the concepts of brain plasticity and neurogenesis.
7. Describe the research with split-brain patients and brain lateralization

If you were someone who understood brain anatomy and were to look at the brain of an animal that you had never seen before, you would nevertheless be able to deduce the likely capacities of the animal. This is because the brains of all animals are very similar in overall form. In each animal, the brain is layered, and the basic structures of the brain are similar (see Figure 3.5). The innermost structures of the brain; that is, the parts nearest the spinal cord, are the oldest part of the brain, and these areas carry out the same the functions they did for our distant ancestors. These regions regulate basic survival functions, such as breathing, moving, resting, and feeding, and creates our experiences of emotion. Mammals, including humans, have developed further brain layers that provide more advanced functions. For instance, better memory, more sophisticated social interactions, and the ability to experience emotions are demonstrated. Humans have a very large and highly developed cerebral cortex, or outer layer which makes us particularly adept at these processes (see Figure 3.6).

Major Brain Structures

The Brain Stem: The **brain stem** is *the oldest and innermost region of the brain and is wired for survial*. It is designed to control the most basic functions of life, including breathing, attention, and motor responses (see Figure 3.7). The brain stem begins where the spinal cord enters the skull and forms the **medulla**, *the area of the brain stem that controls heart rate and breathing*. In many cases the medulla alone is sufficient to maintain life as animals that have the remainder of their brains above the medulla severed are still able to eat, breathe and move.

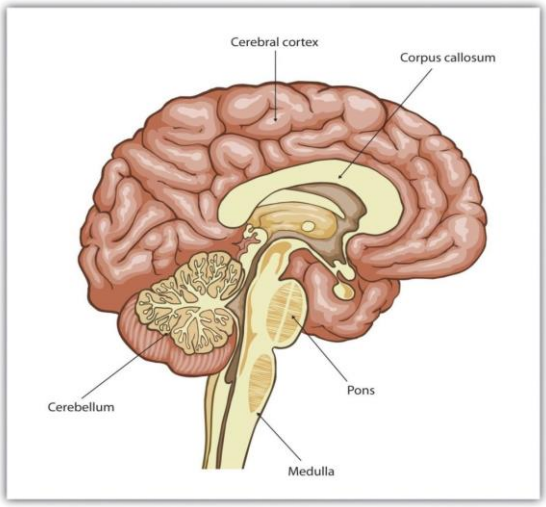
Figure 3.5
The Major Structures in the Human Brain



The major brain parts are colored and labeled.

Source: Adapted from Camazine, S. (n.d.). Images of the brain. Medical, science, and nature things Photography and digital imagery by Scott Camazine. Retrieved from http://www.scottcamazine.com/photos/brain/pages/09MRIBrai n jpg.htm.

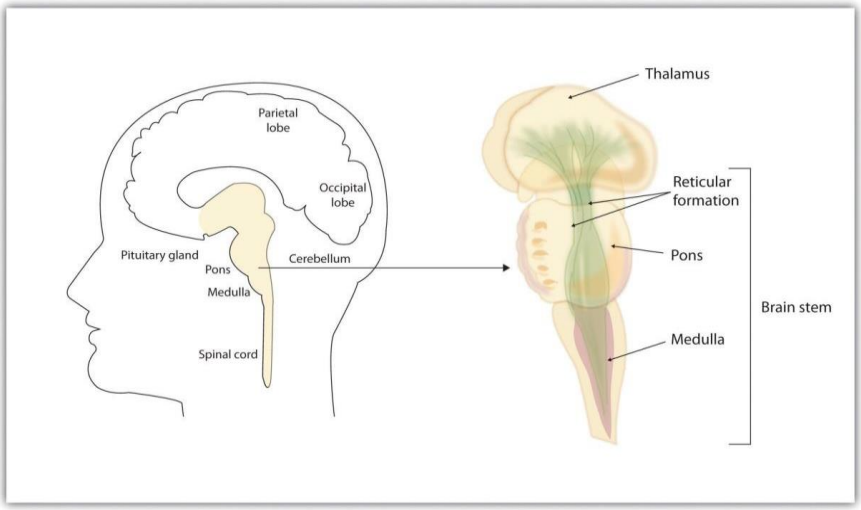
Figure 3.6 Cerebral Cortex



Humans have a very large and highly developed outer brain layer known as the *cerebral cortex*. The cortex provides humans with excellent memory, outstanding cognitive skills, and the ability to experience complex emotions.

Source: Adapted from Wikia Education. (n.d.). Cerebral cortex. Retrieved from http://psychology.wikia.com/wiki/Cerebral_cortex.

Figure 3.7 The Brain Stem and the Thalamus



The brain stem is an extension of the spinal cord, including the medulla, the pons, and the reticular formation.

The spherical shape above the medulla is the **pons**, *a structure in the brain stem that is important to sleep and arousal.*

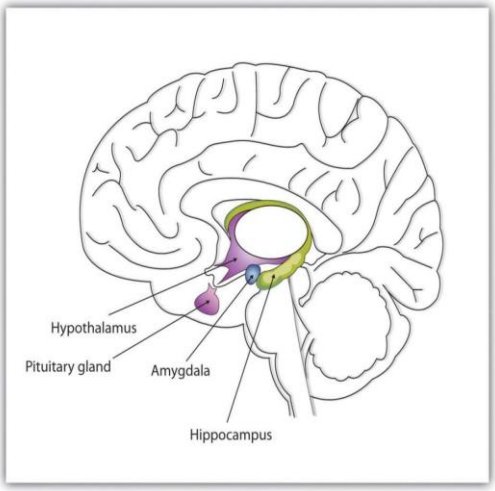
Running through the medulla and the pons is a long, narrow network of neurons known as the reticular formation. The job of the **reticular formation** is to *filter out some of the stimuli that are coming into the brain from the spinal cord and to relay the remainder of the signals to other areas of the brain.* The reticular formation also plays important roles in reflexes, muscle tone, arousal, and sleeping. When electrical stimulation is applied to the reticular formation of an animal, it immediately becomes fully awake, and when the reticular formation is severed from the higher brain regions, the animal falls into a deep coma.

Cerebellum: The **cerebellum**, literally, "little brain", consists of two wrinkled ovals behind the brain stem and its main function is to coordinate voluntry movement. People who have damage to the cerebellum have difficulty walking, keeping their balance, and holding their hands steady. Consuming alcohol influences the cerebellum, which is why people who are drunk have more difficulty walking in a straight line. Also, the cerebellum contributes to emotional responses, helps us discriminate between different sounds and textures, and is important in learning (Bower & Parsons, 2003). Finally, the cerebellum is also used to coordinate thinking through connections to the frontal and parietal cortex (O'Reilly, Beckmann, Tomassini, Ramnani, & Johansen-Berg, 2009).

Thalamus: Above the brain stem are other older parts of the brain that also are involved in the processing of behavior and emotions. The **thalamus** is *the egg-shaped structure above the brain stem that applies still more filtering to the sensory information that is coming up from the spinal cord and through the reticular formation, and it relays some of these remaining signals to the appropriate areas of the cortex or higher brain levels* (Sherman & Guillery, 2002). The thalamus also receives some of the higher brain's replies, forwarding them to the medulla and the cerebellum. The thalamus is also important in sleep because it shuts off incoming signals from the senses, allowing us to rest.

Limbic System: Whereas the primary function of the brain stem is to regulate the most basic aspects of life, including motor functions, the **limbic system** is a brain region *largely responsible for memory and emotions, including our responses to reward and punishment.* The limbic system is located between the brain stem and the two cerebral hemispheres. It includes the amygdala, the hypothalamus, and the hippocampus (see Figure 3.8).

Figure 3.8 The Limbic System



This diagram shows the major parts of the limbic system, as well as the pituitary gland, which is controlled by it.

The **amygdala** *consists of two almond-shaped clusters that is primarily responsible for regulating our perceptions of, and reactions to, aggression and fear*. The amygdala has connections to other bodily systems related to fear, including the sympathetic nervous system, which is important in fear responses, facial responses, the processing of smells, and the release of

neurotransmitters related to stress and aggression (Best, 2009). In one early study, Klüver and Bucy (1939) damaged the amygdala of an aggressive rhesus monkey. They found that the once angry animal immediately became passive and no longer responded to fearful situations with aggressive behavior. Electrical stimulation of the amygdala in other animals also influences aggression. In addition to helping us experience fear, the amygdala also helps us learn from situations that create fear. When we experience events that are dangerous, the amygdala stimulates the brain to remember the details of the situation so that we learn to avoid it in the future (Sigurdsson, Doyère, Cain, & LeDoux, 2007).

Located just under the thalamus and just above the brain stem, the **hypothalamus** *links the nervous system to the endocrine system via the pituitary gland, and thus regulates body temperature, hunger, thirst, and sex. It also responds to the satisfaction of these needs by creating feelings of pleasure.* Olds and Milner (1954) discovered these reward centers accidentally after they had momentarily stimulated the hypothalamus of a rat. The researchers noticed that after being stimulated, the rat continued to move to the exact spot in its cage where the stimulation had occurred, as if it were trying to recreate the circumstances surrounding its original experience. Upon further research into these reward centers, Olds (1958) discovered that animals would do almost anything to re-create enjoyable stimulation, including crossing a painful electrified grid to receive it. In one experiment a rat was given the opportunity to electrically stimulate its own hypothalamus by pressing a pedal. The rat enjoyed the experience so much that it pressed the pedal more than 7,000 times per hour until it collapsed from sheer exhaustion.

The **hippocampus** *is important in forming and storing information in long-term memory* and consists of two horns that curve back from the amygdala. If the hippocampus is damaged, a person cannot build new memories, living instead in a strange world where everything he or she experiences just fades away, even while older memories from the time before the damage are untouched.

Cerebrum: From an evolutionary perspective, the newest part of our brain is the **cerebrum**, *which consists of the cerebral cortex and the corpus callosum*. The key to the advanced intelligence of humans is not found in the size of our brains. What sets humans apart from other animals is our larger **cerebral cortex**, which is *the outer bark-like layer of our cerebrum that allows us to so successfully use language, acquire complex skills, create tools, and live in social groups* (Gibson, 2002). In humans, the cerebral cortex is wrinkled and folded, rather than smooth as it is in most other animals. This creates a much greater surface area and size, and allows increased capacities for learning, remembering, and thinking. Although the cerebral cortex is only about one tenth of an inch thick, it makes up more than 80% of the brain's weight. The cerebral cortex contains about 20 billion nerve cells and 300 trillion synaptic connections (de Courten-Myers, 1999). The corpus callosum *connects the two halves of the brain and supports communication between the hemispheres.*

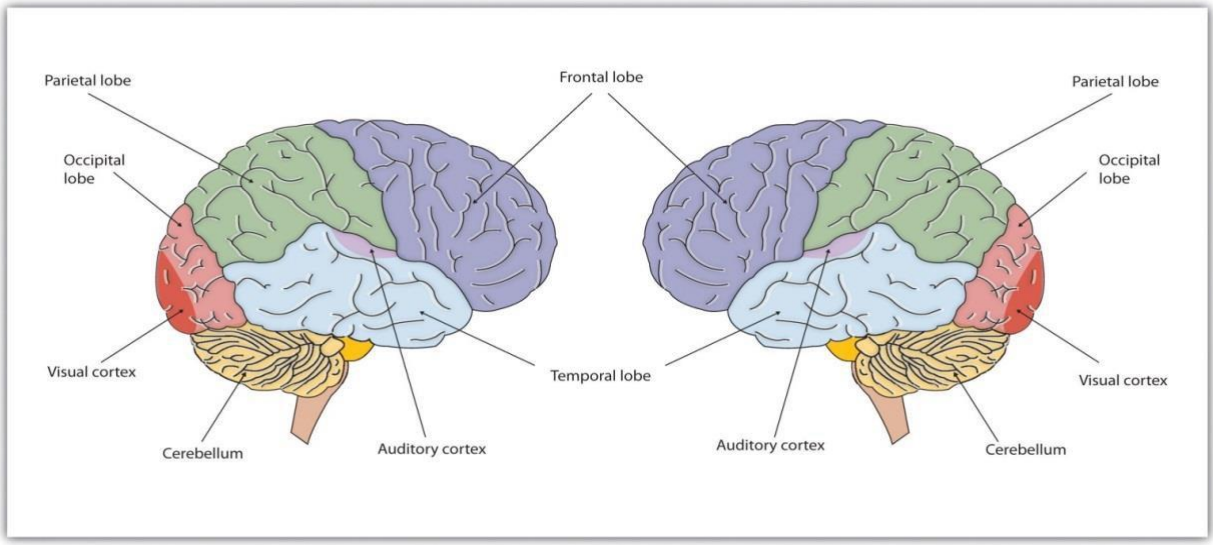


Figure 3.9 The Two Hemispheres
The brain is divided into two hemispheres (left and right), each of which has four lobes (temporal, frontal, occipital, and parietal). Furthermore, there are specific cortical areas that control different processes.

The cerebral cortex is divided into two hemispheres, and each hemisphere is divided into four *lobes*, each separated by folds known as fissures. If we look at the cortex starting at the front of the brain and moving over the top (see Figure 3.9), we see the following:

- **Frontal lobes:** *Located behind the forehead and responsible primarily for thinking, planning, memory, and judgment.*
- **Parietal lobes**: *Located from the middle to the back of the skull, and responsible primarily for processing information about touch and taste. These lobes also receive input from vision, which helps us identify objects by touch and locate objects in space* (Garrett, 2011).
- **Occipital lobes**: *Located at the very back of the skull, and processes visual information.*
- **Temporal lobe**: *Located at the sides of the brain and responsible for hearing, language, and integrating vision and audition*.

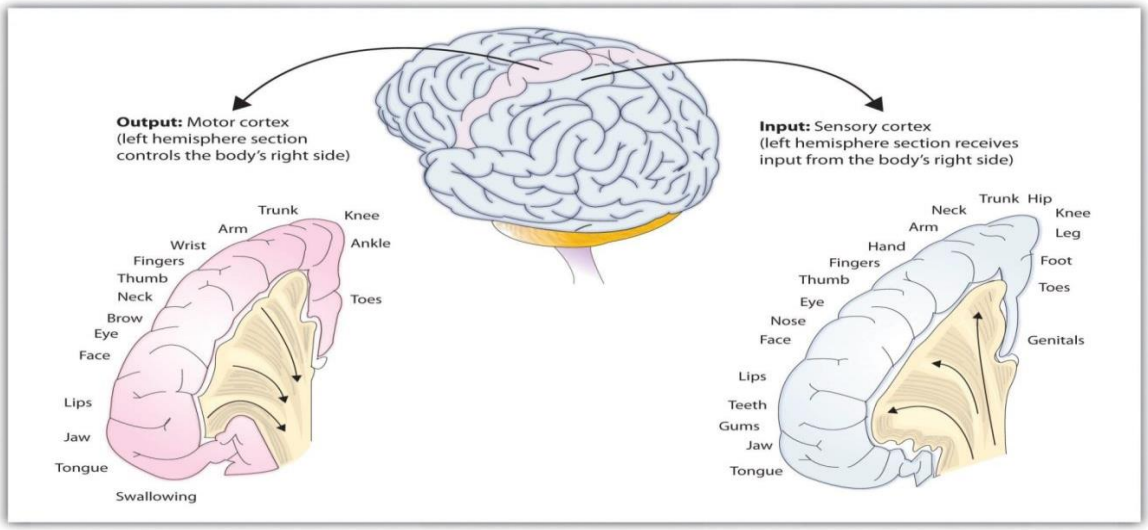
Functions of the Cerbral Cortex

When the German physicists Gustav Fritsch and Eduard Hitzig (1870/2009) applied mild electric stimulation to different parts of a dog's cortex, they discovered that they could make different parts of the dog's body move. Furthermore, they discovered an important and unexpected principle of brain activity. They found that stimulating the right side of the brain produced movement in the left side of the dog's body, and vice versa. This finding follows from a general principle about how the brain is structured, called **contralateral control,** *which means the brain is wired such that in most cases the left hemisphere receives sensations from and controls the right side of the body, and vice versa.*

Fritsch and Hitzig also found that the movement that followed the brain stimulation only occurred when they stimulated a specific arch-shaped region that runs across the top of the brain from ear to

ear, just at the front of the parietal lobe (see Figure 3.10). Fritsch and Hitzig had discovered the **motor cortex**, *the part of the cortex that controls and executes movements of the body by sending signals to the cerebellum and the spinal cord*. The motor cortex is located in the frontal lobes. Recent research has mapped the motor cortex even more fully, by providing mild electronic stimulation to different areas of the motor cortex in fully conscious patients while observing their bodily responses. Because the brain has no sensory receptors, these patients felt no pain. As you can see in Figure 3.10, this research has revealed that the motor cortex is specialized for providing control over the body, in the sense that the parts of the body that require more precise and finer movements, such as the face and the hands, also are allotted the greatest amount of cortical space.

Figure 3.10 The Motor Cortex and the Sensory Cortex



Just as the motor cortex sends out messages to the specific parts of the body, the **somatosensory cortex**, located in the parietal lobe behind the primary motor cortex, *receives information from the skin's sensory receptors (pain, warmth, cold, touch) and the senses that pertain to body postion and movement*. Again, the more sensitive the body region, the more area is dedicated to it in the sensory cortex. Our sensitive lips, for example, occupy a large area in the sensory cortex, as do our fingers and genitals.

Other areas of the cerebral cortex process other types of sensory information. The **visual cortex** is *the area located in the occipital lobe that processes visual information*. If you were stimulated in the visual cortex, you would see flashes of light or color, and perhaps you remember having had the experience of "seeing stars" when you were hit in, or fell on, the back of your head. The temporal lobe contains the **auditory cortex**, *which is responsible for hearing and language*. The temporal lobe also processes some visual information, providing us with the ability to name the objects around us (Martin, 2007).

As you can see in Figure 3.10, the motor and sensory areas of the cortex account for a relatively small part of the total cortex. The remainder of the cortex is made up of **association areas** *in which sensory and motor information is combined and associated with our stored knowledge.* These

association areas are the places in the brain that are responsible for most of the things that make human beings seem human. The association areas are involved in higher mental functions, such as learning, thinking, planning, judging, moral reflecting, figuring, and spatial reasoning.

Broca's area in the *left frontal lobe controls facial movements and the production of language*. **Wernicke's area** is located *in the left temporal lobe and is responsible for understanding speech*. In a small percentage of people, who are usually left-handed, these structures are located on the right side of the brain. Strokes or trauma to Broca's area or Wernicke' area can result in **aphasia**, *an impairment in the use of language*. A patient with Broca's aphasia may be able to understand words, but the individual lacks the ability to speak. Damage in Wernicke's area produces Wernicke's aphasiam, which is difficulty with understanding speech.

Neuroplasticity and Neurogenesis

The control of some specific bodily functions, such as movement, vision, and hearing, is performed in specified areas of the cortex, and if these areas are damaged, the individual will likely lose the ability to perform the corresponding function. For instance, if an infant suffers damage to facial recognition areas in the temporal lobe, it is likely that he or she will never be able to recognize faces (Farah, Rabinowitz, Quinn, & Liu, 2000). On the other hand, the brain is not divided up in an entirely rigid way. The brain's neurons have a remarkable capacity to reorganize and extend themselves to carry out particular functions in response to the needs of the organism, and to repair damage. As a result, the brain constantly creates new neural communication routes and rewires existing ones. **Neuroplasticity** refers to *the brain's ability to change its structure and function in response to experience or damage*. Neuroplasticity enables us to learn and remember new things and adjust to new experiences.

Our brains are the most "plastic" when we are young children, as it is during this time that we learn the most about our environment. On the other hand, neuroplasticity continues to be observed even in adults (Kolb & Fantie, 1989). The principles of neuroplasticity help us understand how our brains develop to reflect our experiences. For instance, accomplished musicians have a larger auditory cortex compared with the general population (Bengtsson et al., 2005) and also require less neural activity to move their fingers over the keys than do novices (Münte, Altenmüller, & Jäncke, 2002). These observations reflect the changes in the brain that follow our experiences.

Plasticity is also observed when there is damage to the brain or to parts of the body that are represented in the motor and sensory cortexes. When a tumor in the left hemisphere of the brain impairs language, the right hemisphere will begin to compensate to help the person recover the ability to speak (Thiel et al., 2006). If a person loses a finger, the area of the sensory cortex that previously received information from the missing finger will begin to receive input from adjacent fingers, causing the remaining digits to become more sensitive to touch (Fox, 1984).

Although neurons cannot repair or regenerate themselves as skin or blood vessels can, new evidence suggests that the brain can engage in **neurogenesis**, *the forming of new neurons* (Van Praag, Zhao, Gage, & Gazzaniga, 2004). These new neurons originate deep in the brain and may then migrate to other brain areas where they form new connections with other neurons (Gould, 2007). This leaves open the possibility that someday scientists might be able to rebuild damaged brains by creating drugs that help grow neurons.

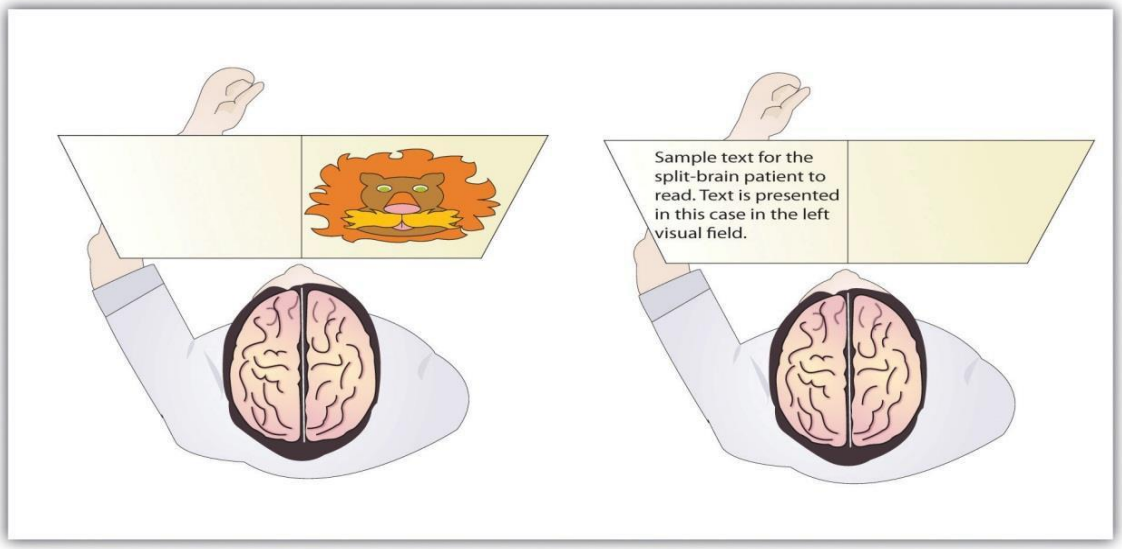
Research Focus Using Split-Brain Patients

We have seen that the left hemisphere of the brain primarily senses and controls the motor movements on the right side of the body, and vice versa. This fact provides an interesting way to study **brain lateralization** which means the *left and the right hemispheres of the brain are specialized to perform different functions*. Gazzaniga, Bogen, and Sperry (1965) studied a patient, known as W. J., who had undergone an operation to relieve severe seizures, and his corpus callosum was severed. Because the left and right hemispheres were separated, each hemisphere developed its own sensations, concepts, and motivations (Gazzaniga, 2005).

Gazzaniga and his colleagues tested the ability of W. J. to recognize and respond to objects and written passages that were presented to only the left or only the right hemispheres (see Figure 3.11). The researchers had W. J. look straight ahead and then flashe a picture of a geometrical shape to the left of where he was looking. By doing so, they assured that the image of the shape was experienced only in the right hemisphere. Remember that sensory input from the left side of the body is sent to the right side of the brain. Gazzaniga and his colleagues found that W. J. identified what he had been shown when he was asked to pick the object from a series of shapes, using his left hand, but he could not do this when the object was shown in the right visual field. On the other hand, W. J. could easily read written material presented in the right visual field, and thus experienced in the left hemisphere, but not when it was presented in the left visual field.

The information that is presented on the left side of our field of vision is transmitted to the right hemisphere, and vice versa. In split-brain patients, the severed corpus callosum does not permit information to be transferred between hemispheres. This allows researchers to learn about the functions of each hemisphere. In the sample on the left, the split-brain patient could not choose which image had been presented because the left hemisphere cannot process visual information. In the sample on the right the patient could not read the passage because the right brain hemisphere cannot process language.

Figure 3.11 Visual and Verbal Processing in the Split-Brain Patient



This research, and many other studies following it, has demonstrated that the two hemispheres specialize in different abilities. In most people the ability to speak, write, and understand language is located in the left hemisphere. This is why W. J. could read passages that were presented on the right side and thus transmitted to the left hemisphere, but could not read passages that were only experienced in the right hemisphere. The left hemisphere is also better at math and at judging time and rhythm. It is also superior in coordinating the order of complex movements, such as the lip movements needed for speech. The right hemisphere has only very limited verbal abilities, and yet it excels in perceptual skills. The right hemisphere is able to recognize objects, including faces, patterns, and melodies, and it can put a puzzle together or draw a picture. This is why W. J. could pick out the image when he saw it on the left, but not the right, visual field.

Although Gazzaniga's research demonstrated that the brain is in fact lateralized, this does not mean that when people behave in a certain way or perform a certain activity they are only using one hemisphere of their brains at a time. That would be drastically oversimplifying the concept of brain differences. We normally use both hemispheres at the same time, and the difference between the abilities of the two hemispheres is not absolute (Soroker et al., 2005).

Psychology in Everyday Life: Why Are Some People Left-Handed?

Across cultures and ethnic groups, about 90% of people are mainly right-handed, whereas only 10% are primarily left-handed (Peters, Reimers, & Manning, 2006). This fact is puzzling, in part because the number of left-handers is so low, and in part because other animals, including our closest primate relatives, do not show any type of handedness. The existence of right-handers and left-handers provides an interesting example of the relationship among evolution, biology, and social factors and how the same phenomenon can be understood at different levels of analysis (Harris, 1990; McManus, 2002).

At least some handedness is determined by genetics. Ultrasound scans show that 9 out of 10 fetuses suck the thumb of their right hand, suggesting that usually the preference is determined before birth (Hepper, Wells, & Lynch, 2005), and the mechanism of transmission has been linked to a gene on the X chromosome (Jones & Martin, 2000).

Culture also plays a role. In the past, left-handed children were forced to write with their right hands in many countries, and this practice continues, particularly in collectivistic cultures, such as India and Japan, where left-handedness is viewed negatively as compared with individualistic societies, such as the United States. For example, India has about half as many left-handers as the United States (Ida & Mandal, 2003).

There are both advantages and disadvantages to being left-handed in a world where most people are right-handed. One problem for lefties is that the world is designed for right-handers. Automatic teller machines (ATMs), classroom desks, scissors, microscopes, drill presses, and table saws are just some examples of everyday machinery that is designed with the most important controls on the right side. This may explain in part why left-handers suffer somewhat more accidents than do right-handers (Dutta & Mandal, 2006).

Despite the potential difficulty living and working in a world designed for right-handers, there seem to be some advantages to being left-handed. Throughout history, a number of prominent artists have been left-handed, including Leonardo da Vinci, Michelangelo, Pablo Picasso, and Max Escher. Because the right hemisphere is superior in imaging and visual abilities, there may be some advantage to using the left hand for drawing or painting (Springer & Deutsch, 1998). Left-handed people are also better at envisioning three-dimensional objects, which may explain why there is such a high number of left-handed architects, artists, and chess players in proportion to their numbers (Coren, 1992). However, there are also more left-handers among those with reading disabilities, allergies, and migraine headaches (Geschwind & Behan, 2007), perhaps due to the fact that a small minority of left-handers owe their handedness to a birth trauma, such as being born prematurely (Betancur, Vélez, Cabanieu, & le Moal, 1990).

In sports in which handedness may matter, such as tennis, boxing, fencing, or judo, left-handers may have an advantage. They play many games against right-handers and learn how to best handle their styles. Right-handers, however, play very few games against left-handers, which may make them more vulnerable. This explains why a disproportionately high number of left- handers are found in sports where direct one-on-one action predominates. In other sports, such as golf, there are fewer left-handed players because the handedness of one player has no effect on the competition.

The fact that left-handers excel in some sports suggests the possibility that they may have also had an evolutionary advantage because their ancestors may have been more successful in important skills such as hand-to-hand combat (Bodmer & McKie, 1994). At this point, however, this idea remains only a hypothesis, and determinants of human handedness are yet to be fully understood.

Key Takeaways

- The oldest parts of the brain, including the brain stem and cerebellum, regulate basic survival functions.
- The limbic system regulates feeding, emotions, sex, and memory.
- The cerebral cortex is divided into the right and left cerebral hemispheres and into four lobes.
- The frontal lobe is primarily responsible for thinking, planning, memory, and judgment. The parietal lobe is primarily responsible for bodily sensations and touch. The temporal lobe is primarily responsible for hearing and language. The occipital lobe is primarily responsible for vision. Other areas of the cortex act as association areas, responsible for integrating information.
- The motor cortex controls voluntary movements. Body parts requiring the most control and dexterity take up the most space in the motor cortex.
- The sensory cortex receives and processes bodily sensations. Body parts that are the most sensitive occupy the greatest amount of space in the sensory cortex.
- The brain changes as a function of experience and potential damage in a process known as neuroplasticity. The brain can generate new neurons through neurogenesis.

- The severing of the corpus callosum, which connects the two hemispheres, creates a split-brain patient.
- Studies with split-brain patients as research participants have been used to study brain lateralization.
- The left cerebral hemisphere is primarily responsible for language and speech in most people, whereas the right hemisphere specializes in spatial and perceptual skills, visualization, and the recognition of patterns, faces, and melodies.

Exercises and Critical Thinking

1. Imagine yourself going through a typical day. Which part of the brain will you rely on for each activity? For the next 24 hours, ask yourself what part of the brain you are using as you change behaviors.
2. Consider your own experiences and speculate on which parts of your brain might be particularly well developed as a result of these experiences.
3. Which brain hemisphere are you likely to be using when you search for a fork in the silverware drawer? Which brain hemisphere are you most likely to be using when you struggle to remember the name of an old friend?
4. Do you think that encouraging left-handed children to use their right hands is a good idea? Why or why not?

Videos

1. You can see a humorous reenactment of the split brain research at: http://www.nobelprize.org/educational/medicine/split-brain/splitbrainexp.html
2. Take a journey through the cerebral cortex at: http://epsych.msstate.edu/biological/neuroanatomy/Part3/index.html
3. You can visualize the parts of the brain and manipulate a 3_D model at: http://www.pbs.org/wnet/brain/3d/
   Or at http://www.g2conline.org/ and select 3-D Brain
4. Neuroscientist Michael Merzenich discusses plasticity in the brain. http://www.ted.com/talks/michael_merzenich_on_the_elastic_brain.html

Psychologists Study the Brain Using Many Different Methods

Learning Objective

1. Compare and contrast the techniques that scientists use to view and understand brain structures and functions.

One problem in understanding the brain is that it is difficult to get a good picture of what is going on inside it. But there are a variety of empirical methods that allow scientists to look at brains in action, and the number of possibilities has increased dramatically in recent years with the

introduction of new neuroimaging techniques. In this section, we will consider the various techniques that psychologists use to learn about the brain. Each of the different techniques has some advantages, and when we put them together, we begin to get a relatively good picture of how the brain functions and which brain structures control which activities.

Brain Lesions

The brains of living human beings may be damaged as a result of strokes, falls, automobile accidents, gunshots, or tumors, and these *brain damages* are called **lesions.** In rare occasions, brain lesions may be created intentionally through surgery, such as that designed to remove brain tumors or to reduce the effects of epilepsy, as in split-brain patients. Psychologists also sometimes intentionally create lesions in animals to study the effects on their behavior. In so doing, they hope to be able to draw inferences about the likely functions of human brains from the effects of the lesions in animals.

Lesions allow the scientist to observe any loss of brain function that may occur. For instance, when an individual suffers a stroke, a blood clot deprives part of the brain of oxygen, killing the neurons in the area and rendering that area unable to process information. In some cases, the result of the stroke is a specific lack of ability. For instance, if the stroke influences the occipital lobe, then vision may suffer, and if the stroke influences the areas associated with language or speech, these functions will suffer. In fact, our earliest understanding of the specific areas involved in speech and language were gained by studying patients who had experienced strokes.

Figure 3.12
Areas in the frontal lobe of Phineas Gage were damaged when a metal rod blasted through it. Although Gage lived through the accident, his personality, emotions, and moral reasoning were influenced. The accident helped scientists understand the role of the frontal lobe in these processes. Source: Photo courtesy of John M. Harlow, http://en.wikipedia.org/wiki/File:Phineas_gage_-_1868_skull_diagram.jpg.

It is now known that a good part of our moral reasoning abilities is located in the frontal lobe, and at least some of this understanding comes from lesion studies. For instance, consider the well-known case of Phineas Gage, a 25-year-old railroad worker who, as a result of an explosion, had an iron rod driven into his cheek and out through the top of his skull (see Figure 3.12), causing major damage to his frontal lobe (Macmillan, 2000). Although remarkably Gage was able to return to work after the wounds healed, he no longer seemed to be the same person to those who knew him. The amiable, soft-spoken Gage had become irritable, rude, irresponsible, and dishonest. Although there are questions about the interpretation of this case study (Kotowicz, 2007), it did provide early evidence that the frontal lobe is involved in emotion and morality (Damasio et al., 2005). Koenigs et al. (2007) also found that the frontal lobe is important in moral judgment.

Recording Electrical Activity in the Brain

In addition to lesion approaches, it is also possible to learn about the brain by studying the electrical activity created by the firing of its neurons. One approach, primarily used with animals, is to place detectors in the brain to study the responses of specific neurons. Research using these

techniques has found, for instance, that there are specific neurons, known as feature detectors, in the visual cortex that detect movement, lines and edges, and even faces (Kanwisher, 2000).

A less invasive approach, and one that can be used on living humans, is **electroencephalography (EEG),** which is *a technique that records the electrical activity produced by the brain's neurons through the use of electrodes that are placed around the research participant's head.* An EEG can show if a person is asleep, awake, or anesthetized because the brain wave patterns are known to differ during each state. EEGs can also track the waves that are produced when a person is reading, writing, and speaking, and are useful for understanding brain abnormalities, such as epilepsy. A particular advantage of EEG is that the participant can move around while the recordings are being taken, which is useful when measuring brain activity in children who often have difficulty keeping still. Furthermore, by following electrical impulses across the surface of the brain, researchers can observe changes over very fast time periods.

Peeking Inside the Brain: Neuroimaging

Figure 3.13

Source: Photo courtesy of the University of Oregon Child and Family Center, http://www.uoregon.edu/~cfc/projects-bbl.htm.

A participant in an EEG study has a number of electrodes placed around the head, which allows the researcher to study the activity of the person's brain. The patterns of electrical activity vary depending on the participant's current state (e.g., whether he or she is sleeping or awake) and on the tasks the person is engaging in.

Although the EEG can provide information about the general patterns of electrical activity within the brain, and although the EEG allows the researcher to see these changes quickly as they occur in real time, the electrodes must be placed on the surface of the skull and each electrode measures brain waves from large areas of the brain. As a result, EEGs do not provide a very clear picture of the structure of the brain.

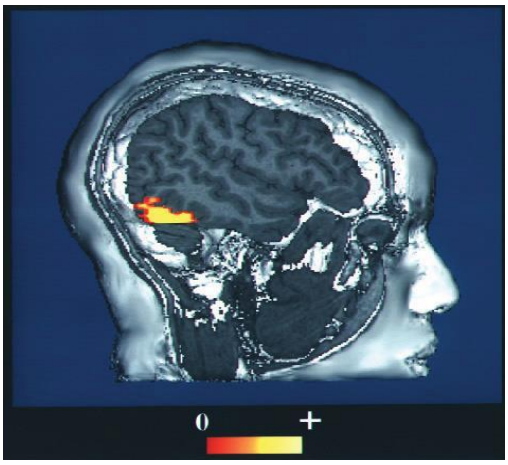
Looking inside the brain can also be accomplished with several techniques. **Computerized Axial Tomography (CT scan)** *uses an X-ray tube to encircle the head, and a cross sectional series of X-rays are combined to produce a three-dimensional image of brain structures.* In traditional **Magnetic Resonance Imaging (MRI),** *magnetic fields are used to differentiate between types of tissue in the brain.* These scans avoid exposing patients to harmful X-rays. Both CT scans and MRIs produce only static images.

Positron Emission Tomography (PET) *monitors the decay of a radioactive isotope which has been injected into the patient.* Rates of decay in different parts of the brain can show which areas are more active. This allows the radiologist to see how the brain is functioning. PET scans are often combined with MRIs or CT scans.

More precise techniques also exist which can provide specific information on structure and function. **Functional Magnetic Resonance Imaging (fMRI)** is *a type of brain scan that uses a magnetic field to create images of brain activity in each brain area*. The patient lies on a bed within a large cylindrical structure containing a very strong magnet. Neurons that are firing use

more oxygen, and the need for oxygen increases blood flow to the area. The fMRI detects the amount of blood flow in each brain region, and thus is an indicator of neural activity.

Figure 3.14 fMRI Image



The fMRI creates brain images of brain structure and activity. In this image the red and yellow areas represent increased blood flow and thus increased activity. From your knowledge of brain structure, can you guess what this person is doing?

Source: Photo courtesy of the National Institutes of Health, http://commons.wikimedia.org/wiki/File:Face_recognition.jpg

Very clear and detailed pictures of brain structures (see Figure 3.14) can be produced via fMRI. Often, the images take the form of cross-sectional slices that are obtained as the magnetic field is passed across the brain. The images of these slices are taken repeatedly and are superimposed on images of the brain structure itself to show how activity changes in different brain structures over time. When the research participant is asked to engage in tasks while in the scanner, for example, by playing a game with another person, the images can show which parts of the brain are associated with which types of tasks. Another advantage of the fMRI is that is it noninvasive. The research participant simply enters the machine and the scans begin.

Although the scanners themselves are expensive, the advantages of fMRIs are substantial, and they are now available in many university and hospital settings. fMRI is now the most commonly used method of learning about brain structure.

There is still one more approach that is being more frequently implemented to understand brain function, and although it is new, it may turn out to be the most useful of all. **Transcranial Magnetic Stimulation (TMS)** is *a procedure in which magnetic pulses are applied to the brain of living persons with the goal of temporarily and safely deactivating a small brain region.* In TMS studies the research participant is first scanned in an fMRI machine to determine the exact location of the brain area to be tested. Then the electrical stimulation is provided to the brain before or while the participant is working on a cognitive task, and the effects of the stimulation on performance are assessed. If the participant's ability to perform the task is influenced by the presence of the stimulation, then the researchers can conclude that this particular area of the brain is important to carrying out the task.

The primary advantage of TMS is that it allows the researcher to draw causal conclusions about the influence of brain structures on thoughts, feelings, and behaviors. When the TMS pulses are applied, the brain region becomes less active, and this deactivation is expected to influence the research participant's responses. Current research has used TMS to study the brain areas responsible for emotion and cognition and their roles in how people perceive intention and approach moral reasoning (Kalbe et al., 2010; Van den Eynde et al., 2010; Young, Camprodon, Hauser, Pascual-Leone, & Saxe, 2010). TMS is also used as a treatment for a variety of psychological conditions, including migraine, Parkinson's disease, and major depressive disorder.

Research Focus: Cyberostracism

Neuroimaging techniques have important implications for understanding our behavior, including our responses to those around us. Naomi Eisenberger and her colleagues (2003) tested the hypothesis that people who were excluded by others would report emotional distress and that images of their brains would show that they experienced pain in the same part of the brain where physical pain is normally experienced. In the experiment, 13 participants were each placed into an fMRI brain-imaging machine. The participants were told that they would be playing a computer "Cyberball" game with two other players who were also in fMRI machines The two opponents did not actually exist, and their responses were controlled by the computer.

Each of the participants was measured under three different conditions. In the first part of the experiment, the participants were told that as a result of technical difficulties, the link to the other two scanners could not yet be made, and thus at first they could not engage in, but only watch, the game play. This allowed the researchers to take a baseline fMRI reading. Then, during a second inclusion scan, the participants played the game, supposedly with the two other players. During this time, the other players threw the ball to the participants. In the third, exclusion, scan, however, the participants initially received seven throws from the other two players but were then excluded from the game because the two players stopped throwing the ball to the participants for the remainder of the scan (45 throws).

The results of the analyses showed that activity in two areas of the frontal lobe was significantly greater during the exclusion scan than during the inclusion scan. Because these brain regions are known from prior research to be active for individuals who are experiencing physical pain, the authors concluded that these results show that the physiological brain responses associated with being socially excluded by others are similar to brain responses experienced upon physical injury.

Further research (Chen, Williams, Fitness, & Newton, 2008; Wesselmann, Bagg, & Williams, 2009) has documented that people react to being excluded in a variety of situations with diverse emotions and behaviors. People who feel that they are excluded, or even those who observe other people being excluded, not only experience pain, but feel worse about themselves and their relationships with people more generally, and they may work harder to try to restore their connections with others.

Key Takeaways

- Lesion studies are informative about the effects of lesions on different brain regions.
- Electrophysiological recording may be used in animals to directly measure brain activity.
- Measures of electrical activity in the brain, such as electroencephalography (EEG), are used to assess brain-wave patterns and activity.
- CT, MRI, PET, fMRI and TMS are all ways to iamge the brain.

Exercise and Critical Thinking

1. Consider the different ways that psychologists study the brain, and think of a psychological characteristic or behavior that could be studied using each of the different techniques.

Videos

1. Neuroscientist Christopher Decharms discusses the use of the fMRI. http://www.ted.com/talks/christopher_decharms_scans_the_brain_in_real_time.html

The Nervous System and the Endocrine System

Learning Objectives

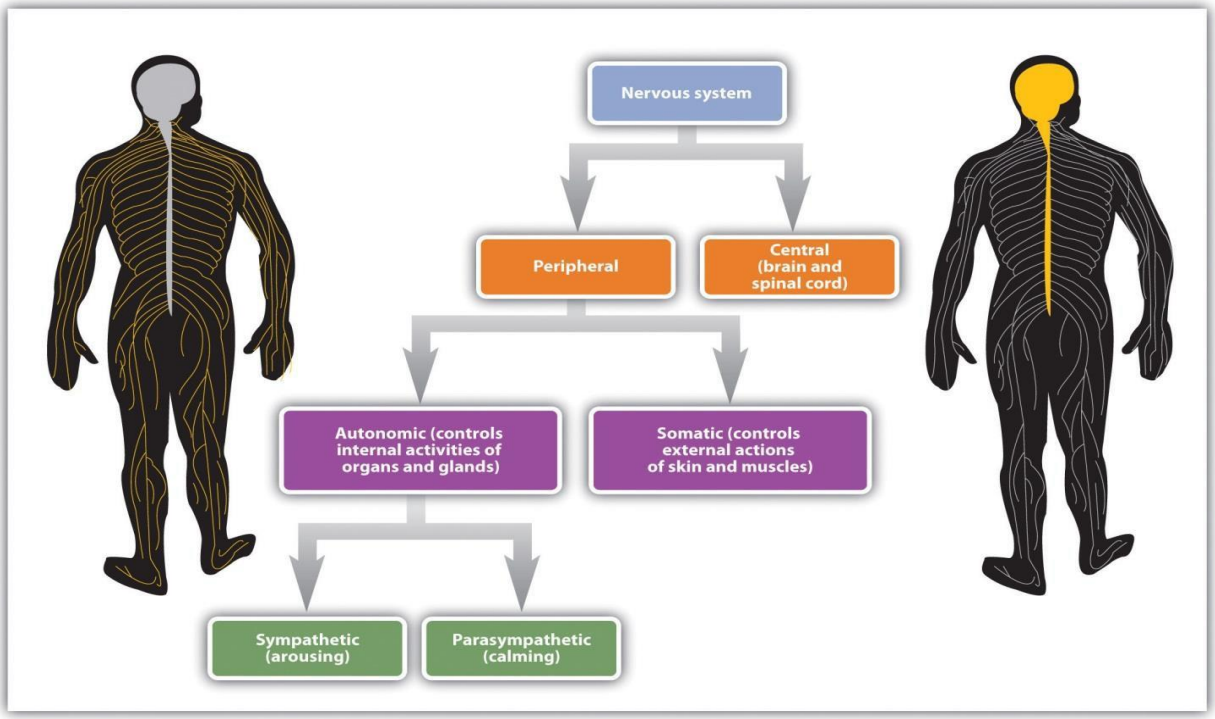
1. Explain the difference between the central, peripheral, sympathetic, parasympathetic, and autonomic nervous systems.
2. Describe the function of hormones.
3. Explain how the nervous system and the endocrine system work together to influence behavior.
4. Explain how the pituitary gland and adrenal glands influence behavior.

Now that we have considered how individual neurons operate and the roles of the different brain areas, it is time to ask how the body manages to "put it all together." How do the complex activities in the various parts of the brain, the simple all-or-nothing firings of billions of interconnected neurons, and the various chemical systems within the body, work together to allow the body to respond to the social environment and engage in everyday behaviors? In this section, we will see that the complexities of human behavior are accomplished through the joint actions of electrical and chemical processes in the nervous system and the endocrine system.

The Nervous System

The nervous system, the electrical information highway of the body, is made up of **nerves**, which are *bundles of interconnected neurons that fire in synchrony to carry messages*. The nervous system has two major divisions. The **central nervous system (CNS),** *made up of the brain and spinal cord,* is the major controller of the body's functions, charged with interpreting sensory information, and responding to it with its own directives. The CNS interprets information coming in from the senses, formulates an appropriate reaction, and sends responses to the appropriate system to respond accordingly. Everything that we see, hear, smell, touch, and taste is conveyed to us from our sensory organs as neural impulses, and each of the commands that the brain sends to the body, both consciously and unconsciously, travels through this system as well. The **peripheral nervous system** ***(PNS)*** *links the CNS to the body's sense receptors, muscles, and glands.*

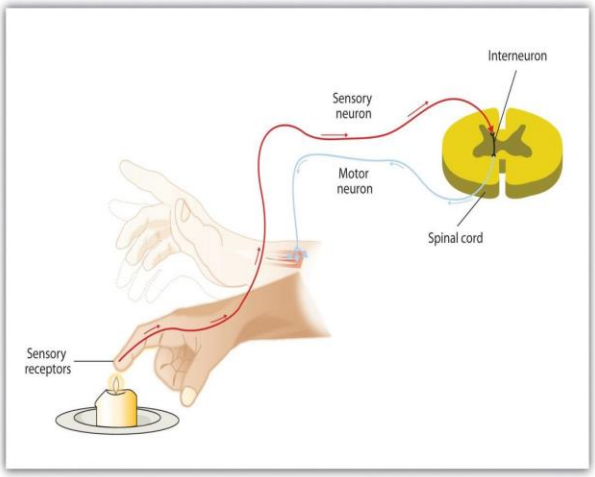
Figure 3.15 The Functional Divisions of the Nervous System



Nerves are differentiated according to their function. A **sensory or afferent neuron** *carries information from the sensory receptors*, whereas a **motor or efferent** neuron *transmits information to the muscles and glands*. Both of these neurons are located in the peripheral nervous system. An **interneuron**, *responsible for communicating among the neurons*, is by far the most common type of neuron, and is located primarily within the central nervous system. Interneurons allow the brain to combine the multiple sources of available information to create a coherent picture of the sensory information being conveyed.

The **spinal cord** is *the long, thin, tubular bundle of nerves and supporting cells that extends down from the brain*. It is the central throughway of information for the body. Within the spinal cord, ascending tracts of sensory neurons relay sensory information from the sense organs to the brain while descending tracts of motor neurons relay motor commands back to the body. When a quicker-than-usual response is required, the spinal cord can do its own processing, bypassing the brain altogether.

Figure 3.16 The Reflex



A **reflex** is *an involuntary and nearly instantaneous movement in response to a stimulus*. Reflexes are triggered when sensory

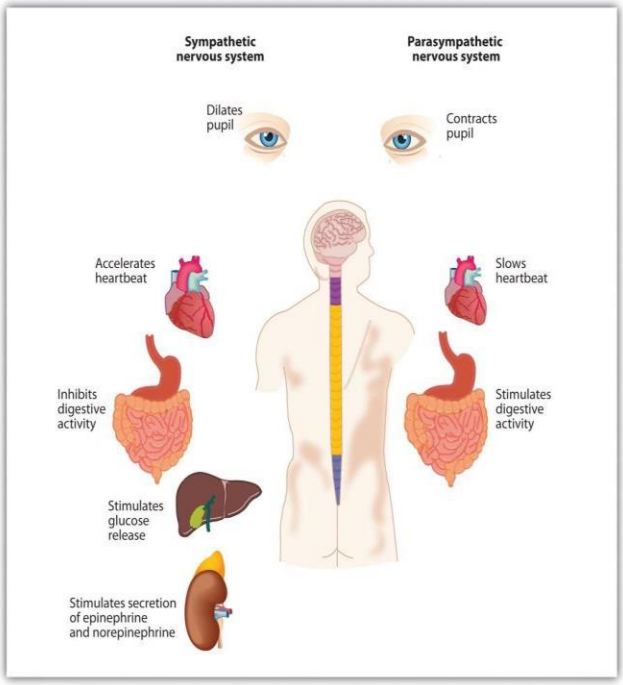
information is powerful enough to reach a given threshold and the interneurons in the spinal cord act to send a message back through the motor neurons without relaying the information to the brain (see Figure 3.16). When you touch a hot stove and immediately pull your hand back, or when you fumble your cell phone and instinctively reach to catch it before it falls, reflexes in your spinal cord order the appropriate responses before your brain even knows what is happening.

The peripheral nervous sytem is divided into two subsystems. The **somatic nervous system (SNS)** is *the division of the PNS that controls the external aspects of the body*, including the skeletal muscles, skin, and sense organs. The somatic nervous system consists primarily of motor nerves responsible for sending brain signals for muscle contraction. We become aware of the world through the sensory division of the somatic nervous system, and we act on the world through the motor division of the somatic nervous system.

The **autonomic nervous system (ANS)** is *the division of the PNS that governs the internal activities of the human body, including heart rate, breathing, digestion, salivation, perspiration, urination, and sexual arousal*. Many of the actions of the ANS, such as heart rate and digestion, are automatic and out of our conscious control, but others, such as breathing and sexual activity, can be controlled and influenced by conscious processes.

The autonomic nervous system itself can be further subdivided into the sympathetic and parasympathetic systems (see Figure 3.17). The **sympathetic division of the ANS** is *involved in preparing the body for behavior, particularly in response to stress, by activating the organs and the glands in the endocrine system*. The **parasympathetic division of the ANS** *tends to calm the body by slowing the heart and breathing and by allowing the body to recover from the activities that the sympathetic system causes*.

Figure 3.17 The Autonomic Nervous System



The sympathetic and the parasympathetic divisions normally function in opposition to each other, such that the sympathetic division acts a bit like the accelerator pedal on a car and the parasympathetic division acts like the brake.

Our everyday activities are controlled by the interaction between the sympathetic and parasympathetic nervous systems. For example, when we get out of bed in the morning, we would experience a sharp drop in blood pressure if it were not for the action of the sympathetic system, which automatically increases blood flow through the body. Similarly, after we eat a big meal, the parasympathetic system automatically sends more blood to the stomach and

intestines, allowing us to efficiently digest the food. Perhaps you have had the experience of not being at all hungry before a stressful event, such as a sports game or an exam when the sympathetic division was primarily in action, but suddenly finding yourself starved afterward, as the parasympathetic takes over. The two systems work together to maintain vital bodily functions, resulting in **homeostasis**, *the natural balance in the body's systems.*

The Endocrine System

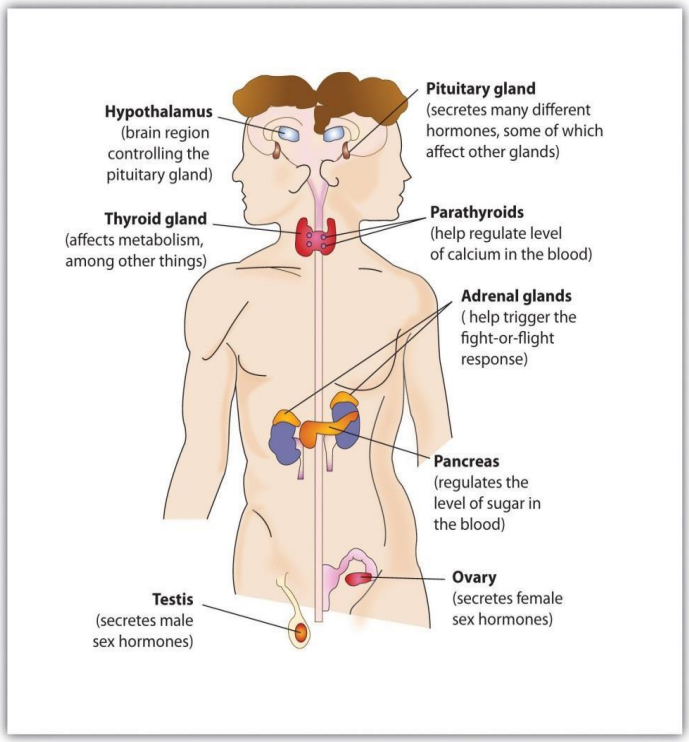
The nervous system is designed to protect us from danger through its interpretation of and reactions to stimuli. However, a primary function of the sympathetic and parasympathetic nervous systems is to interact with the **endocrine system** *the chemical regulation of the body that consists of glands that secrete hormones which influence behavior.*

A **gland** in the endocrine system is made up of *groups of cells that function to secrete hormones*. A **hormone** is *a chemical that moves throughout the body to help regulate emotions and behaviors*. When the hormones released by one gland arrive at receptor tissues or other glands, these receiving receptors may trigger the release of other hormones, resulting in a series of complex chemical chain reactions. The endocrine system works together with the nervous system to influence many aspects of human behavior, including growth, reproduction, and metabolism, and the endocrine system plays a vital role in emotions. The major glands in the endocrine system are shown in Figure 3.18.

The **pituitary gland**, *a small pea-sized gland located near the center of the brain, is responsible for controlling the body's growth*, but it also has many other influences that make it of primary importance to regulating behavior. The pituitary secretes hormones that influence our responses to pain, as well as, hormones that signal the ovaries and testes to make sex hormones. The pituitary gland also controls ovulation and the menstrual cycle in women. Because the pituitary has such an important influence on other glands, it is sometimes known as the master gland.

Other glands in the endocrine system include the **pancreas,** *which secretes hormones designed to keep the body supplied with fuel to produce and maintain stores of energy;* the **pineal gland,** located in the middle of the brain, *which secretes melatonin, a hormone that helps regulate the*

Figure 3.18 The Major Glands of the Endocrine System



The male is shown on the left and the female on the right.

wake-sleep cycle; and the **thyroid** and **parathyroid glands**, *which are responsible for determining how quickly the body uses energy and hormones, and controlling the amount of calcium in the blood and bones.*

The body has two triangular **adrenal glands**, one atop each kidney, *which produce hormones that regulate salt and water balance in the body, and they are involved in metabolism, the immune system, and sexual development and function*. The most important function of the adrenal glands is to secrete the hormones epinephrine and norepinephrine when we are excited, threatened, or stressed.

Epinephrine and norepinephrine stimulate the sympathetic division of the ANS, causing increased heart and lung activity, dilation of the pupils, and increases in blood sugar, which give the body a surge of energy to respond to a threat. The activity and role of the adrenal glands in response to stress provides an excellent example of the close relationship and interdependency of the nervous and endocrine systems. A quick-acting nervous system is essential for immediate activation of the adrenal glands, while the endocrine system mobilizes the body for action.

The male sex glands, known as the **testes**, secrete a number of hormones, the most important of which is **testosterone**, *the male sex hormone*. Testosterone regulates body changes associated with sexual development, including enlargement of the penis, deepening of the voice, growth of facial and pubic hair, and the increase in muscle growth and strength. The **ovaries**, *the female sex glands*, are located in the pelvis. They produce eggs and secrete the female hormones estrogen and progesterone. **Estrogen** *is involved in the development of female sexual features*. Both estrogen and progesterone are also involved in pregnancy and the regulation of the menstrual cycle.

Recent research has pinpointed some of the important roles of the sex hormones in social behavior. Dabbs, Hargrove, and Heusel (1996) measured the testosterone levels of 240 men who were members of 12 fraternities at two universities. They also obtained descriptions of the fraternities from university officials, fraternity officers, yearbook and chapter house photographs, and researcher field notes. The researchers correlated the testosterone levels and the descriptions of each fraternity. They found that the fraternities with the highest average testosterone levels were also more wild and unruly, and one of these fraternities was known across campus for the crudeness of its behavior. On the other hand, the fraternities with the lowest average testosterone levels were better behaved, friendly and pleasant, academically successful, and socially responsible. Banks and Dabbs (1996) found that juvenile delinquents and prisoners who had high levels of testosterone also acted more violently, and Tremblay et al. (1998) found that testosterone was related to toughness and leadership behaviors in adolescent boys. Although testosterone levels are higher in men than in women, the relationship between testosterone and aggression is not limited to males. Studies have also shown a positive relationship between testosterone and aggression and related behaviors (such as competitiveness) in women (Cashdan, 2003).

It must be kept in mind that the observed relationships between testosterone levels and aggressive behavior that have been found in these studies do not prove that testosterone causes aggression, only that the relationships are correlational. In fact, there is evidence that the relationship between violence and testosterone also goes in the other direction: Playing an aggressive game, such as tennis or even chess, increases the testosterone levels of the winners. Testosterone levels in the losers actually go down (Gladue, Boechler, & McCaul, 1989; Mazur, Booth, & Dabbs, 1992).

Recent research has also begun to document the role that female sex hormones may play in reactions to others. A study about hormonal influences on social-cognitive functioning (Macrae, Alnwick, Milne, & Schloerscheidt, 2002) found that women were more easily able to perceive and categorize male faces during the more fertile phases of their menstrual cycles. Although researchers did not directly measure the presence of hormones, it is likely that phase-specific hormonal differences influenced the women's perceptions.

At this point you can begin to see the important role that hormones play in behavior, but the hormones we have reviewed in this section represent only a subset of the many influences that hormones have on our behaviors. In the chapters to come, we will consider the important roles that hormones play in many other behaviors, including sleeping, sexual activity, and helping and harming others.

Key Takeaways

- The body uses both electrical and chemical systems to communicate.
- The CNS is made up of bundles of nerves that carry messages to and from the PNS.
- Specific nerves, including sensory neurons, motor neurons, and interneurons, each have specific functions.
- The spinal cord may bypass the brain by responding rapidly using reflexes.
- The peripheral nervous system is composed of the autonomic nervous system (ANS) and the somatic nervous system (SNS). The ANS is further divided into the sympathetic (activating) and parasympathetic (calming) nervous systems. These divisions are activated by glands and organs in the endocrine system.
- The endocrine system is composed of glands that secrete hormones. These chemicals influence thoughts, feelings, and behaviors.
- The pituitary gland is a master gland, affecting many other glands.
- Hormones produced by the pituitary and adrenal glands regulate growth, stress, sexual functions, and chemical balance in the body.
- The adrenal glands produce epinephrine and norepinephrine, the hormones responsible for our reactions to stress.
- The sex hormones, testosterone, estrogen, and progesterone, play an important role in sex differences.

Exercises and Critical Thinking

1. Recall a time when you were threatened or stressed. What physiological reactions did you experience in the situation and what aspects of the endocrine system do you think created those reactions?
2. Consider the emotions that you have experienced over the past several weeks. What hormones do you think might have been involved in creating those emotions?

Videos

1. Take a journey through the central nervous system at http://epsych.msstate.edu/biological/neuroanatomy/Part2/index.html (click "next" for feedback).
2. Take a journey through the Peripheral Nervous System: http://epsych.msstate.edu/biological/neuroanatomy/Part1/index.html (progress through all small squares, then click next.

Sleeping and Dreaming

Learning Objectives

1. Explain circadian rhythms.
2. Distinguish among the diferent stages of sleep.
3. Review the disorders that affect sleep and the costs of sleep deprivation.
4. Explain the similarities and differences among the theories of sleep and dreaming.

The lives of all organisms, including humans, are influenced by *regularly occurring cycles of behaviors* known as **biological rhythms**. One important biological rhythm is the annual cycle that guides the migration of birds and the hibernation of bears. Women also experience a 28-day cycle that guides their fertility and menstruation. But perhaps the strongest and most important biorhythm is the daily **circadian rhythm** *that guides the daily waking and sleeping cycle in many animals*.

Many biological rhythms are coordinated by changes in the level and duration of ambient light, for instance, as winter turns into summer and as night turns into day. In some animals, such as birds, the pineal gland in the brain is directly sensitive to light and its activation influences behavior, such as mating and annual migrations. Light also has a profound effect on humans. We are more likely to experience depression during the dark winter months than during the lighter summer months, and exposure to bright lights can help reduce this depression (McGinnis, 2007).

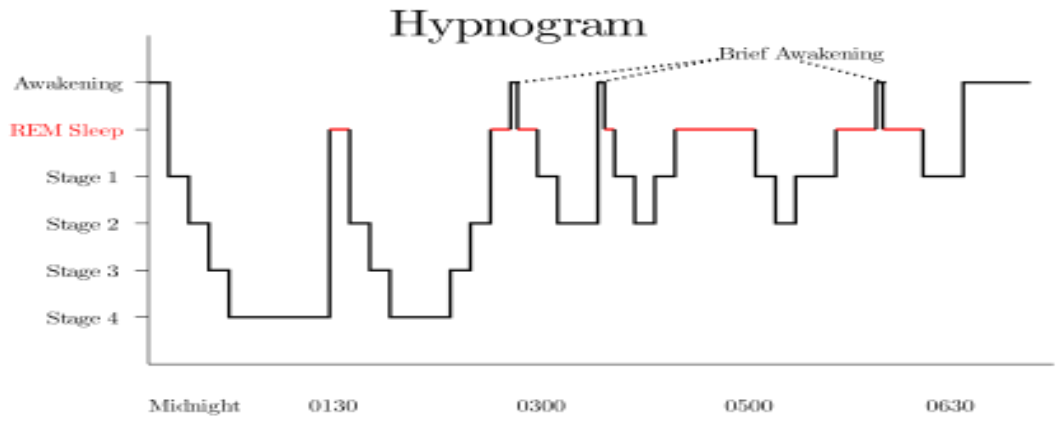
Sleep is also influenced by ambient light. The ganglion cells in the retina send signals to a brain area above the thalamus called the **suprachiasmatic nucleus**, *which is the body's primary circadian pacemaker.* The suprachiasmatic nucleus analyzes the strength and duration of the light stimulus and sends signals to the pineal gland when the ambient light level is low or its duration is short. In response, the pineal gland secretes **melatonin,** *a powerful hormone that facilitates the onset of sleep.*

Sleep Stages

Although we lose consciousness as we sleep, the brain nevertheless remains active. The patterns of sleep have been tracked in thousands of research participants who have spent nights sleeping in research labs while their brain waves were recorded by monitors, such as an EEG. Sleep researchers have found that sleeping people undergo a fairly consistent pattern of sleep stages, each lasting about 90 minutes.

As you can see in Figure 3.19, these stages are of two major types: **Rapid eye movement (REM) sleep** is *a sleep stage characterized by the presence of quick fast eye movements and dreaming.* REM sleep accounts for about 25% of our total sleep time. During REM sleep, our awareness of external events is dramatically reduced, and consciousness is dominated primarily by internally generated images and a lack of overt thinking (Hobson, 2004). During this sleep stage our muscles shut down, and this is probably a good thing as it protects us from hurting ourselves or trying to act out the scenes that are playing in our dreams. The second major sleep type, **non-rapid eye movement (non-REM) sleep** is *a deep sleep, characterized by very slow brain waves, that is further subdivided into four stages: 1, 2, 3, and 4.* Each of the sleep stages has its own distinct pattern of brain activity (Horne, 1988).

Figure 3.19 Stages of Sleep



During a typical night, our sleep cycles move between REM and non-REM sleep, with each cycle repeating at about 90-minute intervals. The deeper non-REM sleep stages usually occur earlier in the night, and more REM sleep (in red) at the end of the sleep cycle.
Wikimedia http://en.wikipedia.org/wiki/Sleep#mediaviewer/File:Sleep_Hypnogram.svg

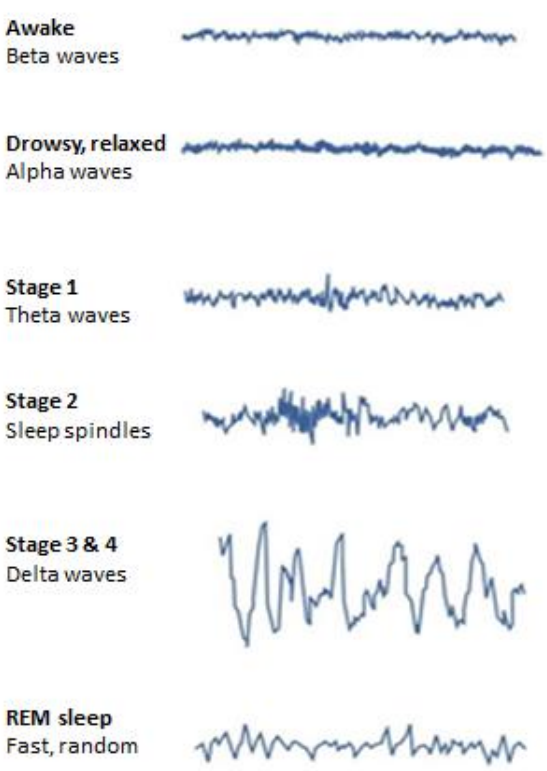
As you can see in Figure 3.20, the brain waves that are recorded by an EEG as we sleep show that the brain's activity changes during each stage of sleeping. When we are awake, our brain activity is characterized by the presence of very fast beta waves. When we first begin to fall asleep, the waves get longer, called alpha waves, and as we move into stage 1 sleep, which is characterized by the experience of drowsiness, the brain begins to produce even slower theta waves. During stage 1 sleep, some muscle tone is lost, as well as most awareness of the environment. Some people may experience sudden jerks or twitches and even vivid hallucinations during this initial stage of sleep. Stage 1 sleep occupies about 5 percent of the night.

Normally, if we are allowed to keep sleeping, we will move from stage 1 to stage 2 sleep. During stage 2 sleep, muscular activity is further decreased and conscious awareness of the environment is lost. This stage typically represents about half of the total sleep time in normal adults. Stage 2 sleep is characterized by theta waves interspersed with *bursts of rapid brain activity* known as **sleep spindles**.

Stage 3 is a transition phase between stages 2 and 4. Stage 4, also known as **slow wave sleep**, *is the deepest level of sleep, characterized by an increased proportion of very slow delta waves.* This is the stage in which most sleep abnormalities, such as sleepwalking, sleeptalking, sleep terrors, and bed-wetting occur.

Some skeletal muscle tone remains, making it possible for affected individuals to rise from their beds and engage in sometimes very complex behaviors, but consciousness is distant. Even in the deepest sleep, however, we are still aware of the external world. If smoke enters the room or if we hear the cry of a baby we are likely to react, even though we are sound asleep. These occurrences again demonstrate the extent to which we process information outside consciousness.

Figure 3.20 EEG Recordings of Brain Patterns During Sleep



Each stage of sleep has its own distinct pattern of brain activity. Non-Rem Stage 3 and 4 demonstrate delta waves.

After falling initially into a very deep sleep, the brain begins to become more active again, and we normally move into the first period of REM sleep about 90 minutes after falling asleep. REM sleep is accompanied by an increase in heart rate, facial twitches, and the repeated rapid eye movements that give this stage its name. People who are awakened during REM sleep almost always report that they were dreaming, while those awakened in other stages of sleep report dreams much less often. REM sleep is also emotional sleep. Activity in the limbic system, including the amygdala, is increased during REM sleep, and the genitals become aroused, even if the content of the dreams we are having is not sexual. A typical 25-year-old man may have an erection nearly half of the night, and the common "morning erection" is left over from the last REM period before waking.

Normally we will go through several cycles of REM and non-REM sleep each night (see Figure 3.19). The length of the REM portion of the cycle tends to increase through the night, from about 5 to 10 minutes early in the night to 15 to 20 minutes shortly before awakening in the morning. Dreams also tend to become more elaborate and vivid as the night goes on. Eventually, as the sleep cycle finishes, the brain resumes its faster alpha and beta waves and we awake, normally refreshed.

Sleep-Wake Disorders

According to a recent poll (National Sleep Foundation, 2009), about one-fourth of American adults say they get a good night's sleep only a few nights a month or less. These people are suffering from an **insomnia disorder**, defined as *persistent difficulty falling or staying asleep*. Most cases of insomnia are temporary, lasting from a few days to several weeks, but in some cases insomnia can last for years.

Figure 3.21

Taking pills to sleep is not recommended unless all other methods of improving sleep have been tried. © Thinkstock

Insomnia can result from physical disorders, such as pain due to injury or illness, or from psychological problems such as stress, financial worries, or relationship difficulties. Changes in sleep patterns, such as jet lag, changes in work shift, or even the movement to or from daylight savings time can produce insomnia. Sometimes the sleep that the insomniac does get is disturbed and nonrestorative, and the lack of quality sleep produces impairment of functioning during the day. Ironically, the problem may be compounded by people's anxiety over insomnia itself. Their fear of being unable to sleep may wind up keeping them awake. Some people may also develop a conditioned anxiety to the bedroom or the bed.

People who have difficulty sleeping may turn to drugs to help them sleep. Barbiturates, benzodiazepines, and other sedatives are frequently marketed and prescribed as sleep aids, but they may interrupt the natural stages of the sleep cycle, and in the end, are likely to do more harm than good. In some cases, they may also promote dependence. Most practitioners of sleep medicine today recommend making environmental and scheduling changes first, followed by therapy for underlying problems, with pharmacological remedies used only as a last resort.

According to the National Sleep Foundation, some steps that can be used to combat insomnia include the following:

- Use the bed and bedroom for sleep and sex only. Do not spend time in bed during the day.
- Establish a regular bedtime routine and a regular sleep-wake schedule.
- Think positively about your sleeping and try not to get anxious just because you are losing a little sleep.
- Do not eat or drink too much close to bedtime.
- Create a sleep-promoting environment that is dark, cool, and comfortable.
- Avoid disturbing noises and consider a bedside fan or white-noise machine to block out disturbing sounds.
- Consume less or no caffeine, particularly late in the day.
- Avoid alcohol and nicotine, especially close to bedtime.
- Exercise, but not within 3 hours before bedtime.
- Avoid naps, particularly in the late afternoon or evening.
- Keep a sleep diary to identify your sleep habits and patterns that you can share with your doctor.

Another common sleep problem is **sleep apnea**, *a sleep disorder characterized by pauses in breathing that last at least 10 seconds during sleep* (Morgenthaler, Kagramanov, Hanak, & Decker, 2006). In addition to preventing restorative sleep, sleep apnea can also cause high blood pressure and may raise the risk of stroke and heart attack (Yaggi et al., 2005).

Most sleep apnea is caused by an obstruction of the walls of the throat that occurs when we fall asleep. It is most common in obese or older individuals who have lost muscle tone and is particularly common in men. Sleep apnea caused by obstructions is usually treated with an air machine that uses a mask to create a continuous pressure that prevents the airway from collapsing, or with mouthpieces that keep the airway open. If all other treatments have failed, sleep apnea may be treated with surgery to open the airway.

Narcolepsy is *a disorder characterized by extreme daytime sleepiness with frequent episodes of nodding off.* The syndrome may also be accompanied by attacks of **cataplexy**, *in which the individual loses muscle tone, resulting in a partial or complete collapse.* It is estimated that at least 200,000 Americans suffer from narcolepsy, although only about a quarter of these people have been diagnosed (National Heart, Lung, and Blood Institute, 2008).

Narcolepsy is in part the result of genetics; that is, people who suffer from the disease lack neurotransmitters that are important in keeping us alert (Taheri, Zeitzer, & Mignot, 2002), and is also the result of a lack of deep sleep. While most people descend through the sequence of sleep stages, then move back up to REM sleep soon after falling asleep, narcolepsy sufferers move directly into REM and undergo numerous awakenings during the night, often preventing them from getting good sleep.

Narcolepsy can be treated with stimulants, such as amphetamines, to counteract the daytime sleepiness, or with antidepressants to treat a presumed underlying depression. However, since these drugs further disrupt already-abnormal sleep cycles, these approaches may, in the long run, make the problem worse. Many sufferers find relief by taking a number of planned short naps during the day, and some individuals may find it easier to work in jobs that allow them to sleep during the day and work at night.

Other sleep disorders occur when cognitive or motor processes that should be turned off or reduced in magnitude during sleep operate at higher than normal levels (Mahowald & Schenck, 2000). One example is **somnambulism** or *sleepwalking* in which the person leaves the bed and moves around while still asleep. Sleepwalking is more common in childhood, with the most frequent occurrences around the age of 12 years. About 4% of adults experience somnambulism (Mahowald & Schenck, 2000).

Sleep terrors is a *disruptive sleep disorder, most frequently experienced in childhood that may involve loud screams and intense panic.* The sufferer cannot wake from sleep even though he or she is trying to. In extreme cases, sleep terrors may result in bodily harm or property damage as the sufferer moves about abruptly. Up to 3% of adults suffer from sleep terrors, which typically occur in non-REM sleep stage four (Mahowald & Schenck, 2000).

Other sleep disorders include **bruxism**, in which *the sufferer grinds his teeth during sleep;* **restless legs syndrome**, in which *the sufferer reports an itching, burning, or otherwise uncomfortable*

feeling in his legs, usually exacerbated when resting or asleep; and **periodic limb movement disorder,** which involves *sudden involuntary movement of limbs*. The latter can cause sleep disruption and injury for both the sufferer and bed partner.

Although many sleep disorders occur during non-REM sleep, **REM sleep behavior disorder** (Mahowald & Schenck, 2005) is a condition, thought to be neurological in nature, in which *people, especially middle-aged or older men, engage in vigorous and bizarre physical activities during REM sleep in response to intense, violent dreams.* As their actions may injure themselves or their sleeping partners, this disorder is normally treated with medications.

Why do we sleep?

Currently there is no consensus on the function of sleep for humans or other animals (Harrison, 2012). However, there are several theories.

Evolutionary Theory: From an evolutionary perspective, sleep has evolved as a function of homeostasis and the circadian rhythms discussed earlier. Our sleep patterns have adjusted to the environmental demands placed on us including climate, seasonal patterns and predators. Our preferred sleep times and our sleep requirements vary throughout our life cycle. Newborns tend to sleep between 16 and 18 hours per day, preschoolers tend to sleep between 10 and 12 hours per day, school-aged children and teenagers usually prefer at least 9 hours of sleep per night, and most adults say that they require 7 to 8 hours per night (Mercer, Merritt, & Cowell, 1998; National Sleep Foundation, 2008). There are also individual differences in need for sleep. Some people do quite well with fewer than 6 hours of sleep per night, whereas others need 9 hours or more. The most recent study by the National Sleep Foundation suggests that adults should get between 7 and 9 hours of sleep per night (see Figure 3.22), and yet Americans now average fewer than 7 hours.

Figure 3.22 Average Hours of Required Sleep per Night

How much sleep do you really need?

Age	Sleep needs
Newborns (0–2 months)	12 to 18 hours
Infants (3–11 months)	14 to 15 hours
Toddlers (1–3 years)	12 to 14 hours
Preschoolers (3–5 years)	11 to 13 hours
School-age children (5–10 years)	10 to 11 hours
Teens (10–17 years)	8.5 to 9.25 hours
Adults	7 to 9 hours

Restoration Theory: Sleep has a vital restorative function and a prolonged lack of sleep results in increased anxiety, diminished performance, and, if severe and extended, may even result in death. In 1964, 17-year-old high school student Randy Gardner remained awake for 264 hours (11 days) in

order to set a new Guinness World Record. At the request of his worried parents, he was monitored by a U.S. Navy psychiatrist, Lt. Cmdr. John J. Ross. The chart in Figure 3.23 maps the progression of his behavioral changes over the 11 days.

Research shows that after sleep loss there is a rebound of non-REM sleep to compensate for the loss (Harrison, 2012). Many road accidents involve sleep deprivation, and people who are sleep deprived show decrements in driving performance similar to those who have ingested alcohol (Hack, Choi, Vijayapalan, Davies, & Stradling, 2001; Williamson & Feyer, 2000). Poor treatment by doctors (Smith- Coggins, Rosekind, Hurd, & Buccino, 1994) and a variety of industrial accidents have also been traced in part to the effects of sleep deprivation

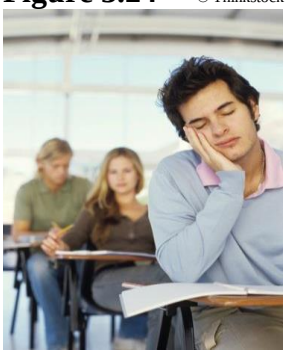
Figure 3.23 The Effects of Sleep Deprivation

Source: Adapted from Ross, J. J. (1965). Neurological findings after prolonged sleep deprivation. *Archives of Neurology*, *12*, 399–403.

Health and Growth: Good sleep is also important to our health and longevity. It is no surprise that we sleep more when we are sick, because sleep works to fight infection. Sleep deprivation suppresses immune responses that fight off infection, and can lead to obesity, memory impairment, and hypertension (Ferrie et al., 2007; Kushida, 2005). Sleeping well can even save our lives. Dew et al. (2003) found that older adults who had better sleep patterns also lived longer. Additionally, during slow wave sleep the pituitary gland releases a surge of growth hormone. No nighttime surge is noted when the individual is awake, only when asleep (Dijk & Lazar, 2012).

Memory Consolidation: Lastly, sleep is linked to the formation of memories and learning. Sleep has been implicated in the encoding process as well as the consolidation of memory (Walker, 2012). Under conditions of sleep deprivation using fMRI, deficits are noted in regions of the hippocampus, which are critical for learning new information. Sleep deprivation on memory formation is especially pronounced for emotional material.

Figure 3.24



For college students, getting needed rest is difficult in part because school and work schedules still follow the early-to-rise timetable that was set years ago. We tend to stay up late to enjoy activities in the evening, but then are forced to get up early to go to work or school. The situation is particularly bad for college students, who are likely to combine a heavy academic schedule, an active social life, and work. Getting enough sleep is a luxury that many of us seem to be unable or unwilling to afford, and yet sleeping is one of the most important things we can do for ourselves. Continued over time, a nightly deficit of even only 1 or 2 hours can have a substantial impact on mood and performance.

Theories of Dreaming

Dreams are *the succession of images, thoughts, sounds, and emotions that passes through our minds while sleeping*. When people are awakened from REM sleep, they normally report that they have been dreaming, suggesting that people normally dream several times a night but that most dreams are forgotten on awakening (Dement, 1997). The content of our dreams generally relates to our everyday experiences and concerns, and frequently our fears and failures (Cartwright, Agargun, Kirkby, & Friedman, 2006; Domhoff, Meyer-Gomes, & Schredl, 2005). Just like with sleep, there is no consensus on the funtions of dreams, and consequently, we will focus on the three most prominent theories.

Road to the Unconscious: Many cultures regard dreams as having great significance for the dreamer, either by revealing something important about the dreamer's present circumstances or predicting his future. The Austrian psychologist Sigmund Freud (1913/1988) analyzed the dreams of his patients to help him understand their unconscious needs and desires, and psychotherapists still make use of this technique today. Freud believed that the primary function of dreams was **wish fulfillment,** or *the idea that dreaming allows us to act out the desires that we must repress during the day*. He differentiated between the **manifest content** of the dream or *its literal actions*, and its **latent content** or *the hidden psychological meaning of the dream*. Freud believed that the real meaning of dreams is often suppressed by the unconscious mind in order to protect the individual from thoughts and feelings that are hard to cope with. By uncovering the real meaning of dreams through psychoanalysis, Freud believed that people could better understand their problems and resolve the issues that create difficulties in their lives.

Information Processing: Although Freud and others have focused on the meaning of dreams, other theories about the causes of dreams are less concerned with their content. One possibility is that we dream primarily to help with consolidation, or the moving of information into long-term memory (Alvarenga et al., 2008; Zhang (2004). Rauchs, Desgranges, Foret, and Eustache (2005) found that rats that had been deprived of REM sleep after learning a new task were less able to perform the task again later than were rats that had been allowed to dream, and these differences were greater on tasks that involved learning unusual information or developing new behaviors. Payne and Nadel (2004) argued that the content of dreams is the result of consolidation when we dream about the things that are being moved into long-term memory. Thus, dreaming may be an important part of the learning that we do while sleeping (Hobson, Pace-Schott, and Stickgold, 2000).

Activation-Synthesis Theory: The activation-synthesis theory of dreaming (Hobson & McCarley, 1977; Hobson, 2004) proposes still another explanation for dreaming; that is, dreams are our brain's interpretation of the random firing of neurons in the brain stem. According to this theory, the signals from the brain stem are sent to the cortex, just as they are when we are awake, but because the pathways from the cortex to skeletal muscles are disconnected during REM sleep, the cortex does not know how to interpret the signals. As a result, the cortex strings the messages together into the coherent stories we experience as dreams.

Although researchers are still trying to determine the exact causes of dreaming, one thing remains clear, and that is we need to dream. If we are deprived of REM sleep, we quickly become less able to engage in the important tasks of everyday life, until we are finally able to dream again.

Key Takeaways

- Human and animal behavior is influenced by biological rhythms, including annual, monthly, and circadian rhythms.
- Sleep consists of two major stages: REM and non-REM sleep. Non-REM sleep has four substages, known as stages 1, 2, 3, and 4.
- Each sleep stage is marked by a specific pattern of biological responses and brain wave patterns.
- Sleep is essential for adequate functioning during the day. Sleep disorders, including insomnia, sleep apnea, and narcolepsy, may make it hard for us to sleep well.
- Dreams occur primarily during REM sleep. Some theories of dreaming, such Freud's, are based on the content of the dreams. Other theories of dreaming propose that dreaming is related to memory consolidation. The activation-synthesis theory of dreaming is based only on neural activity.

Exercises and Critical Thinking

1. If you happen to be home alone one night, try this exercise: At nightfall, leave the lights and any other powered equipment off. Does this influence what time you go to sleep as opposed to your normal sleep time?
2. Review your own sleep patterns. Are you getting enough sleep? What makes you think so?
3. Review some of the dreams that you have had recently. Consider how each of the theories of dreaming discussed would explain your dreams.

Chapter Summary

All human behavior, thoughts, and feelings are produced by the actions of our brains, nerves, muscles, and glands.

The body is controlled by the nervous system, consisting of the central nervous system (CNS) and the peripheral nervous system (PNS) and the endocrine system, which is made up of glands that create and control hormones.

Neurons are the cells in the nervous system. Neurons are composed of a soma that contains the nucleus of the cell; a dendrite that collects information from other cells and sends the information to the soma; and a long-segmented fiber, known as the axon, which transmits information away from the cell body toward other neurons and to the muscles and glands.

The nervous system operates using an electrochemical process. An electrical charge moves through the neuron itself, and chemicals are used to transmit information between neurons. Within the neuron, the electrical charge occurs in the form of an action potential. The action potential operates in an all-or-nothing manner.

Neurons are separated by junction areas known as synapses. Neurotransmitters travel across the synaptic space between the terminal button of one neuron and the dendrites of other neurons, where they bind to the dendrites in the neighboring neurons. More than 100 chemical substances produced in the body have been identified as neurotransmitters, and these substances have a wide and profound effect on emotion, cognition, and behavior.

Drugs that we may ingest can be agonists that mimic neurotramsmitters, or they may be antagonists that block the operations of neurotransmitters.

The brain stem is the oldest and innermost region of the brain. It controls the most basic functions of life, including breathing, attention, and reflexes. The brain stem includes the medulla, the pons, and the reticular formation.

The cerebellum, behind the brain stem, is primarily responsible for the coordination of voluntary movement.

Above the brain stem are other older parts of the brain involved in the processing of behavior and emotions, including the thalamus and the limbic system. The limbic system includes the amygdala, the hypothalamus, and the hippocampus.

The cerebral cortex contains about 20 billion nerve cells and 300 trillion synaptic connections, and it is supported by billions more glial cells that surround and link to the neurons. The cerebral cortex is divided into two cerebral hemispheres, and each hemisphere is divided into four lobes, each separated by folds known as fissures.

The frontal lobe is primarily responsible for thinking, planning, memory, and judgment. The parietal lobe is responsible for processing information about touch and locating objects in space. The occipital lobe processes visual information, and the temporal lobe is responsible for hearing and language.

The cerebral cortex also includes the motor cortex, the somatosensory cortex, the visual cortex, the auditory cortex, and the association areas. Damage to Broca's area can lead to difficulty speaking, and damage in Wernicke’s area produces difficulty with understanding speech.

The brain can develop new neurons, a process known as neurogenesis, as well as new routes for neural communications known as neuroplasticity.

Psychologists study the brain using lesion approaches, as well as through neuroimaging techniques that include electroencephalography (EEG), magnetic resonance imaging (MRI), functional magnetic resonance imaging (fMRI), positron emission tomography (PET), computerized axial tomography (CT), and transcranial magnetic stimulation (TMS).

Sensory or afferent neurons carry information from the sensory receptors, whereas motor or efferent neurons transmit information to the muscles and glands. Both are locatesd in the peripheral nervous system. Interneurons, by far the most common neurons, are located primarily within the CNS and responsible for communicating among the neurons.

The Central Nervous System consists of the brain and spinal cord. The peripheral nervous system is divided into two subsystems, one controlling internal responses called the autonomic nervous system (ANS) and one controlling external responses, called the somatic nervous system. The sympathetic division of the ANS is involved in preparing the body for behavior by activating the organs and the glands in the endocrine system. The parasympathetic division of the ANS tends to calm the body by slowing the heart and breathing and by allowing the body to recover from the activities that the sympathetic system causes.

Glands in the endocrine system include the pituitary gland, the pancreas, the adrenal glands, and the male and female sex glands. The male sex hormone testosterone and the female sex hormones estrogen and progesterone play important roles in behavior and contribute to sex differences. Other hormones also influence thoughts, feelings, and behaviors.

The behavior of organisms is influenced by biological rhythms, including the daily circadian rhythms that guide the waking and sleeping cycle in many animals.

Each of the sleep stages has its own distinct pattern of brain activity. Rapid eye movement (REM) accounts for about 25% of our total sleep time, during which we dream. Non-rapid eye movement (non-REM) sleep is a deep sleep characterized by very slow brain waves, and is further subdivided into four stages: Stages 1, 2, 3, and 4.

Sleep has a vital restorative function, and a prolonged lack of sleep results in increased anxiety, diminished performance, and if severe and extended, even death. Sleep deprivation suppresses immune responses that fight off infection, and can lead to obesity, hypertension, and memory impairment.

Some people suffer from sleep disorders, including insomnia, sleep apnea, narcolepsy, sleepwalking, and REM sleep behavior disorder.

Freud believed that the primary function of dreams was wish fulfillment, and he differentiated between the manifest and latent content of dreams. Other theories of dreaming propose that we dream primarily to help with memory consolidation or the moving of information into long-term memory. The activation-synthesis theory of dreaming proposes that dreams are simply our brain's interpretation of the random firing of neurons in the brain stem.

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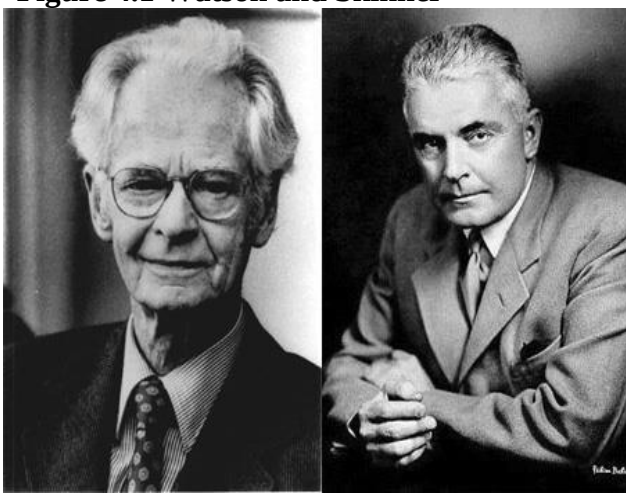
Chapter 4 Learning

Learning Objective

1. Define learning and conditioning.

The topic of this chapter is **learning** defined as *the relatively permanent change in knowledge or behavior that is the result of experience*. You might think of learning in terms of what you need to do before an upcoming exam or new skills that you acquire through practice, but these changes represent only one component of learning. In fact, learning is a broad topic that is also used to explain a wide variety of other psychological changes. Learning even describes how a person acquires a psychological disorder such as Post Traumatic Stress Disorder.

Figure 4.1 Watson and Skinner



John B. Watson (right) and B. F. Skinner (left) were champions of the behaviorist school of learning.
Source: Watson photo
Source: Skinner photo

Learning is perhaps the most important human capacity. Learning allows us to create effective lives by being able to respond to changes. We learn to avoid touching hot stoves, to find our way home from school, and to remember which people have helped us in the past. Without the ability to learn from our experiences, our lives would be remarkably dangerous and inefficient. The principles of learning can also be used to explain a wide variety of social interactions, including social dilemmas in which people make important decisions about how to behave.

The study of learning is closely associated with the behavioral perspective of psychology. Two early leaders in the behaviorist school are John B. Watson and B. F. Skinner. These psychologists focused their research entirely on behavior, excluding mental processes. For behaviorists, learning is a process of **conditioning** which means that *the response to a specific stimulus can be learned.*

Conditioning is just one type of learning. In this chapter, we will also consider learning through insight, cognition, and observation. In each case, we will see not only what psychologists have learned about the topics, but also the important influence that learning has on many aspects of our everyday lives. Additionally, we will see that in some cases learning can be maladaptive.

Classical Conditioning

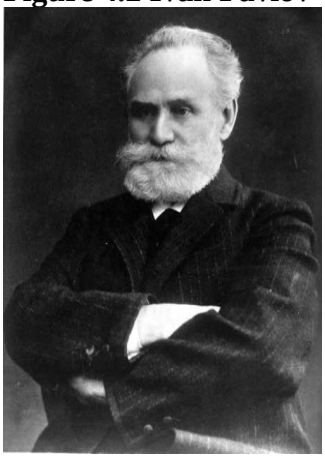
Learning Objectives

1. Explain the process of classical conditioning as described by Pavlov.
2. Differentiate among the concepts of classical conditioning, including neutral stimulus (NS), unconditioned stimulus (US), conditioned stimulus (CS), unconditioned response (UR), and conditioned response (CR).
3. Explain the processes of extinction, spontaneous recovery, stimulus generalization, stimulus discrimination, and second-order conditioning, in learning.
4. Explain how classical conditioning occurs in everyday life through both nature and nurture factors.

Pavlov Demonstrates Conditioning in Dogs

In the early part of the 20th century, Russian physiologist Ivan Pavlov (1849–1936) was studying the digestive system of dogs when he noticed an interesting behavioral phenomenon: The dogs began to salivate as soon as the lab technicians who normally fed them entered the room. Pavlov realized that the dogs were salivating because they knew that they were about to be fed; the dogs had begun to associate the arrival of the technicians with the food that soon followed their appearance in the room.

Figure 4.2 Ivan Pavlov



Ivan Pavlov's research made substantial contributions to our understanding of learning. Source

With his team of researchers, Pavlov began studying this process in more detail. He conducted a series of experiments in which, over a number of trials, dogs were exposed to a sound immediately before receiving food. He systematically controlled the onset of the sound and the timing of the delivery of the food, and recorded the amount of the dogs' salivation. Initially the dogs salivated only when they saw or smelled the food, but after several pairings of the sound and the food, the dogs began to salivate as soon as they heard the sound. The animals had learned to associate the sound with the food that followed.

Pavlov had identified a fundamental associative learning process called classical conditioning. **Classical conditioning** refers to *learning that occurs when a neutral stimulus becomes associated with a stimulus that naturally produces a behavior*. After the association is learned, the previously neutral stimulus is sufficient to produce the behavior.

Psychologists use specific terms to identify the stimuli and the responses in classical conditioning.

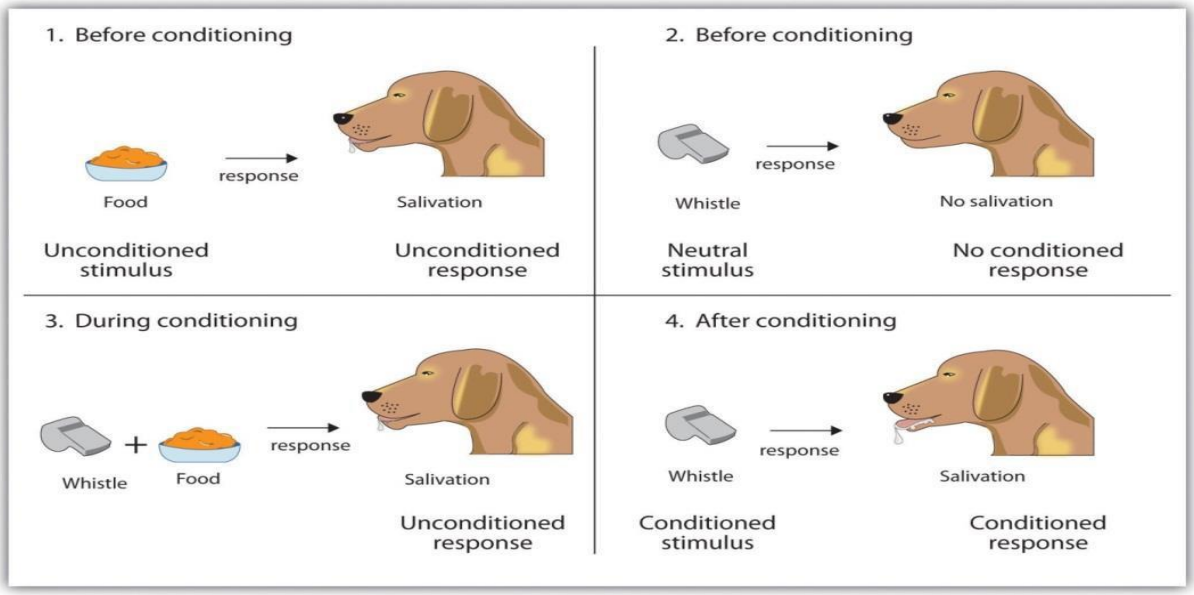
- **Unconditioned stimulus (US)** is *something that triggers a naturally occurring response*.
- **Unconditioned response (UR)** is the *naturally occurring response that follows the unconditioned stimulus*. Some examples of the US-UR pairs include:
    - Sneezing (UR) to pepper (US)
    - Shivering (UR) to cold (US)
    - Blinking (UR) to a bright light (US)

*Notice how all of these responses are reflexive and unlearned, which is why we refer to them as being unconditioned.

- **Neutral stimulus (NS)** *is something that does not naturally produce a response*.
- **Conditioned stimulus (CS)** *is a once neutral stimulus that has been repeatedly presented prior to the unconditioned stimulus and evokes a similar response as the unconditioned stimulus.*
- **Conditioned Response (CR)** *is the acquired response to the conditioned stimulus, which was the formerly neutral stimulus.*

In Pavlov's experiment, the sound of the tone served as the initial neutral stimulus. It became a conditioned stimulus after learning because it produced a conditioned response. Note that the unconditioned response and the conditioned response are the same behavior. In Pavlov's experiment, it was salivation. The unconditioned and conditioned responses are given different names because they are produced by different stimuli. The unconditioned stimulus produces the unconditioned response and the conditioned stimulus produces the conditioned response (see Figure 4.3).

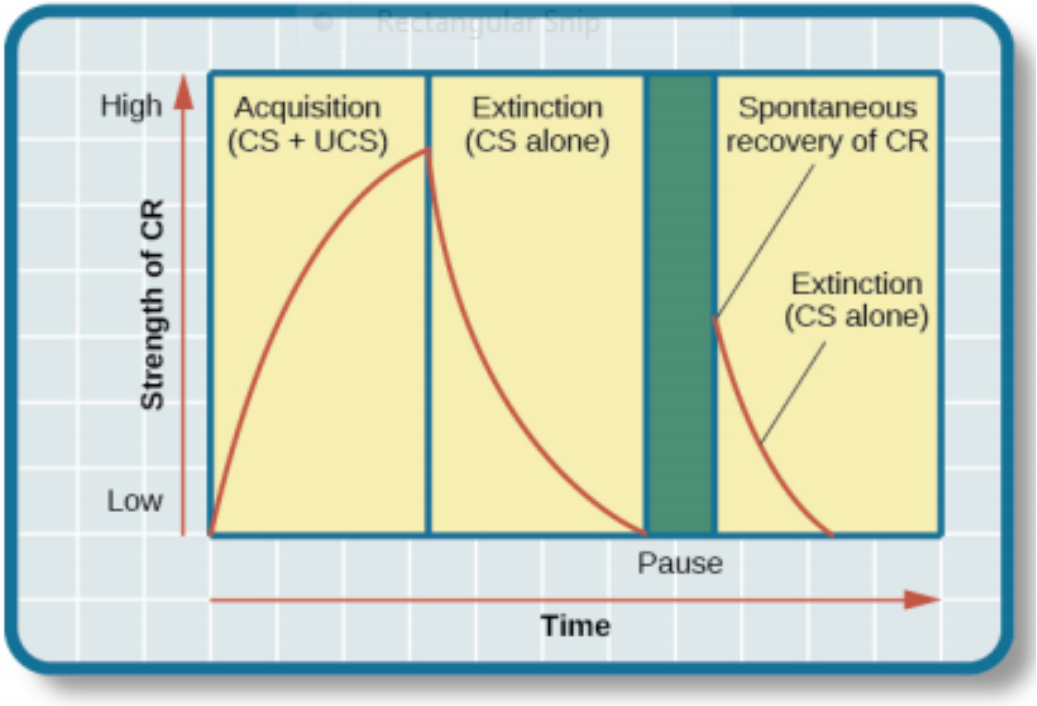
Figure 4.3 Four-Panel Illustration of Classical Conditioning



The Persistence and Extinction of Conditioning

After he had demonstrated that learning could occur through association, Pavlov moved on to study the variables that influenced the strength and the persistence of conditioning. In some studies, after the conditioning had taken place, Pavlov presented the sound repeatedly but without presenting the food afterward. Figure 4.4 shows what happened. As you can see, after the initial acquisition or learning phase in which the conditioning occurred, when the CS was then presented alone, the behavior rapidly decreased. The dogs salivated less and less to the sound, and eventually the sound did not elicit salivation at all. **Extinction** refers to *the reduction in responding that occurs when the conditioned stimulus is presented repeatedly without the unconditioned stimulus.*

Figure 4.4 Acquisition, Extinction, and Spontaneous Recovery



Acquisition: *The CS and the US are repeatedly paired together and behavior increases.*
Extinction: *The CS is repeatedly presented alone, and the behavior slowly decreases.*
Spontaneous Recovery: *After a pause, when the CS is again presented alone, the behavior may again occur and then again show extinction.*
Source

Although at the end of the first extinction period the CS was no longer producing salivation, the effects of conditioning had not entirely disappeared. Pavlov found that, after a pause, sounding the tone again elicited salivation, although to a lesser extent than before extinction took place. *The increase in responding to the CS following a pause after extinction* is known as **spontaneous recovery**. When Pavlov again presented the CS alone, the behavior again showed extinction.

Although the behavior has disappeared, extinction is never complete. If conditioning is again attempted, the animal will learn the new associations much faster than it did the first time.

Stimulus Generalization vs. Stimulus Discrimination

Pavlov also experimented with presenting new stimuli that were similar, but not identical to, the original conditioned stimulus. For instance, if the dog had been conditioned to being scratched before the food arrived, the stimulus would be changed to being rubbed rather than scratched. He found that the dogs also salivated upon experiencing the similar stimulus.

This process is known as **stimulus generalization**, which refers to *the tendency to respond to stimuli that resemble the original conditioned stimulus*. The ability to generalize has important evolutionary significance. If we eat some red berries and they make us sick, it would be a good idea to think twice before we eat some purple berries. Although the berries are not exactly the same, they nevertheless are similar and may have the same negative properties.

Lewicki (1985) conducted research that demonstrated the influence of stimulus generalization and how quickly and easily it occurs. In his experiment, high school students first had a brief interaction with a female experimenter who had short hair and glasses. The study was set up so that the students had to ask the experimenter a question, and according to random assignment, the experimenter responded either in a way that made students feel bad or in a neutral way. Then the students were told to go into a second room in which two experimenters were present, and to approach either one of them. However, the researchers arranged it so that one of the two experimenters looked a lot like the original experimenter, while the other one did not as she had longer hair and no glasses. The students were significantly more likely to avoid the experimenter who looked like the earlier experimenter when that experimenter had been negative to them than when she had treated them more neutrally. The participants showed stimulus generalization, such that the new, similar-looking experimenter created the same negative response in the participants as had the experimenter in the prior session.

The flip side of generalization is **stimulus discrimination** or *the tendency to respond differently to stimuli that are similar but not identical*. Pavlov's dogs quickly learned, for example, to salivate when they heard the specific tone that had preceded food, but not upon hearing similar tones that had never been associated with food. Discrimination is also useful; if we do try the purple berries, and if they do not make us sick, we will be able to make the distinction in the future.

Second-order Conditioning: In some cases, *an existing conditioned stimulus can serve as an unconditioned stimulus for a pairing with a new conditioned stimulus*, and this process is known as **second-order conditioning**. In one of Pavlov's studies, for instance, he first conditioned the dogs to salivate to a sound, and then repeatedly paired a new CS, a black square, with the sound. Eventually he found that the dogs would salivate at the sight of the black square alone, even though it had never been directly associated with the food.

Secondary conditioners in everyday life include our attractions to or fears of things that stand for or remind us of something else. For example, we might feel good (CR) when hearing a particular song (CS) that is associated with a romantic moment (US). If we associate that song with a particular artist, then we may have those same good feelings whenever we hear another song by

that same artist. We now have a favorite performing artist, thanks to second order conditioning, and according to the early behaviorists, we acquired this preference without consciously making the decision.

Classical Conditioning and the Role of Nature

In the beginning, behaviorists argued that all learning is driven by experience, and that nature plays no role. Classical conditioning, which is based on learning through experience, represents an example of the importance of the environment, but classical conditioning cannot be understood entirely in terms of experience. Natural instinct also plays a part. Unconditioned stimulus-response patterns generally represent reflexes that are species-specific. In addition, our evolutionary history has made us more prepared to learn some associations than others. We are more likely to learn a fear of dogs, for example, than a fear of small children, even though both may bite, move suddenly, and make loud noises.

Conditioning is evolutionarily beneficial because it allows organisms to develop expectations that help them prepare for both good and bad events. Imagine, for instance, that an animal first smells a new food, eats it, and then gets sick. If the animal can learn to associate the smell (CS) with the food (US), then it will quickly learn that the food creates the negative outcome, and not eat it the next time. This is referred to as **taste aversion**, *one time learning to avoid a food that made an organism sick*. Generally, the US-UR pairs are reflexive and unlearned. The fact that these pairs are present in all members of a species adds to the evidence that these are the result of evolution.

Even more significant, nature based conditioning is superior to other environmental stimuli present during the conditioning. In his important research on food conditioning, John Garcia and his colleagues (Garcia, Kimeldorf, & Koelling, 1955; Garcia, Ervin, & Koelling, 1966) attempted to condition rats by presenting either a taste, a sight, or a sound as a neutral stimulus before the rats were given drugs (the US) that made them nauseous. Garcia discovered that taste conditioning was extremely powerful and that the rat learned to avoid the taste associated with illness, even if the illness occurred several hours later. Conditioning the behavioral response of nausea to a sight or a sound was much more difficult. These results contradicted the idea that conditioning occurs entirely as a result of environmental events, such that it would occur equally for any kind of unconditioned stimulus that followed any kind of conditioned stimulus. Rather, Garcia's research showed that genetics matters. Organisms are evolutionarily prepared to learn some associations more easily than others, which is referred to as **biological preparedness**. You can see that the ability to associate smells with illness is an important survival mechanism, allowing the organism to quickly learn to avoid foods that are poisonous.

Clinical psychologists make use of classical conditioning to explain the learning of a **phobia**, *a strong and irrational fear of a specific object, activity, or situation*. People are more likely to develop phobias toward objects such as snakes, spiders, heights, and open spaces. In modern society, it is rare for humans to be bitten by spiders or snakes, to fall from trees, or to be attacked by a predator in an open area. Being injured while riding in a car or being cut by a knife are much more likely, but in our evolutionary past, being bitten by snakes or spiders, falling out of a tree, or being trapped in an open space represented survival issues. Therefore, humans are still biologically more prepared to learn associations with these objects or situations (Öhman & Mineka, 2001; LoBue & DeLoache, 2010).

John Watson, described in chapter 1 as the first behaviorist, may have benefitted from this biological preparedness in his work with Little Albert (Seligman, 1970). As you recall from that chapter, Little Albert was the baby who learned to be afraid of a rat. The rat (a neutral stimulus) was paired with a loud noise (the unconditioned stimulus). Little Albert's response to the loud noise was fear (unconditioned response). After conditioning, the rat became a conditioned stimulus which produced a conditioned response of fear. From an evolutionary perspective, people are more prepared to develop a fear of creatures that may spread disease or, especially in the case of babies, harm them.

Classical conditioning has also been used to help explain the experience of posttraumatic stress disorder (PTSD). **PTSD** *is a severe anxiety disorder that can develop after exposure to a fearful event, such as the threat of death* (American Psychiatric Association, 2013). PTSD occurs when the individual develops a strong association between the situational factors that surrounded the traumatic event. For example in war, military uniforms or the sounds and smells (neutral stimuli) become associated with the fearful trauma of war (unconditioned stimulus). As a result of the conditioning, being exposed to similar stimuli, or even thinking about the situation in which the trauma occurred (conditioned stimulus) becomes sufficient to produce the conditioned response of severe anxiety (Keane, Zimering, & Caddell, 1985).

Figure 4.5 The Role of Classical Conditioning and PTSD

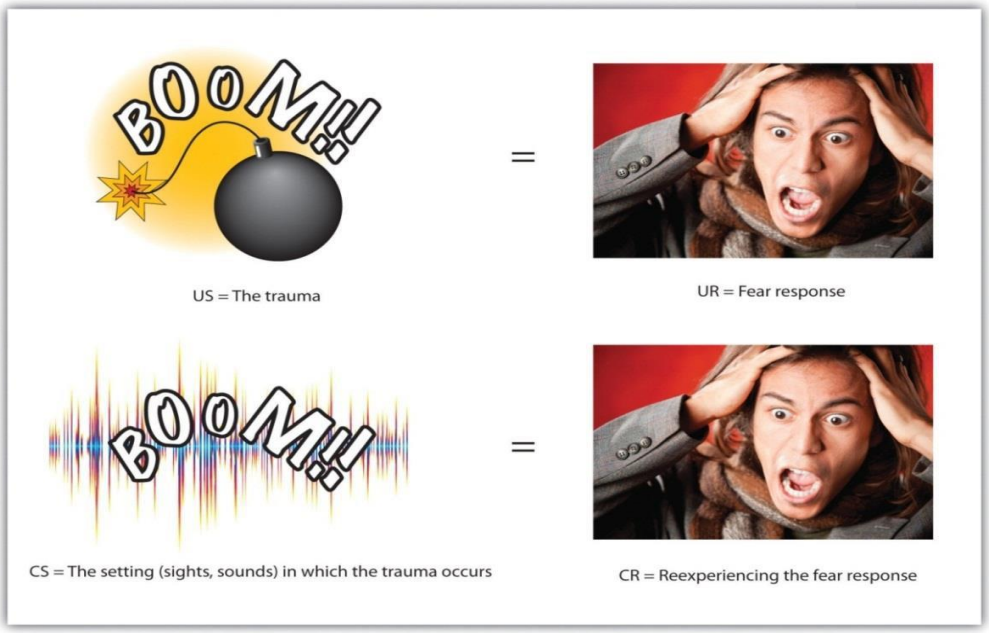


Photo © Thinkstock

PTSD develops because the emotions experienced during the event have produced neural activity in the amygdala and created strong conditioned learning. In addition to the strong conditioning that people with PTSD experience, they also show slower extinction to classical conditioning (Milad et al., 2009). In short, people with PTSD have developed very strong association with the events surrounding the trauma and are also slow to show extinction to the conditioned stimulus.

Key Takeaways

- In classical conditioning, a neutral stimulus is paired with an unconditioned stimulus. The result of the pairing is that the neutral stimulus becomes conditioned or learned and elicits the same response as the unconditioned stimulus
- Extinction occurs when the CS is repeatedly presented without the US, and the CR eventually disappears, although it may reappear later in a process known as spontaneous recovery.
- Stimulus generalization occurs when a stimulus that is similar to an already-conditioned stimulus begins to produce the same response as the original stimulus does.
- Stimulus discrimination occurs when the organism learns to differentiate between the CS and other similar stimuli.
- In second-order conditioning, a neutral stimulus becomes a CS after being paired with a previously established CS.
- Some stimuli, such as response pairs, such as those between smell and food, are more easily conditioned than others because they have been particularly important in our evolutionary past.

Exercises and Critical Thinking

1. A particular song is playing when you first fell in love with a special person. Now, every time you hear the song, you get a warm feeling. Can you explain this response in terms of classical conditioning? Can you label the NS, US, UR, CS, and CR?
2. Recall a time in your life, perhaps when you were a child, when your behaviors were influenced by classical conditioning. Describe in detail the nature of the unconditioned and conditioned stimuli and the response, using the appropriate psychological terms.
3. If posttraumatic stress disorder (PTSD) is a type of classical conditioning, how might psychologists use the principles of classical conditioning to treat the disorder?

Operant Conditioning

Learning Objectives

1. Describe the work of Edward Thorndike and B.F. Skinner.
2. Explain the process of operant conditioning.
3. Define reinforcement, reinforcer, punishment, punisher, shaping, successive approximations, extinction, generalization, discriminative stimulus, primary reinforcer, secondary reinforcer.
4. Explain the difference between positive and negative reinforcement.
5. Explain the difference between positive and negative punishment.
6. Describe the effective use of punishment.
7. Describe the use of behavior modification and a token economy.
8. Differentiate amongh the four partial reinforcement schedules.

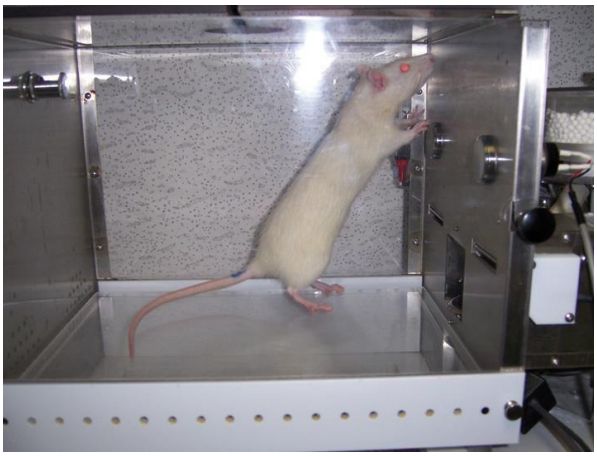
In classical conditioning the organism learns to associate new stimuli with natural, biological responses such as salivation or fear. The organism does not learn something new, but rather begins to perform in an existing behavior in the presence of a new signal. **Operant conditioning**, on the other hand, is *learning that occurs based on the consequences of behavior* and can involve the learning of new actions. Operant conditioning occurs when a dog rolls over on command because it has been praised for doing so in the past, when a schoolroom bully threatens his classmates because doing so allows him to get his way, and when a child gets good grades because her parents threaten to punish her if she does not. In operant conditioning, the organism learns from the consequences of its own actions.

The Research of Thorndike and Skinner

Psychologist Edward L. Thorndike (1874–1949) was the first scientist to systematically study operant conditioning. In his research, Thorndike (1898) observed cats who had been placed in a puzzle box from which they tried to escape. At first the cats scratched, bit, and swatted haphazardly, without any idea of how to get out, but eventually, and accidentally, they pressed the lever that opened the door and exited to their prize, a scrap of fish. The next time the cat was constrained within the box it attempted fewer of the ineffective responses before carrying out the successful escape, and after several trials the cat learned to almost immediately make the correct response.

Observing these changes in the cats' behavior led Thorndike to develop his **law of effect**, *the principle that responses that create a typically pleasant outcome in a particular situation are more likely to occur again in a similar situation, whereas responses that produce a typically unpleasant outcome are less likely to occur again in the same situation* (Thorndike, 1911). The essence of the law of effect is that successful responses are pleasurable. These responses are strengthened or enriched by experience, and thus occur more frequently. Unsuccessful responses, which produce unpleasant experiences, are weakened and subsequently occur less frequently. When Thorndike placed his cats in a puzzle box, he found that they learned to engage in the important escape behavior faster after each trial.

Figure 4.6 Rat in a Skinner Box



B. F. Skinner used a Skinner box to study operant learning. The box contains a bar or key that the organism can press to receive food and water, and a device that records the organism's responses.

Source

The influential behavioral psychologist B. F. Skinner (1904–1990) expanded on Thorndike's ideas to develop a more complete set of principles to explain operant conditioning. Skinner created a specially designed environment known as a **Skinner box,** *which is a structure that is big enough to fit a rodent or bird and that contains a bar or key that the organism can press or peck to release food or water. It also contains a device to record the animal's responses* (see Figure 4.6).

The most basic of Skinner's experiments was quite similar to Thorndike's research with cats. A hungry rat placed in the chamber reacted as one might expect, scurrying about the box and sniffing and clawing at the floor and walls. Eventually the rat chanced upon a lever, which it pressed to release pellets of food. The next time around, the rat took a little less time to press the lever, and on successive trials, the time it took to press the lever became shorter and shorter. Soon the rat was pressing the lever as fast as it could eat the food that appeared. As predicted by the law of effect, the rat had learned to repeat the action that brought about the food and cease the actions that did not.

Reinforcement and Punishment

Skinner studied in detail how animals changed their behavior through **reinforcement,** *which increases the likelihood of a behavior reoccurring*, and **punishment**, *which decreases the likelihood of a behavior reoccurring.* Skinner used the term **reinforcer** to refer to *any event that strengthens or increases the likelihood of a behavior* and the term **punisher** to refer to *any event that weakens or decreases the likelihood of a behavior*. He used the terms positive and negative to refer to whether a reinforcement was presented or removed, respectively.

Reinforcement: There are two ways of reinforcing a behavior: **Positive reinforcement** *strengthens a response by presenting something pleasant after the response* and **negative reinforcement** *strengthens a response by reducing or removing something unpleasant*. For example, giving a child praise for completing his homework is positive reinforcement. Taking aspirin to reduce the pain of a headache is negative reinforcement. In both cases, the reinforcement makes it more likely that behavior will occur again in the future.

Unfortunately, getting a child to do homework is not as simple as giving praise. The rats in Skinner's box were always hungry, so food was always reinforcing. A child is not always in need of praise, especially if some alternate activity (e.g. TV) is providing superior reinforcement. Reinforcement is not a specific item or event. Reinforcement is what increases behavior. People differ in what makes them feel good, and what makes a hungry person feel good is not the same as what will reinforce a full person. Something does not count as reinforcement unless it increases the targeted behavior.

Because people differ in what please them, using reinforcement to control behavior in a group setting is not easy. *Sometimes tokens, such as coins or points, are used as reinforcers in settings such as schools, homes, or prison,* and this is called a **token economy**. These tokens can be exchanged for what the individual finds reinforcing at that time. A child, for example, might be able to use his points for a desired snack or time on the computer. Reinforcement size must still, however, be greater than the reinforcement value of any alternate behavior. A tired teenager, for example, might obtain more reinforcement from sleeping, even if they are offered a lot of money to take a job that starts at 5 a.m.

Punishment: There are two ways to punish a behavior: **Positive punishment** weakens a response by presenting something unpleasant after the response, whereas **negative punishment** weakens a response by reducing or removing something pleasant. A child who is given chores after fighting with a sibling, a type of positive punishment, or who loses out on the opportunity to go to recess after getting a poor grade, a type of negative punishment, is less likely to repeat these behaviors. Consistent use of punishment for a behavior is more effective than occasional punishment. A child who is only occasionally reprimanded for sneaking candy into his room will be more likely to continue. Also, if the punishment is strong, it will be more effective. For example, a $1000 fine for a first-time jaywalking offense will be more likely to deter the behavior in the future than a $10 fine. These terms are summarized in Table 4.1.

Table 4.1 How Positive and Negative Reinforcement and Punishment Influence Behavior

Operant conditioning term	Description	Outcome	Example
Positive reinforcement	Add or increase a pleasant stimulus	Behavior is strengthened	Giving a student a prize after he gets an A on a test
Negative reinforcement	Reduce or remove an unpleasant stimulus	Behavior is strengthened	Taking painkillers that eliminate pain increases the likelihood that you will take painkillers again
Positive punishment	Present or add an unpleasant stimulus	Behavior is weakened	Giving a student extra homework after she misbehaves in class
Negative punishment	Reduce or remove a pleasant stimulus	Behavior is weakened	Taking away a teen's computer after he misses curfew

Discriminative stimuli can *provide clues to let the organism know when reinforcement, or punishment, will occur in response to a behavior*. For example, the presence of other speeding vehicles might let the hurried motorist know that he will be reinforced by arriving sooner at his destination without a ticket. The presence of a police car might alert a driver that punishment will likely occur if they speed. Some motorists slow down when they see a car in their rear-view mirror that resembles a police car. Similar to classical conditioning, this is referred to as stimulus generalization. Drivers are treating the similar stimulus in the same way as they treated the discriminative stimulus.

Reinforcement Schedules

One way to expand the use of operant learning is to modify the schedule on which the reinforcement is applied. To this point we have only discussed a **continuous reinforcement schedule**, in which *the desired response is reinforced every time it occurs*; whenever the dog rolls over, for instance, it gets a biscuit. Continuous reinforcement results in relatively fast learning, but also rapid extinction of the desired behavior once the reinforcer disappears. The problem is that because the organism is used to receiving the reinforcement after every behavior, the responder may give up quickly when it does not appear.

Most real-world reinforcers are not continuous; they occur on a **partial (or intermittent) reinforcement schedule**, which is *a schedule in which the responses are sometimes reinforced, and sometimes not*. In comparison to continuous reinforcement, partial reinforcement schedules lead to slower initial learning, but they also lead to greater resistance to extinction. Because the reinforcement does not appear after every behavior, it takes longer for the learner to determine that the reward is no longer coming, and thus extinction is slower.

Partial reinforcement schedules are determined by whether the reinforcement is:

- **Ratio:** *Based on the number of responses that the organism engages in*
- **Interval**: *Based on the time that elapses between reinforcement*
- **Fixed:** *Based on a regular schedule*
- **Variable**: *Based on an unpredictable schedule*

In a **fixed-ratio schedule**, *a behavior is reinforced after a specific number of responses*. For instance, a rat's behavior may be reinforced after it has pressed a key 20 times, or a salesperson may receive a bonus after she has sold 10 products. As you can see in Figure 4.8, once the organism has learned to act in accordance with the fixed-reinforcement schedule, it will pause only briefly when reinforcement occurs before returning to a high level of responsiveness.

Figure 4.7 Slot Machine

Slot machines are examples of a variable-ratio reinforcement schedule. © Thinkstock

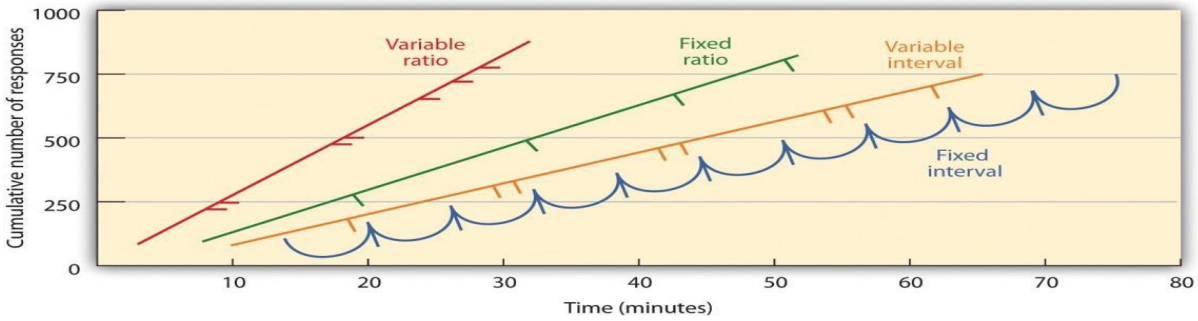
A **variable-ratio schedule** *provides reinforcers after a specific but average number of responses*. Winning money from slot machines or on a lottery ticket are examples of reinforcement that occur on a variable-ratio schedule. For instance, a slot machine may be programmed to provide a win every 20 times the user pulls the handle, on average. As you can see in Figure 4.7 involving slot machines, a variable ratio schedule tends to produce high rates of responding because reinforcement increases as the number of responses increase.

In a **fixed-interval schedule**, *reinforcement occurs for the first response made after a specific amount of time has passed*. For instance, on a one-minute fixed-interval schedule the animal receives a reinforcer every minute, assuming it engages in the behavior at least once during the minute. As you can see in Figure 4.8, animals under fixed-interval schedules tend to slow down

their responding immediately after the reinforcement, but then increase the behavior again as the time of the next reinforcement gets closer. Most students study for exams the same way.

In a **variable-interval schedule**, *the reinforcers appear on an interval schedule, but the timing is varied around the average interval, making the appearance of the reinforcer unpredictable*. An example might be checking your e-mail: You are reinforced by receiving messages that come, on average, say every 30 minutes, but the reinforcement occurs only at random times. Interval reinforcement schedules tend to produce slow and steady rates of responding. The four types of partial reinforcement schedules are summarized in Table 4.2.

Figure 4.8 Examples of Response Patterns by Animals Trained Under Different Partial Reinforcement Schedules



Schedules based on the number of responses (ratio types) induce greater response rate than do schedules based on elapsed time (interval types). Also, unpredictable schedules (variable types) produce stronger responses than do predictable schedules (fixed types).

Source: Adapted from Kassin, S. (2003). *Essentials of psychology*. Upper Saddle River, NJ: Prentice Hall. Retrieved from *Essentials of Psychology* Prentice Hall Companion Website:

Table 4.2 Reinforcement Schedules

Reinforcement schedule	Explanation	Real-world example
Fixed-ratio	Behavior is reinforced after a specific number of responses	Factory workers who are paid according to the number of products they produce
Variable-ratio	Behavior is reinforced after an average, but unpredictable, number of responses	Payoffs from slot machines and other games of chance
Fixed-interval	Behavior is reinforced for the first response after a specific amount of time has passed	People who earn a monthly salary
Variable-interval	Behavior is reinforced for the first response after an average, but unpredictable, amount of time has passed	Person who checks voice mail for messages

Creating Complex Behaviors through Operant Conditioning

Perhaps you remember watching a movie or going to an aquarium in which an animal, maybe a dolphin, did some pretty amazing things. The trainer gave a command and the dolphin swam to the bottom of the pool, picked up a ring on its nose, jumped out of the water through a hoop in the air, dived again to the bottom of the pool, picked up another ring, and then took both of the rings to the trainer at the edge of the pool. The animal was trained to do the trick, and the principles of operant conditioning were used to train it. How can reinforcement be used to create complex behaviors such as these?

Complex behaviors are also created through shaping. **Shaping** is *the process of guiding an organism's behavior to the desired outcome through the reinforcement of successive approximations to a final desired behavior*. Successive approximations are small changes in behavior which move the organism in the right direction. In other words, successive approximations are improvements. Skinner made extensive use of this procedure in his boxes. For instance, he could train a rat to press a bar two times to receive food, by first providing food when the animal moved near the bar. Then when that behavior had been learned he would begin to provide food only when the rat touched the bar. Further shaping limited the reinforcement to only when the rat pressed the bar, to when it pressed the bar and touched it a second time, and finally, to only when it pressed the bar twice. Although it can take a long time, in this way operant conditioning can create chains of behaviors that are reinforced only when they are completed.

Reinforcing animals if they correctly discriminate between similar stimuli allows scientists to test the animals' ability to learn, and the discriminations that they can make are sometimes quite remarkable. Pigeons have been trained to distinguish between images of Charlie Brown and the other Peanuts characters (Cerella, 1980), and between different styles of music and art (Porter & Neuringer, 1984; Watanabe, Sakamoto & Wakita, 1995).

Primary and Secondary Reinforcers

Behaviors can also be trained through the use of secondary reinforcers. Whereas a **primary reinforcer** includes *stimuli that are naturally preferred or enjoyed by the organism, such as food, water, and relief from pain*, a **secondary reinforcer,** *also called a conditioned reinforce,* is a *neutral event that has become associated with a natural primary reinforcer through classical conditioning*. An example of a learned secondary reinforcer would be the whistle given by an animal trainer, which has been associated over time with the primary reinforcer, food. An example of an everyday secondary reinforcer is money. We enjoy having money for the primary reinforcers with which it is associated. For example, money can be used to buy food.

Changing Behavior with Reinforcement and Punishment

It is also important to note that reinforcement and punishment are not simply opposites. The use of positive reinforcement in changing behavior is almost always more effective than using punishment. This is because positive reinforcement makes the person or animal feel better, helping create a positive relationship with the person providing the reinforcement.

Types of positive reinforcement that are effective in everyday life include verbal praise or approval, the awarding of status or prestige, and direct financial payment. Punishment combined with reinforcement for an alternative behavior is more effective than punishment alone.

Punishment is more likely to create only temporary changes in behavior because it is based on coercion and typically creates a negative and adversarial relationship with the person providing the punishment. When the person, who provides the punishment, leaves the situation, the unwanted behavior is likely to return. Additionally, those punished for bad behavior typically change their behavior only to avoid the punishment rather than internalizing the norms of being good for its own sake.

Punishment may also have unintended consequences. Punishment models aggression as a method to control other people (Kohn, 1993). Punishment can cause anxiety which interferes with learning. Emotional punishment, such as criticism or withdrawal of affection, can lead to depression. If punishment is used, it is important to combine the punishment with reinforcement for an alternative behavior. Then the person can leave the situation having learned how to earn positive consequences.

There are alternatives to using punishment in operant conditioning. **Extinction**, for example, *will occur if you remove reinforcement from a previously occurring behavior*. For example, if a child is getting attention for throwing a tantrum, some psychologists recommend that you ignore him. If attention has been the reward for this behavior in the past, removing the attention will cause extinction of the tantrum. In some cases, "time-outs" are a form of extinction for a misbehaving child. The parent takes away the reinforcing situation to eliminate a behavior.

Behavior modification refers to *the deliberate and systematic use of conditioning to modify behavior*. Parents, for example, might want to use behavior modification with their children. A system of rewards and punishments could be used to train children to do chores. Psychologists might design programs using behavior modification for a variety of group settings. Prisons, schools, and mental institutions are examples of places where administrators need to control behavior. Token economies might be established so that individuals received tokens for good behaviors. Tokens could then be exchanged for a variety of rewards. Penalties would be used for less desirable acts, and these penalties could include fines that are paid with tokens.

Although the distinction between reinforcement and punishment is usually clear, in some cases it is difficult to determine whether a reinforcer is positive or negative. On a hot day, a cool breeze could be seen as a positive reinforcer (because it brings in cool air) or a negative reinforcer (because it removes hot air). In other cases, reinforcement can be both positive and negative. One may smoke a cigarette both because it brings pleasure, positive reinforcement, and because it eliminates the craving for nicotine, negative reinforcement. Remember that reinforcement always increases behavior, regardless of whether it is negative or positive. Punishment is the correct term used for a consequence that suppresses behavior.

Key Takeaways

- Edward Thorndike developed the law of effect: The principle that responses that create a typically pleasant outcome in a particular situation are more likely to occur again in a similar situation, whereas responses that produce a typically unpleasant outcome are less likely to occur again in the same situation.
- B. F. Skinner expanded on Thorndike's ideas to develop a set of principles to explain operant conditioning.
- Positive reinforcement strengthens a response by presenting something that is typically pleasant after the response, whereas negative reinforcement strengthens a response by reducing or removing something that is typically unpleasant.
- Positive punishment weakens a response by presenting something typically unpleasant after the response, whereas negative punishment weakens a response by reducing or removing something that is typically pleasant.
- Discriminative stimuli helps us to predict the consequence of a behavior before we do it.
- Reinforcement may be either partial or continuous. Partial reinforcement schedules are determined by whether the reinforcement is presented on the basis of the time that elapses between reinforcements (interval) or on the basis of the number of responses that the organism engages in (ratio), and by whether the reinforcement occurs on a regular (fixed) or unpredictable (variable) schedule.
- Complex behaviors may be created through shaping, the process of guiding an organism's behavior to the desired outcome through the reinforcement of successive approximations to a final desired behavior.
- Primary and secondary reinforcers can also train behaviors.
- Behavior modification is the deliberate and systematic use of conditioning to modify behavior.

Exercises and Critical Thinking

1. Give an example from daily life of each of the following: Positive reinforcement, negative reinforcement, positive punishment, and negative punishment.
2. Consider the reinforcement techniques that you might use to train a dog to catch and return a Frisbee that you throw.
3. Watch the following two videos from current television shows. Can you determine which learning procedures are being demonstrated? How is the concept of negative reinforcement used incorrectly in the second clip? How can you remember the difference between punishment and negative reinforcement?
   a. The Office: http://www.break.com/video/ugc/the-office-altoid-experiment-1499823
   b. The Big Bang Theory: http://www.youtube.com/watch?v=JA96Fba-WHk

Cognition and Conditioning

Learning Objective

1. Understand the role of cognition in conditioning and learning.

Contemporary learning theorists recognize that *internal mental processes*, referred to as **cognition**, also play a role in most instances of classical and operant conditioning (Kirsch & Lynn, 2004). The level of cognition varies according to the situation and according to the individual. At a minimum, almost all agree that for adult humans, expectations are involved in the learning process. For classical conditioning, this means that specific unconditioned and even conditioned stimuli are anticipated. Like Pavlov's dogs, people salivate when they eat. Food is an unconditioned stimulus, and salivation is the unconditioned response. If the lunch break at work happens at noon every day, people learn to associate 12 o'clock (conditioned stimulus) with food (unconditioned stimulus). They may begin to salivate (conditioned response) when they see that time on wall clock. However, people anticipate lunch time even when they cannot see a clock. They may start thinking about lunch at 9 a.m. when someone mentions where they want to go. They may begin to watch the clock and even put away their work well in advance, and they may salivate and get hungry just thinking about food.

Fear responses can also be acquired through expectations, especially since some people are very skilled at imagining painful consequences. For example, the sound of a dentist's drill (conditioned stimulus) is associated with painful stimulation (unconditioned stimulus). The painful stimulation causes anxiety/fear (unconditioned response). For some people, the sound of that drill is enough to make them nervous (conditioned response). They may even experience second order conditioning and fear entering the dentist's office. Expectations of pain can even cause some people to avoid making or keeping appointments with their dentist.

For operant conditioning, reinforcements and punishments are expected and sometimes even requested. The child reminds a parent who has forgotten to provide reinforcement for a chore, and employees request extra pay for working more hours. Placebos, described in chapter 2, provide negative reinforcement for a headache because of the expectation that taking the placebo will remove the headache.

People can also learn to expect that their actions will have no effect on a situation. For example, **learned helplessness** results from *repeated exposure to inescapable, painful events* (Seligman & Maier, 1967). Learned helplessness was originally demonstrated in dogs. One group of dogs was permitted to escape an electrified floor. They quickly learned the behavior required to do this through negative reinforcement. Another group could not avoid the shocks. This group became passive. They had learned to be helpless. Psychologists have demonstrated learned helplessness in a variety of species, including humans. Learned helplessness has been used to explain the passiveness that might accompany repeated academic failure or even abuse. People can sometimes think through a problem and change a pattern of helplessness, though. Cognition and expectations can influence conditioned responses.

Cognition and expectations can also affect the major decisions that people make in life. People start college, change jobs, get married, and have children with the expectation that rewards will

follow. Even when these expectations are unrealistic, the anticipation of pleasure encourages risk-taking and change. This optimism about the future provides its own reward in the form of pleasant daydreams. In fact, this optimism may be adaptive since it encourages people to explore, initiate relationships, and innovate (Sharot, Riccardi, Raio, & Phelps, 2010).

Exercises

1. Imagine being outside on a hot summer day. Someone arrives with a tray of limes, a knife, a pitcher of ice water, a glass and a bowl of sugar. You begin to slice a large, juicy lime, and then slowly squeeze it into the glass. Are these thoughts affecting your salivation? How would seeing a large fly in the bottom of the glass affect your conditioned response?
2. Most children are controlled, at least in part, by punishment and reinforcement. Remember a time as a child when you were conditioned to respond in a particular way. How is your behavior different now? Did your cognitions or expectations produce this change?
3. List the situations in which you anticipate reinforcement. These might include trying a new hobby, getting into a relationship, becoming a parent. Are there situations in which you anticipate punishment? How do these expectations affect your behavior?

Other Forms of Learning based on Cognition

Learning Objectives

1. Understand the principles of learning by insight and latent learning.
2. Explain observational learning, including the research on mirror neurons.
3. Explain how learning principles can be used in advertisement and education.

John B. Watson and B. F. Skinner were behaviorists who believed that all learning could be explained by the processes of conditioning; that is, that associations, and associations alone, influence learning. However, some kinds of learning are very difficult to explain using only conditioning. Thus, although classical conditioning and operant conditioning play a key role in learning, they constitute only a part of the total picture.

Insight: One type of learning that is not determined only by conditioning occurs when we suddenly find the solution to a problem, as if the idea just popped into our head. This type of learning is known as **insight**, *the sudden understanding of a solution to a problem*. The German psychologist Wolfgang Köhler (1925) carefully observed what happened when he presented chimpanzees with a problem that was not easy for them to solve, such as placing food in an area that was too high in the cage to be reached. He found that the chimps first engaged in trial-and-error attempts at solving the problem. When these attempts failed, they seemed to stop and think for a while. After this period of contemplation, they would suddenly seem to know how to solve the problem. For instance, they might use a stick to knock the food down or stand on a chair to

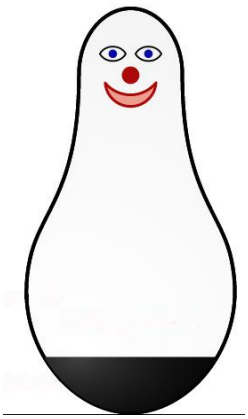
reach it. Köhler argued that it was this flash of insight that allowed the animals to solve the problem.

Latent Learning: Further demonstrating the role of the mind in problem solving, Edward Tolman compared the behavior of three groups of rats that were learning to navigate their way through mazes (Tolman & Honzik, 1930). The first group always received a reward of food at the end of the maze. The second group never received any reward, and the third group received a reward, but only beginning on the 11th day of the experimental period. As you might expect when considering the principles of conditioning, the rats in the first group quickly learned to negotiate the maze, while the rats of the second group seemed to wander aimlessly through it. The rats in the third group, however, although they wandered aimlessly for the first 10 days, quickly learned to navigate to the end of the maze as soon as they received food on day 11. By the next day, the rats in the third group had caught up in their learning to the rats that had been rewarded from the beginning.

It was clear to Tolman that the rats that had been allowed to experience the maze, even without any reinforcement, had nevertheless learned something. Tolman called this **latent learning,** which refers to *learning that is not reinforced and not demonstrated until there is motivation to do so*. Tolman argued that the rats had formed a cognitive map of the maze but did not demonstrate this knowledge until they received reinforcement.

Observational Learning: The idea of latent learning suggests that animals, and people, may learn simply by experiencing or watching. **Observational learning,** also called **modeling**, is *learning by observing the behavior of others*. To demonstrate the importance of observational learning in children, Bandura, Ross, and Ross (1963) showed children a live image of either a man or a woman interacting with a Bobo doll, (see Figure 4.9), a filmed version of the same events, or a cartoon version of the events. The Bobo doll is an inflatable balloon with a weight in the bottom that makes it come back up when you knock it down. In all three conditions, the model violently punched the clown, kicked the doll, sat on it, and hit it with a hammer.

Figure 4.9



The researchers first let the children view one of the three types of modeling, and then let them play in a room in which there were some really fun toys. To create some frustration in the children, Bandura let the children play with the fun toys for only a couple of minutes before taking them away. Then Bandura gave the children a chance to play with the Bobo doll.

If you guessed that most of the children imitated the model, you would be correct. Regardless of which type of modeling the children had seen, and regardless of the sex of the model or the child, the children who had seen the model behaved aggressively, just as the model had done. They also punched, kicked, sat on the doll, and hit it with the toy hammer. Bandura and his colleagues had demonstrated that these children had learned new behaviors, simply by observing and imitating others.

Observational learning is useful for animals and for people because it allows us to learn without having to actually engage in what might be a risky behavior. Monkeys that see other monkeys respond with fear to the sight of a snake learn to fear the snake themselves, even if they have been raised in a laboratory and have never actually seen a snake (Cook & Mineka, 1990). As Bandura put it:

> *The prospects for [human] survival would be slim indeed if one could learn only by suffering the consequences of trial and error. For this reason, one does not teach children to swim, adolescents to drive automobiles, and novice medical students to perform surgery by having them discover the appropriate behavior through the consequences of their successes and failures. The more costly and hazardous the possible mistakes, the heavier is the reliance on observational learning from competent learners (Bandura, 1977, p. 212).*

Although modeling is normally adaptive, it can be problematic for children who grow up in violent families. These children are not only the victims of aggression, but they also see it happening to their parents and siblings. Because children learn how to be parents, in large part by modeling the actions of their own parents, it is no surprise that there is a strong correlation between family violence in childhood and violence as an adult. Children who witness their parents being violent or who are themselves abused are more likely as adults to inflict abuse on intimate partners or their children, and to be victims of intimate violence (Heyman & Slep, 2002). In turn, their children are more likely to interact violently with each other and to aggress against their parents (Patterson, Dishion, & Bank, 1984).

However, although modeling can increase violence, it can also have positive effects. Research has found that, just as children learn to be aggressive through observational learning, they can also learn to be altruistic in the same way (Seymour, Yoshida, & Dolan, 2009). Simple exposure to a model is not enough to explain observational learning. Many children watch violent media and do not become violent. Others watch acts of kindness and do not learn to behave in a similar fashion. A variety of factors have been shown to explain the likelihood that exposure will lead to learning and modeling. Similarity, proximity, frequency of exposure, reinforcement, and likeability of the model are all related to learning. In addition, people can choose what to watch and whom to imitate. Observational learning is dependent on many factors, so people are well advised to select models carefully, both for themselves and their children.

Some scientists now believe that **mirror neurons,** *or nerons that fire when an organism is observing an action,* in the parieto-frontal cortex provide the biological basis for observational learning (Rizzolatti & Sinigaglia, 2010). These neurons were originally identified in monkeys during a research study on the motor cortex. Scientists found that the same neurons fired regardless of whether the monkeys performed an action or merely watched it being performed. Similar research on humans also supports the role of mirror neurons in learning through mental imitation (Carlson, 2014). Neural firing may be less dramatic during observation than during actual performance of a behavior, however. This lower level of neural firing may explain why people inhibit their actions rather than immediately imitate what they see (Villiger, Chandrasekharan, & Welsh, 2011).

Using the Principles of Learning in Advertisement and Education

The principles of learning are some of the most general and most powerful in all of psychology. The principles of learning are applied in numerous ways in everyday settings. For example, operant conditioning has been used to motivate employees, to improve athletic performance, to increase the functioning of those suffering from developmental disabilities, and to help parents successfully toilet train their children (Simek & O'Brien, 1981; Pedalino & Gamboa, 1974; Azrin & Foxx, 1974; McGlynn, 1990). In this section, we will consider how learning theories are used in advertising and education.

Classical conditioning has long been, and continues to be, an effective tool in marketing and advertising (Hawkins, Best, & Coney, 1998). The general idea is to create an advertisement that has positive features, such that the ad creates enjoyment in the person exposed to it. The enjoyable ad serves as the unconditioned stimulus (US), and the enjoyment is the unconditioned response (UR). Because the product being advertised is mentioned in the ad, it becomes associated with the US, and then becomes the conditioned stimulus (CS). In the end, if everything has gone well, seeing the product online or in the store will then create a conditioned response (CR) leading him or her to be more likely to purchase the product.

A similar strategy is used by corporations that sponsor teams or events. For instance, if people enjoy watching a college basketball team playing basketball, and if that team is sponsored by a product, such as Pepsi, then people may end up experiencing positive feelings when they view a can of Pepsi. Of course, the sponsor wants to sponsor only good teams and good athletes because these create more pleasurable responses.

Advertisers use a variety of techniques to create positive advertisements, including enjoyable music, cute babies, attractive models, and funny spokespeople. In one study, Gorn (1982) showed research participants pictures of different writing pens of different colors, but paired one of the pens with pleasant music and the other with unpleasant music. When given a choice as a free gift, more people chose the pen color associated with the pleasant music. And Schemer, Matthes, Wirth, and Textor (2008) found that people were more interested in products that had been embedded in music videos of artists that they liked and less likely to be interested when the products were in videos featuring artists that they did not like.

Another type of ad that is based on principles of classical conditioning is one that associates fear with the use of a product or behavior, such as those that show images of lung cancer surgery to discourage smoking. These ads have also been found to be effective (Das, de Wit, & Stroebe, 2003; Perloff, 2003; Witte & Allen, 2000), due in large part to conditioning. When we see a cigarette and the fear of dying has been associated with it, we are hopefully less likely to light up.

Taken together then, there is ample evidence of the utility of classical conditioning, using both positive as well as negative stimuli, in advertising. This does not, however, mean that we are always influenced by these ads. The likelihood of conditioning being successful is greater for products that we do not know much about, where the differences between products are relatively minor, and when we do not think too carefully about the choices (Schemer et al., 2008).

Psychology in Everyday Life: Operant Conditioning in the Classroom

John B. Watson and B. F. Skinner believed that all learning was the result of reinforcement, and thus that reinforcement could be used to educate children. For instance, Watson wrote in his book on behaviorism,

> *Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. I am going beyond my facts and I admit it, but so have the advocates of the contrary and they have been doing it for many thousands of years (Watson, 1930, p. 82)*

Skinner promoted the use of **programmed instruction**, *an educational tool that consists of self-teaching with the aid of a specialized textbook or teaching machine that presents material in a logical sequence* (Skinner, 1965). Programmed instruction allows students to progress through a unit of study at their own rate, checking their own answers and advancing only after answering correctly. Programmed instruction is used today in many classes, for instance to teach computer programming (Emurian, 2009).

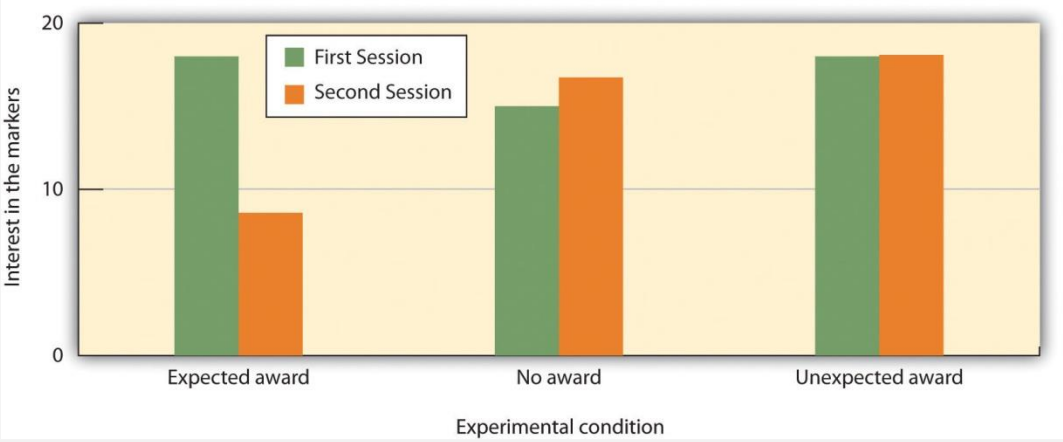
Although reinforcement can be effective in education, and teachers make use of it by awarding gold stars, good grades, and praise, there are also substantial limitations to using reward to improve learning. To be most effective, rewards must be contingent on appropriate behavior. In some cases, teachers may distribute rewards indiscriminately, for instance by giving praise or good grades to children whose work does not warrant it, in the hope that they will feel good about themselves, and that this self-esteem will lead to better performance. Studies indicate, however, that high self-esteem alone does not improve academic performance (Baumeister, Campbell, Krueger, & Vohs, 2003). When rewards are not earned, they become meaningless and no longer provide motivation for improvement.

Another potential limitation of rewards is that they may teach children that the activity should be performed for the reward, rather than for one's own interest in the task. If rewards are offered too often, the task itself becomes less appealing. Mark Lepper and his colleagues (Lepper, Greene, & Nisbett, 1973) studied this possibility by leading some children to think that they engaged in an activity for a reward, rather than because they simply enjoyed it. First, they placed some fun felt-tipped markers in the classroom of the children they were studying. The children loved the markers and played with them right away. Then, the markers were taken out of the classroom, and the children were given a chance to play with the markers individually at an experimental session with the researcher. At the research session, the children were randomly assigned to one of three experimental groups. One group of children in the expected reward condition was told that if they played with the markers they would receive a good drawing award. A second group in the unexpected reward condition also played with the markers, and also got the award, but they were not told ahead of time that they would be receiving the award; it came as a surprise after the session. The third group, or the no reward group, played with the markers too, but got no award.

Then, the researchers placed the markers back in the classroom and observed how much the children in each of the three groups played with them. As you can see in Figure 4.10, the children who had been led to expect a reward for playing with the markers during the experimental session played with the markers less at the second session than they had at the first session. The idea is that, when the children had to choose whether or not to play with the markers when the markers reappeared in the classroom, they based their decision on their own prior behavior. The children in the no reward groups and the children in the unexpected reward groups realized that they played with the markers because they liked them. Children in the expected award condition, however, remembered that they were promised a reward for the activity the last time they played with the markers. These children, then, were more likely to draw the inference that they play with the markers only for the external reward, and because they did not expect to get an award for playing with the markers in the classroom, they determined that they did not like them. Expecting to receive the award at the session had undermined their initial interest in the markers.

This research suggests that, although giving rewards may in many cases lead us to perform an activity more frequently or with more effort, reward may not always increase our liking for the activity. In some cases, rewards may actually make us like an activity less than we did before we were rewarded for it. This outcome is particularly likely when the reward is perceived as an obvious attempt on the part of others to get us to do something.

Figure 4.10 Undermining Intrinsic Interest



Source: Adapted from Lepper, M. R., Greene, D., & Nisbett, R. E. (1973). Undermining children's intrinsic interest with extrinsic reward: A test of the "overjustification" hypothesis. *Journal of Personality & Social Psychology, 28*(1), 129–137

When children are given money by their parents to get good grades in school, they may improve their school performance to gain the reward. But at the same time their liking for school may decrease. On the other hand, rewards that are seen as more internal to the activity, such as rewards that praise us, remind us of our achievements in the domain, and make us feel good about ourselves as a result of our accomplishments are more likely to be effective in increasing not only the performance of, but also the liking of, the activity (Hulleman, Durik, Schweigert, & Harackiewicz, 2008; Ryan & Deci, 2002).

Key Takeaways

- Not all learning can be explained through the principles of classical and operant conditioning.
- Insight is the sudden understanding of the components of a problem that makes the solution apparent.
- Latent learning refers to learning that is not reinforced and not demonstrated until there is motivation to do so.
- Observational learning occurs by viewing the behaviors of others, and researchers believe that mirror neurons play a role.
- Both aggression and altruism can be learned through observation.
- Many factors influence whether or not observational learning will occur.
- Learning theories have been used to change behaviors in many areas of everyday life.
- Some advertising uses classical conditioning to associate a pleasant response with a product.
- Rewards are frequently and effectively used in education, but must be carefully designed to be contingent on performance and to avoid undermining interest in the activity.

Exercises and Critical Thinking

1. Describe a time when you learned something by insight. What do you think led to your learning?
2. Imagine that you had a 12-year-old nephew who spent many hours a day playing violent video games. Basing your answer on the material covered in this chapter, do you think that his parents should limit his exposure to the games? Why or why not?
3. How might we incorporate principles of observational learning to encourage acts of kindness and selflessness in our society?
4. Find and share with your class some examples of advertisements that make use of classical conditioning to create positive attitudes toward products.
5. Should parents use both punishment as well as reinforcement to discipline their children? On what principles of learning do you base your opinion?

Videos and Activities

1. Train Pavlov's Dog: http://www.nobelprize.org/educational/medicine/pavlov/index.html
2. Original footage and an explanation of Pavlov's research: http://www.youtube.com/watch?v=hhqumfpxuzI&playnext=1&list=PL50FD6087AFEADFEE
3. Thorndike's Puzzle Box: https://www.youtube.com/watch?v=BDujDOLre-8
4. Train Fuzz using operant conditioning: Needs Java http://epsych.msstate.edu/adaptive/Fuzz/index.html?2.html
5. Test your own cognitive mapping abilities by learning your way through the cave maze: http://epsych.msstate.edu/adaptive/learningCurves/mazeJS.html
6. Bandura Discussing Clips From His Modeling Studies https://www.youtube.com/watch?v=8ZXOp5PopIA
7. Mirror Neurons http://video.pbs.org/video/1615173073
8. Consider how this ad is using conditioning to get you to like the product. https://www.youtube.com/watch?v=_zCsFvVg0UY

Chapter Summary

Learning is the relatively permanent change in knowledge or behavior due to experience.

Classical conditioning was first studied by Russian physiologist Ivan Pavlov. In classical conditioning a person or animal learns to associate a neutral stimulus with a stimulus (the unconditioned stimulus, or US) that naturally produces a behavior (the unconditioned response, or UR). As a result of this association, the previously neutral stimulus becomes a conditioned stimulus (CS) and elicits the same or similar response (the conditioned response, or CR). Classically conditioned responses show extinction if the CS is repeatedly presented without the US. The CR may reappear later in a process known as spontaneous recovery.

Organisms may show stimulus generalization, in which stimuli similar to the CS may produce similar behaviors, or stimulus discrimination, in which the organism learns to differentiate between the CS and other similar stimuli.

Second-order conditioning occurs when a second CS is conditioned to a previously established CS.

Organisms are evolutionarily prepared to learn some associations more easily than others, which is referred to as biological preparedness. Taste aversion, phobias, and PTSD reactions are all examples.

Psychologist Edward Thorndike developed the law of effect: The idea that responses that are reinforced are strengthened by experience and thus occur more frequently, whereas responses that are punishing are weakened and subsequently occur less frequently.

B. F. Skinner (1904–1990) expanded on Thorndike's ideas to develop a set of principles to explain operant conditioning.

A reinforcer is anything which increases behavior. Positive reinforcement strengthens a response by presenting something pleasant after the response, and negative reinforcement strengthens a response by reducing or removing something unpleasant. Punishment suppresses behavior. Positive punishment weakens a response by presenting something unpleasant after the response, whereas negative punishment weakens a response by reducing or removing something pleasant.

Reinforcement may be either partial or continuous. Partial-reinforcement schedules are determined by whether the reward is presented on the basis of an interval, or the time that elapses between rewards, or on the basis of a ratio, the number of responses that the organism engages in, and by whether the reinforcement occurs on a fixed or regular schedule or one that is variable or unpredictable.

Shaping is the process of guiding an organism's behavior by reinforcing successive approximations to the desired behavior.

Primary reinforcers are innately satisfying consequences such as sleep or food. Secondary reinforcers have been associated with primary reinforcers and acquire their reinforcement value through learning. For example, money can be used to buy food, so money becomes a reinforcer.

Side effects of punishment include aggression, anxiety, and poor relationships. Punishment should be combined with reinforcement of a preferred behavior.

Behavior modification is the systematic use of behavioral learning principles to modify behavior. Tokens are generic reinforcers that can be exchanged for items that are reinforcing to a particular individual. Token economies can be used for behavior modification in group settings. Contemporary psychologists recognize that people do not merely react to stimuli or change their behavior based on how a consequence makes them feel. People anticipate associations and expect specific consequences. These expectations can also change behavior.

Not all learning can be explained through the principles of classical and operant conditioning. Insight is the sudden understanding of the components of a problem that makes the solution apparent, and latent learning refers to learning that is not reinforced and not demonstrated until there is motivation to do so.

Learning by observing the behavior of others and the consequences of those behaviors is known as observational learning. Aggression, altruism, and many other behaviors are learned through observation.

Learning theories can and have been applied to change behaviors in many areas of everyday life. Some advertising uses classical conditioning to associate a pleasant response with a product.

Rewards are frequently and effectively used in education but must be carefully designed to be contingent on performance and to avoid undermining interest in the activity.

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Chapter 5 Memory and Cognition

Learning Objectives

1. Define cognitive psychology, memory, cognition, and problem-soving.
2. Describe information processing theory.

Cognitive psychology is *the field of psychology dedicated to examining how people think.* It attempts to explain how and why we think the way we do by studying how our memory system functions, how creativity affects our problem-solving, the impact of language on our development, the different types of intelligence, and the fundamental errors we make in decision-making. Cognitive psychologists also focus on how we organize thoughts and information gathered from our environments into meaningful categories.

The three subjects of this chapter are **memory**, defined as *the ability to store and retrieve information over time*, **cognition**, defined as *the processes of acquiring and using knowledge*, and **problem-solving**, defined as *the strategies used to find a solution.* It is useful to consider memory and cognition in the same chapter because they work together to help us interpret and understand our environments. The next chapter will examine intelligence and language.

Memory and cognition represent the two major interests of cognitive psychologists. The cognitive approach became the most important perspective of psychology during the 1960s, and the field of psychology has remained, in large part, cognitive since that time. The cognitive perspective was influenced by the development of the computer, and although the differences between computers and the human mind are vast, cognitive psychologists have used the computer as a model for understanding the workings of the mind. **Information processing theory** *is a theory of cognitive development that describes the mind as functionally similar to a computer.* Information comes in as data or inputted. It is processed through working memory, stored in long term memory, and can be converted to output by using the correct commands. Changes in thinking occur over time as new information enters the system.

Our memories allow us to do relatively simple things, such as remembering where we put our keys or the name of the current governor of Illinois. Memories also allow us to form complex memories, such as how to ride a bicycle or to write a computer program. Moreover, our memories define us as individuals as they are our experiences, our relationships, our successes, and our failures. Without our memories, we would not have a life, but our memories are far from perfect (Schacter, 1996).

At least for some things, our memory is very good (Bahrick, 2000). Once we learn a face, we can recognize that face many years later. We know the lyrics of many songs by heart, and we can give definitions for tens of thousands of words, but memory is not like a video. When people are asked to remember an event, they use current knowledge to put together a story that makes sense. This story is assembled using their original perceptions and memory traces, emotions, beliefs, and other experiences from life. In effect, they rebuild the memory each time they are asked to recall it. **Reconstructive memory** *is a memory for an event that has been pieced together from past and present knowledge, emotions, and beliefs.* Reconstructive memory can also be inaccurate (Bartlett, 1932). The errors that we make are because our memories are not simply recording devices

that input, store, and retrieve the world around us. Rather, we actively process and interpret information as we remember it, and we do not reproduce exact replicas of those events. Later in the chapter, the reasons these inaccuracies occur will be explained.

Figure 5.1 Kim Peek

Source.

For some people, memory is truly amazing. Consider, for instance, the case of Kim Peek, who was the inspiration for the Academy Award winning film *Rain Man* (see Figure 5.1) Although Peek's IQ was only 87, significantly below the average of about 100, it is estimated that he memorized more than 10,000 books in his lifetime (Wisconsin Medical Society, n.d.; Kim Peek, 2004). The Russian psychologist Luria (2004) has described the abilities of a man known as "S," who seems to have unlimited memory. He remembered strings of hundreds of random letters for years at a time, and seemed to never forget anything.

Encoding and Storage: How Our Perceptions Become Memories

Learning Objectives

1. Explain the processes of encoding, storage, and retrieval.
2. Describe the role of elaborative encoding in studying and learning.
3. Explain the progression from sensory memory to short-term memory to long-term memory
4. Describe the role of chunking and rehearsal in aiding memory.
5. Differentiate between declarative/explicit and nondeclarative/implicit memory.
6. Describe the following methods of measuring memory: Recall, free recall, cued recall, recognition, and relearning.
7. Define semantic and episodic memory.
8. Describe the ways in which long-term memory organizes information, and the impact those organization strategies have on memory.

Psychologists conceptualize memory in terms of three processes. These include:

- **Encoding** is *the process by which we place the things that we experience into memory*. Unless information is encoded, it cannot be remembered. You have been to a party where you were introduced to someone and then, maybe only seconds later, you realized that you did not remember the person's name. You could not remember the name, probably because you were distracted and never encoded the name to begin with.
- **Storage** is *the process of holding information in memory to be processed or used*. Some memories we will hold for years, other memories we hold only long enough to use the information, such as looking up a phone number and retaining it long enough to place the call.

- **Retrieval** refers to *the process of reactivating information that has been stored in memory*. Memory would be useless without the ability to retrieve the memories that we have created. Retrieval is not a simple process and many factors can influence the ease with which we can locate a memory.

Encoding

Not everything we experience can or should be encoded. We tend to encode things that we need to remember and not bother to encode things that are irrelevant. Look at Figure 5.2, which shows different images of U.S. pennies. Can you tell which one is the real one? Nickerson and Adams (1979) found that very few of the U.S. participants they tested could identify the right one. We see pennies a lot, but we do not bother to encode all of the details.

Figure 5.2 Pennies in Different Styles

Can you identify the "real" penny? We tend to have poor memory for things that do not matter, even if we see them frequently.

One way to improve our memory is to use better encoding strategies. Some ways of studying are more effective than others. Research has found that we are better able to remember information if we encode it in a meaningful way. When we engage in **elaborative rehearsal or elaborative encoding**, *we process new information in ways that make it more relevant or meaningful* (Craik & Lockhart, 1972; Harris & Qualls, 2000).

Ineffective encoding, or an encoding failure, is an important cause of memory failure and forgetting in humans. If you do not make the correct association between memories, for example, you will not be able to retrieve a memory when cued. If you have encoded someone's name in the category of "people in my class," you might not be able to identify that person when you see them in the grocery store. Whether you are trying to learn names or definitions for psychology, it is important to make useful associations when you encode or memorize the information.

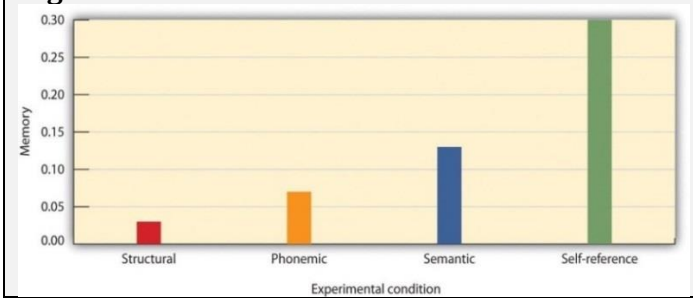
Imagine that you are trying to remember the characteristics of the different perspectives of psychology we discussed in Chapter 1. Rather than simply trying to remember the perspectives and their characteristics, you might try to relate the information to things you already know. For instance, you might try to remember the fundamentals of cognitive psychology by linking the characteristics to the computer model. The cognitive perspective focuses on how information is inputed, processed, and retrieved, and you might think about how computers do pretty much the same thing. You might also try to organize the information into meaningful units. For instance, you might link the cognitive perspective to structuralism because both were concerned with mental processes. You also might try to use visual cues to help you remember the information. You might look at the image of Freud and imagine what he looked like as a child. That image might help you remember that childhood experiences were an important part of Freudian theory. Each person has his or her unique way of elaborating on information; the important thing is to try to develop unique and meaningful associations among the materials.

Research Focus: Elaboration and Memory

In an important study showing the effectiveness of elaborative encoding, Rogers, Kuiper, and Kirker (1977) studied how people recalled information that they had learned under different processing conditions. All the participants were presented with the same list of 40 adjectives to learn, but through the use of random assignment, the participants were given one of four different sets of instructions about how to process the adjectives. Participants assigned to the structural task condition were asked to judge whether the word was printed in uppercase or lowercase letters. Participants in the phonemic task condition were asked whether or not the word rhymed with another given word. In the semantic task condition, the participants were asked if the word was a synonym of another word, and in the self-reference task condition, participants were asked to indicate whether or not the given adjective was or was not true of themselves. After completing the specified task, each participant was asked to recall as many adjectives as he or she could remember.

Rogers and his colleagues hypothesized that different types of processing would have different effects on memory. As you can see in Figure 5.3, the students in the self-reference task condition recalled significantly more adjectives than did students in any other condition. This finding, known as the **self-reference effect**, is powerful evidence that *the self-concept helps us organize and remember information.* The next time you are studying for an exam, you might try relating the material to your own experiences. The self-reference effect suggests that doing so will help you better remember the information (Symons & Johnson, 1997).

Figure 5.3 Self-Reference Effect Results



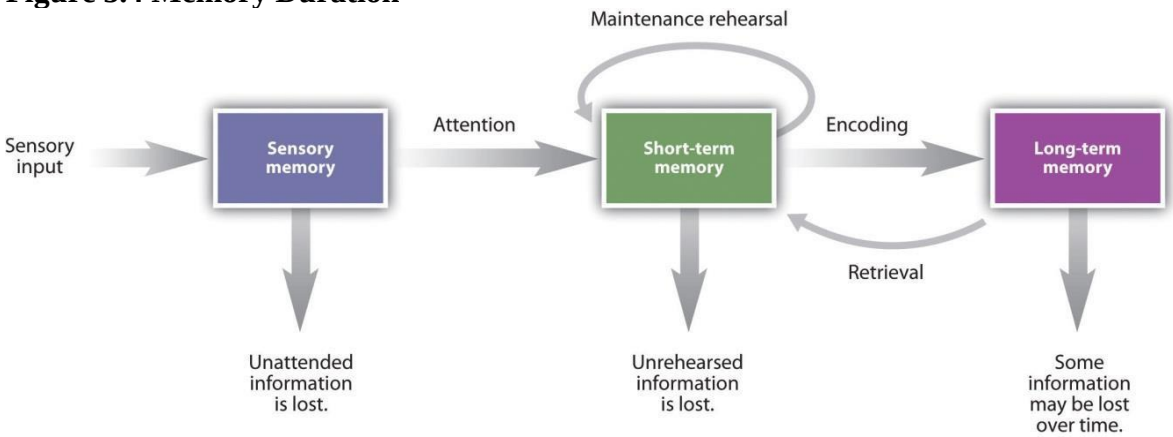
Participants recalled the same words significantly better when they were processed in relation to the self than when they were processed in other ways.

Source: Adapted from Rogers, T. B., Kuiper, N. A., & Kirker, W. S. (1977). Self-reference and the encoding of personal information.*Journal of Personality & Social Psychology, 35*(9), 677–688.

Storage

Another way of understanding memory is to think about it in terms of stages that describe the length of time that information remains available to us; how long it can be stored. According to this approach (see Figure 5.4), information begins in sensory memory, moves to short-term memory, and eventually moves to long-term memory (Atkinson & Shriffin, 1968). Not all information makes it through all three stages; most of it is forgotten. Whether the information moves from shorter-duration memory into longer-duration memory or whether it is lost from memory entirely depends on how the information is attended to and processed.

Figure 5.4 Memory Duration



Memory can be characterized in terms of stages—the length of time that information remains available to us.

Source: Adapted from Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. Spence (Ed.) *The psychology of learning and motivation* (Vol. 2). Oxford, England: Academic Press.

Sensory Memory

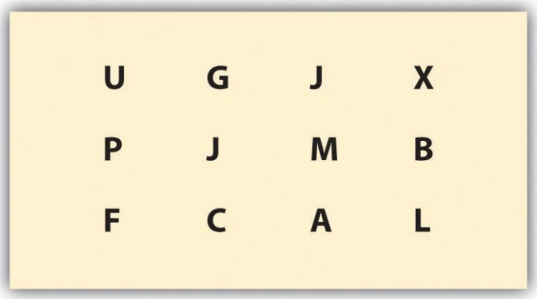
Sensory memory refers to *the brief storage of sensory information*. Unless it is attended to and passed on for more processing, the memory is quickly forgotten. The purpose of sensory memory is to give the brain some time to process the incoming sensations, and to allow us to see the world as an unbroken stream of events rather than as individual pieces.

Iconic memory *is sensory memory for visual information*. Iconic memory was first studied by the psychologist George Sperling (1960). In his research, Sperling showed participants a display of letters in rows, similar to that shown in Figure 5.5. He showed the image of 12 letters for only about 50 milliseconds (1/20 of a second). Then, Sperling gave his participants a recall test in which they were asked to name all the letters that they could remember. On average, the participants could remember only about one-third of the letters that they had seen. Sperling knew that the participants had seen all the letters, but he could tell that they did not have enough time to memorize all twelve.

To Sperling's surprise, some participants reported a lingering visual image of all the letters, although the image of the twelve letters faded quickly. Sperling decided to look for evidence that this image existed in the mind of each participant who reported it. To do so, in his next experiment he again showed twelve letters in three rows of four to each participant. Then after the display had been removed, he quickly signaled to the participants to report the letters from only the first, second, or third row. He did this by presenting a high, medium, or low tone for each row in the display. In this condition, the participants reported almost all the letters in that specific row.

This finding confirmed Sperling's hunch: Participants had access to all of the letters in their iconic memories. If the time delay between the removal of the display and the presentation of the tone was short enough, they were able to report on the part of the display he asked them to before the iconic memory faded from view. Sperling discovered that if the delay between the removal of the display and the presentation of the tone was greater than about ¼ second, the entire image would fade from view. The participant could remember few if any letters. Thus, we say the duration of iconic sensory memory is about ¼ second.

Figure 5.5 Measuring Iconic Memory



Sperling (1960) showed his participants displays such as this one for only 1/20th of a second. He found that when he cued the participants to report one of the three rows of letters, they could do it, even if the cue was given shortly after the display had been removed. The research demonstrated the existence of iconic memory.

Source: Adapted from Sperling, G. (1960). The information available in brief visual presentation. *Psychological Monographs, 74*(11), 1–29.

Echoic memory *is the sensory memory for sound.* In contrast to iconic memory, which decays very rapidly, echoic memories can last as long as 4 seconds (Cowan, Lichty, & Grove, 1990). This is convenient as it allows you to remember the words that you said at the beginning of a long sentence when you get to the end of it, and to take notes on your psychology professor's most recent statement even after he or she has finished saying it.

In some people, iconic or echoic memory seems to last longer than usual. For visual images, this phenomenon is known as **eidetic imagery**, *having a photographic memory*. People with a photographic memory can report details of an image over long periods of time. These people state that they can see an image long after it has been presented, and can often report accurately on that image. There is also some evidence for eidetic memories in hearing; some people report that their echoic memories persist for unusually long periods of time. The composer Wolfgang Amadeus Mozart may have possessed eidetic memory for music, because even when he was very young and had not yet had a great deal of musical training, he could listen to long compositions and then play them back almost perfectly (Solomon, 1995).

Short-Term Memory

Most of the information that gets into sensory memory is forgotten, but information that we turn our attention to, with the goal of remembering it, may pass into short-term memory. In **Short-term memory (STM)** *small amounts of information can be temporarily kept for more than a few seconds, but usually for less than one minute* (Baddeley, Vallar, & Shallice, 1990). Information in short-term memory is not stored permanently but rather becomes available for us to process, and *the processes that we use to make sense of, modify, interpret, and store information in STM* are known as **working memory**.

Working memory is not a store of memory like STM, but rather a set of memory procedures or operations. Imagine that you are asked to participate in a working memory task, such as this one researched by Unsworth & Engle (2007). Each of the following questions appears individually on a computer screen and then disappears after you answer the question (see Figure 5.6):

Figure 5.6

Is 10 × 2 − 5 = 15? (Answer YES OR NO) Then remember "S"

Is 12 ÷ 6 − 2 = 1? (Answer YES OR NO) Then remember "R"

Is 10 × 2 = 5? (Answer YES OR NO) Then remember "P"

Is 8 ÷ 2 − 1 = 1? (Answer YES OR NO) Then remember "T"

Is 6 × 2 − 1 = 8? (Answer YES OR NO) Then remember "U"

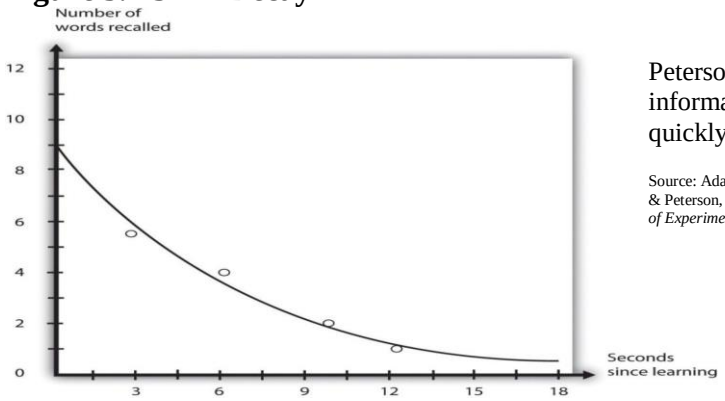
Is 2 × 3 − 3 = 0? (Answer YES OR NO) Then remember "Q"

To successfully accomplish the task, you have to answer each of the math problems correctly and at the same time remember the letter that follows the task. Then, after the six questions, you must list the letters that appeared in each of the trials in the correct order (in this case S, R, P, T, U, Q).

To accomplish this difficult task you need to use a variety of skills. You clearly need to use STM, as you must keep the letters in storage until you are asked to list them, but you also need a way to make the best use of your available attention and processing. For instance, you might decide to use a strategy of "repeat the letters twice, then quickly solve the next problem, and then repeat the letters twice again including the new one." Keeping this strategy, or others like it, going is the role of working memory's **central executive**, which is *the part of working memory that directs attention and processing*. The central executive will make use of whatever strategies seem to be best for the given task. For instance, the central executive will direct the process known as rehearsal. At the same time, it will direct the visual cortex to form an image of the list of letters in memory. You can see that although STM is involved, the processes that we use to operate on the material in memory are also critical.

Short-term memory is limited in both the length and the amount of information it can hold. Peterson and Peterson (1959) found that when people were asked to remember a list of three-letter strings and then were immediately asked to perform a distracting task, such as counting backward by threes, the material was quickly forgotten. By 18 seconds it was virtually gone (see Figure 5.7).

Figure 5.7 STM Decay



Peterson and Peterson (1959) found that information that was not rehearsed decayed quickly from memory.

Source: Adapted from Peterson, L., & Peterson, M. J. (1959). Short-term retention of individual verbal items. *Journal of Experimental Psychology, 58*(3), 193–198.

However, Keppel and Underwood (1962) reexamined Peterson and Peterson's research and argued that the problem was not one of memory decay, but memory interference. They reasoned that in the Peterson and Peterson study there was a confound between length of delay and the order of the memory strings. In the first trial of the study, participants were asked to recall the letter string immediately. In subsequent trials of the study, participants were given new letter strings and asked to hold that information for longer and longer periods before recalling the information. Keppel and Underwood suggested that any forgetting of later letter strings may not have been due to the delay in recall, but interference from earlier letter strings. When information is very similar it is easier for us to confuse one memory for another. In Keppel and Underwood's research they found that it did not matter whether people were asked to recall the information immediately or for up to 18 seconds later; they were able to accurately recall the three letters on the first trial. It was only on later trials that they showed memory decline, suggesting it was interference not decay that influenced Peterson and Peterson's results.

One way to prevent the decay of information from short-term memory is to use working memory to rehearse it. **Maintenance rehearsal** is *the process of repeating information mentally or out loud with the goal of keeping it in memory*. We engage in maintenance rehearsal to keep something that we want to remember (e.g., a person's name, e-mail address, or phone number) in mind long enough to write it down, use it, or potentially transfer it to long-term memory. If we continue to rehearse information, it will stay in STM until we stop rehearsing it, but there is also a capacity limit to STM.

The digit span of most adults is between five and nine digits, with an average of about seven. The cognitive psychologist George Miller (1956) referred to "seven plus or minus two" pieces of information as the "magic number" in short-term memory. However, if we can only hold a maximum of about nine digits in short-term memory, then how can we remember larger amounts of information than this? For instance, how can we ever remember a 10-digit phone number long enough to dial it?

One way we are able to expand our ability to remember things in STM is by using a memory technique called chunking. **Chunking** is *the process of organizing information into smaller groupings, or chunks, thereby increasing the number of items that can be held in STM*.

For instance, try to remember this string of 12 letters:

X O F C B A N N C V T M

You probably will not do that well because the number of letters is more than the magic number of seven. Now try again with this one:

M T V C N N A B C F O X

Would it help you if we pointed out that the material in this string could be chunked into four sets of three letters each? It would, because then rather than remembering 12 letters, you would only have to remember the names of four television stations. In this case, chunking changes the number of items you have to remember from 12 to only four. People routinely rely on chunking to help them process complex information efficiently. Remembering area codes for phone numbers is one example. Usually these are put into memory as a three-digit chunk rather than individual numbers, especially since each region has only a limited number of area codes. Knowing the first number in the chunk enables you to recall the other two numbers automatically.

Long-term Memory

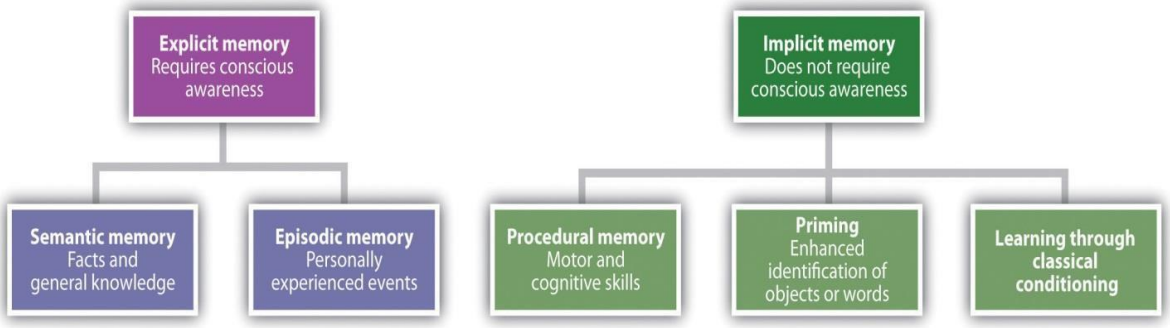
If information makes it past short term-memory it may enter **long-term memory (LTM),** *the memory storage that can hold information for days, months, and years*. The capacity of long- term memory is large, and there is no known limit to what we can remember (Wang, Liu, & Wang, 2003). Although we may forget at least some information after we learn it, other things will stay with us forever. In the next section we will discuss the two types of long-term memory; that is explicit and implicit.

Explicit/Declarative Memory

When we assess memory by asking a person to consciously remember things, we are measuring explicit memory. **Explicit/declarative memory** refers to *knowledge or experiences that can be consciously remembered.* As you can see in Figure 5.8, there are two types of explicit memory: episodic and semantic. **Episodic memory** refers to *the firsthand experiences that we have had.* For example, recollections of our high school graduation day or sixteenth birthday. **Semantic memory** refers to *our knowledge of facts and concepts about the world.* For example, the absolute value of −90 is greater than the absolute value of 9 and one definition of the word "affect" is the experience of feeling or emotion.

Explicit memory is assessed using measures in which the individual being tested must consciously attempt to remember the information. A **recall memory test** is *a measure of explicit memory that involves bringing from memory information that has previously been remembered*. We rely on our recall when we take an essay test, because the test requires us to generate previously remembered information. **Free recall** *is a measure of memory with no prompts or clues.* **Cued recall** *includes a retrieval cue in the request for memory*. Fill-in the blank questions use cued recall. A multiple-choice test is an example of a **recognition memory test**, *a measure of explicit memory that involves determining whether information has been seen or learned before.*

Figure 5.8 Types of Memory



Your own experiences taking tests will probably lead you to agree with the scientific research finding that recall is more difficult than recognition. Recall, which is required on essay tests, involves two steps: first generating an answer and then determining whether it seems to be the correct one. Recognition, which is required on multiple-choice tests, only involves determining which item from a list seems most correct (Haist, Shimamura, & Squire, 1992). Although they involve different processes, recall and recognition memory measures tend to be correlated. Students who do better on a multiple-choice exam will also, by and large, do better on an essay exam (Bridgeman & Morgan, 1996).

A third way of measuring memory is known as relearning (Nelson, 1985). Measures of **relearning** *assess how much more quickly information is processed or learned when it is studied again after it has already been learned, but then forgotten*. If you have taken some French courses in the past, for instance, you might have forgotten most of the vocabulary you learned. However, if you were to work on your French again, you would learn the vocabulary much faster the second time around. Relearning can be a more sensitive measure of memory than either recall or recognition because it allows assessing memory in terms of how much or how fast rather than simply correct versus incorrect responses. Relearning also allows us to measure memory for procedures like driving a car or playing a piano piece, as well as memory for facts and figures.

Implicit/Nondeclarative Memory

While explicit memory consists of the things that we can consciously report that we know, **implicit/nondeclarative memory** *refers to knowledge that we cannot consciously access.* However, implicit memory is nevertheless exceedingly important to us because it has a direct effect on our behavior. As you can see in Figure 5.8, there are three general types of implicit memory: Procedural memory, classical conditioning effects, and priming.

Procedural memory refers to *our knowledge of how to do things*. When we walk from one place to another, speak to another person in English, dial a cell phone, or play a video game, we are using procedural memory. Procedural memory allows us to perform complex tasks, even though we may not be able to explain to others how we do them. There is no way to tell someone how to

ride a bicycle; a person has to learn by doing it. The idea of implicit memory helps explain how infants are able to learn. The ability to crawl, walk, and talk are procedures, and these skills are easily and efficiently developed while we are children despite the fact that as adults we have no conscious memory of having learned them.

A second type of implicit memory involves the effects of classical conditioning, in which we learn, without effort or awareness, to associate a neutral stimulus with another stimulus that creates a naturally occurring response. The memory for the association is demonstrated when the conditioned stimulus begins to create the same response as the unconditioned stimulus did before the learning. For example, you may learn to associate the sounds in a restaturant (CS) with food (US), that naturally results in enjoyment (UR). When you enter a restaurant and hear the sounds (CS), the same response of enjoyment (CR) is experienced.

The final type of implicit memory is known as **priming**, or *changes in behavior as a result of experiences that have happened frequently or recently*. Priming refers both to the activation of knowledge and to the influence of that activation on behavior. For example, we can prime the concept of "kindness" by presenting people with words related to kindness. We can then assess if people who are primed, actually act more kindly.

Our everyday behaviors are influenced by priming in a wide variety of situations. Seeing the flag of our home country may arouse our patriotism, and seeing a rival school may arouse our competitive spirit. Moreover, these influences on our behaviors may occur without our being aware of them.

The Structure of Long-Term Memory: Categories, Prototypes, and Schemas

Memories that are stored in LTM are not isolated but rather are linked together into **categories** or *networks of associated memories that have features in common with each other*. Forming categories, and using categories to guide behavior, is a fundamental part of human nature. Organization within the categories improves memory. Associated concepts within a category are connected through **spreading activation**, *which occurs when activating one element of a category activates other associated elements*. When people have lerned lists of words that come from different categories, they do not recall the words haphazardly. If they have just remembered the word "wrench," from a list, they are more likely to remember the word "screwdriver" than to remember the word "rose," because the words are organized in memory by category (Srull & Wyer, 1989).

Some categories have defining features that must be true of all members of the category. For instance, all members of the category triangles have three sides, and all members of the category birds lay eggs. However, most categories are not so well-defined; the members of the category share some common features, but it is impossible to define which are or are not members of the category. For instance, there is no clear definition of the category tool. Some examples of the category, such as a hammer and a wrench, are clearly and easily identified as category members, whereas other members are not so obvious. Is an ironing board a tool? What about a car?

Figure 5.9 Prototype

Category members vary in terms of their prototypicality. Some cats are "better" members of the category than are others. © Thinkstock

Members of categories, even those with defining features, can be compared to the category **prototype**, which is *the member of the category that is most average or typical of the category*. Some category members are more prototypical of, or similar to, the category than others. For instance, some category members, such as Siamese, are highly prototypical of the category cat, whereas other category members, such as lions, are less prototypical. We retrieve information that is prototypical of a category faster than we retrieve information that is less prototypical (Rosch, 1975).

Mental categories are sometimes referred to as **schemas**, or *frameworks of knowledge in long-term memory that help us organize information*. We have schemas about objects, people, events, and social groups. Schemas are important because they help us remember new information by providing an organizational structure for it.

Figure 5.10 Different Schemas

Our schema about people, couples, and events help us organize and remember information. © Thinkstock

Read the following paragraph (Bransford & Johnson, 1972) and then try to write down everything you can remember.

> *The procedure is actually quite simple. First you arrange things into different groups. Of course, one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities, that is the next step; otherwise you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run this may not seem important, but complications can easily arise. A mistake can be expensive as well. At first the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then one never can tell. After the procedure is completed, one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually they will be used once more and the whole cycle will then have to be repeated. However, that is part of life.*

It turns out that people's memory for this information is quite poor. However, if they have been told ahead of time that the information describes doing the laundry, their memory for the material is much better. This demonstration of the role of schemas in memory shows how our existing knowledge can help us organize new information, and how this organization can improve encoding, storage, and retrieval. Unfortunately, categories, prototypes, and schemas can also lead to memory distortions. For example, each of us has a prototype for colors. When judging the "blueness" of a color we compare it to the color that comes to mind when we think of the color blue. Sometimes what we later recall is not the exact shade of blue, such as a blue car speeding away from the scene of an accident, but our prototype color blue. Thus, what we recall is often a product of whatever categories, prototypes, or schemas were activated during the creation of the memory, rather than exactly what happened.

Key Takeaways

- Memory refers to the ability to store and retrieve information over time.
- For some things our memory is very good, but our active cognitive processing of information assures that memory is never an exact replica of what we have experienced.
- We use three processes to control the movement of information in memory: Encoding, storage, and retrieval.
- Information processing begins in sensory memory, moves to short-term memory, and eventually moves to long-term memory.
- Maintenance rehearsal and chunking are used to keep information in short-term memory.
- The capacity of long-term memory is large, and there is no known limit to what we can remember.
- Long-term memory organizes information using categories, prototypes, and schemas. This can both improve memory and lead to distortions.

Exercises and Critical Thinking

1. List some situations in which sensory memory is useful for you. What do you think your experience of the stimuli would be like if you had no sensory memory?
2. Describe a situation in which you need to use working memory to perform a task or solve a problem. How do your working memory skills help you?
3. Try the following interactive activities to test digit span memory, chunking, and your memory for faces:

a. http://www.youramazingbrain.org.uk/yourmemory/digitspan.htm
b. http://www.youramazingbrain.org.uk/yourmemory/chunk01.htm
c. http://www.bbc.co.uk/science/humanbody/sleep/tmt/

Retrieval

Learning Objectives

1. Define memory retrieval.
2. Describe how the context, bodily states or mood can influence memory retrieval.
3. Describe the serial position curve and the role of rehearsal and decay theory.
4. Distinguish between proactive and retroactive interference.
5. Define the tip-of-the-tongue phenomenon.

Even when information has been adequately encoded and stored, it does not do us any good without **retrieval**, *which is getting information out of long term memory*. We have all experienced retrieval failure for information we know we have encoded. How does this happen?

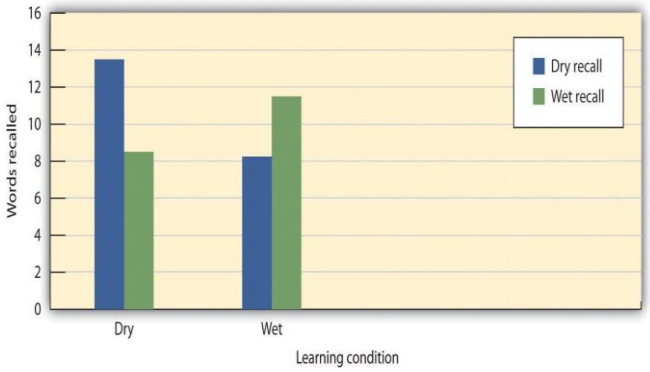
The main reason for retrieval failure is that the *information was not adequately encoded to begin with*, which is known as an **encoding failure**. Remember the penny example earlier in the chapter? If you had difficulty identifying the correct image, it was because you had not adequately encoded the details to your long-term memory.

Decay theory *is an older memory theory proposed to explain the loss of information, that has not been used over time, from long-term memory.* However, most current research does not support the concept of decay as a reason for the loss of information in long term memory. Instead, the prevailing belief is that, with the proper cues, memories can still be retrieved.

We are more likely to retrieve items from memory when conditions at retrieval are similar to the conditions under which we encoded them. **Context-dependent learning** refers to *an increase in retrieval when the external situation in which information is learned matches the situation in which it is remembered.* Godden and Baddeley (1975) conducted a study to test this idea using scuba divers. They asked the divers to learn a list of words either when they were on land or when they were underwater. Then they tested the divers on their memory, either in the same or the opposite situation. As you can see in Figure 5.11, the divers' memory was better when they were tested in the same context in which they had learned the words than when they were tested in the other context.

Context-dependent learning might also be important in improving your memory. For instance, you might want to try to study for an exam in a situation that is similar to the one in which you are going to take the exam. Whereas context-dependent learning refers to a match in the external situation between learning and remembering, **state-dependent learning** refers to *superior retrieval of memories when the individual is in the same physiological or psychological state as during encoding.*

Figure 5.11 Context Dependent Memory

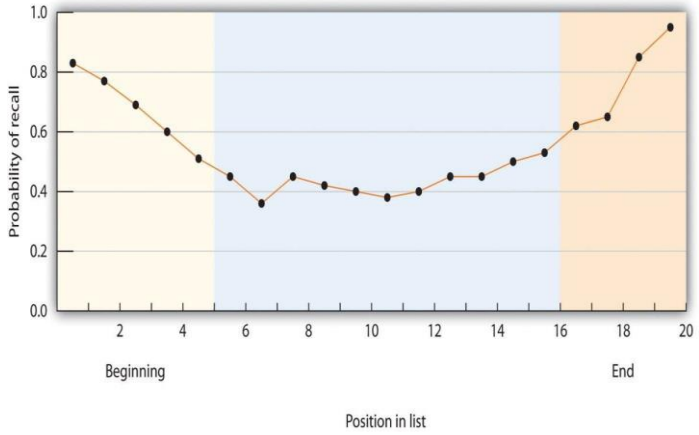


Godden and Baddeley (1975) tested the memory of scuba divers to learn and retrieve information in different contexts and found strong evidence for context-dependent learning.

Source: Adapted from Godden, D. R., & Baddeley, A. D. (1975). Context-dependent memory in two natural environments: On land and underwater. *British Journal of Psychology, 66*(3), 325–331.

Research has found, for instance, that animals that learn a maze while under the influence of one drug tend to remember their learning better when they are tested under the influence of the same drug than when they are tested without the drug (Jackson, Koek, & Colpaert, 1992). Research with humans finds that bilinguals remember better when tested in the same language in which they learned the material (Marian & Kaushanskaya, 2007). Mood states may also produce state-dependent learning. People who learn information when they are in a bad, rather than a good, mood find it easier to recall these memories when they are tested in the same mood. It is easier to recall unpleasant memories than pleasant ones when we are sad, and easier to recall pleasant memories than unpleasant ones when we are happy (Bower, 1981; Eich, 2008).

Figure 5.12 The Serial Position Curve



Variations in the ability to retrieve information are also seen in the serial position curve. When we give people a list of words one at a time, and then ask them to recall them, the results look something like those in Figure 5.12. These results form the **Serial Position Curve** *as people are able to retrieve more words presented to them at the beginning and end of the list than words presented in the middle of the list.* This pattern is caused by two retrieval phenomena: The **primacy effect** refers to *a tendency to better remember stimuli that are presented early in a list*. The **recency effect** refers to *the tendency to better remember stimuli that are presented later in a list*.

While there are a number of explanations for primacy and recency effects, one of them is the effects of rehearsal on short-term and long-term memory (Baddeley, Eysenck, & Anderson, 2009). Because we can keep the last words that we learned in the presented list in short-term memory by rehearsing them before the memory test begins, they are relatively easily remembered. So, the recency effect can be explained in terms of maintenance rehearsal in short-term memory. The primacy effect may also be due to rehearsal because we hear the first word in the list we start to rehearse it, making it more likely that it will be moved from short- term to long-term memory.

The same is true for the other words that come early in the list. However, for the words in the middle of the list, this rehearsal becomes much harder, making them less likely to be moved to LTM.

According to **interference theory**, *our existing memories can influence our new learning*. This may occur either in a backward way or a forward way. **Retroactive interference** occurs when *learning something new impairs our ability to retrieve information that was learned earlier*. For example, when you start a new semester and learn the names of your new teacher and classmates, you may have difficulty remembering the names of previous teachers and classmates. In this case the new memories work backward, or retroactively, to influence retrieval from memory that is already in place.

In **proactive interference** occurs when *earlier learning impairs our ability to encode information that we try to learn later*. For example, have you ever written the previous year down when writing the date? For many people this type of proactive interference occurs in the first few days of a new year. An old memory, such as the prior year, is moving forward in time and putting itself in the place of a new memory. Proactive interference is common in everyday verbal mistakes. For example, many parents find themselves calling a younger child by an older child's name, or someone may call their new boyfriend or girlfriend by a previous partner's name.

A partial retrieval failure can be explained by the frustrating **tip-of-the- tongue phenomenon**, in which *we are certain that we know something that we are trying to recall, but cannot quite come up with it*. The tip-of-the-tongue phenomen occurs more frequently as one ages, typically due to interference among many similar memories.

Key Takeaways

- There are several factors that can influence the retrieval of information from memory: Encoding failure, absence of retrival cues, the context, our physiological state or mood, the order of presentation and our ability to rehearse the information, and competing information in memory.

The Biology of Memory

Learning Objectives

1. Describe long-term potentiation (LTP) and the role of neurotransmitters.
2. Describe the brain regions involved in memory.
3. Define amnesia and distinguish between anterograde and retrograde amnesia.
4. Describe the effect of drugs on memory.

Just as information is stored on digital media, such as DVDs and flash drives, the information in long term memory must be stored in the brain. The ability to maintain information in long term memory involves a gradual strengthening of the connections among the neurons in the brain. When pathways in these neural networks are frequently and repeatedly fired, the synapses become more

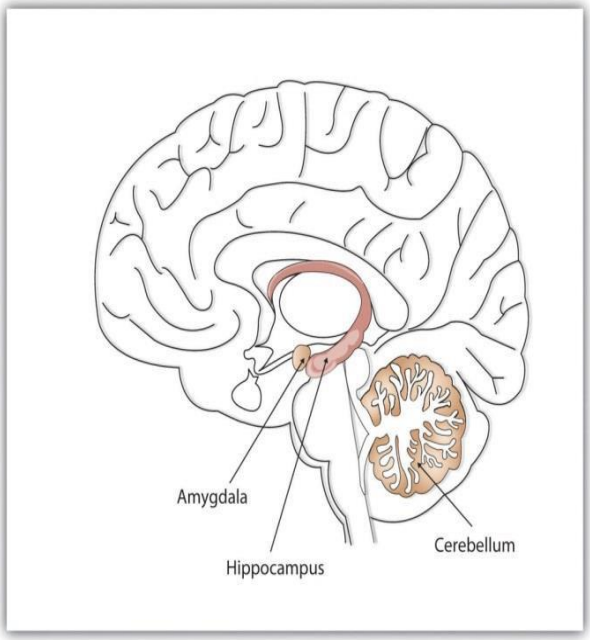
efficient in communicating with each other, and these changes create memory. This process, known as **long-term potentiation (LTP)**, refers to *the strengthening of the synaptic connections between neurons as result of frequent stimulation* (Lynch, 2002). Drugs that block LTP reduce learning, whereas drugs that enhance LTP increase learning (Lynch et al., 1991). Because the new patterns of activation in the synapses take time to develop, LTP happens gradually. *The period of time in which LTP occurs and in which memories are stored is known as* **consolidation.**

The Role of Neurotransmitters in LTP

Long-term potentiation occurs as a result of changes in the synapses, which suggests that chemicals, particularly neurotransmitters and hormones, must be involved in memory. There is quite a bit of evidence that this is true. Glutamate, a neurotransmitter and a form of the amino acid glutamic acid, is perhaps the most important neurotransmitter in memory (McEntee & Crook, 1993). When animals, including people, are under stress, more glutamate is secreted, and this glutamate can help them remember (McGaugh, 2003). The neurotransmitter serotonin is also secreted when animals learn, and epinephrine may also increase memory, particularly for stressful events (Maki & Resnick, 2000; Sherwin, 1998).

Location of Memory

Figure 5.13 Schematic Image of Brain with Hippocampus, Amygdala, and Cerebellum Highlighted



Memory is not confined to the cortex; it occurs through sophisticated interactions between new and old brain structures (see Figure 5.13). One of the most important brain regions in explicit memory is the hippocampus, which serves as a preprocessor and elaborator of information (Squire, 1992). The hippocampus helps us encode information about spatial relationships, the context in which events were experienced, and the associations among memories (Eichenbaum, 1999). The hippocampus also serves as a switching point that holds the memory for a short time. It then directs the information to other parts of the brain, such as the cortex, to actually do the rehearsing, elaboration, and long-term storage (Jonides, Lacey, & Nee, 2005).

Without the hippocampus, our explicit memories would be inefficient and disorganized. While the hippocampus is handling explicit memory, the cerebellum and the amygdala are concentrating on implicit and emotional memories, respectively. Research shows that the cerebellum is more active when we are learning associations and in priming task. Animals and humans with damage to the cerebellum have more difficulty in classical conditioning studies (Krupa, Thompson, & Thompson, 1993; Woodruff-Pak, Goldenberg, Downey-Lamb,

Boyko, & Lemieux, 2000). The storage of many of our most important emotional memories, and particularly those related to fear, is initiated and controlled by the amygdala (Sigurdsson, Doyère, Cain, & LeDoux, 2007).

Evidence for the role of different brain structures in different types of memories comes in part from case studies of patients who suffer from **amnesia**, *a memory disorder that involves the inability to remember information*. As with memory interference effects, amnesia can work in either a forward or a backward direction, affecting retrieval or encoding. For people who suffer damage to the brain, for instance, as a result of a stroke or other trauma, the amnesia may work backward. The outcome is **retrograde amnesia**, *a memory disorder that produces an inability to retrieve events that occurred before a given time*. Because LTP takes time through the process of consolidation, retrograde amnesia is usually more severe for memories that occurred just prior to the trauma than for older memories. In fact, events that occurred just before the trauam that caused the memory loss, may never be recovered because they were not fully encoded.

Organisms with damage to the hippocampus develop a type of amnesia that works in a forward direction to affect encoding, known as anterograde amnesia. **Anterograde amnesia** is *the inability to transfer information from short-term into long-term memory*, making it impossible to form new memories. One well-known case study was a man named Henry Gustav Molaison who had parts of his hippocampus removed to reduce severe seizures (Corkin, Amaral, González, Johnson, & Hyman, 1997). Following the operation, Molaison developed virtually complete anterograde amnesia. Although he could remember most of what had happened before the operation, and particularly what had occurred early in his life, he could no longer create new memories. Molaison was said to have read the same magazines over and over again without any awareness of having seen them before.

Cases of anterograde amnesia also provide information about the brain structures involved in different types of memory (Bayley & Squire, 2005; Helmuth, 1999; Paller, 2004). Although Molaison's explicit memory was compromised because his hippocampus was damaged, his implicit memory was not because his cerebellum was intact. He could learn to trace shapes in a mirror, a task that requires procedural memory, but he never had any explicit recollection of having performed this task or of the people who administered the test to him.

Although some brain structures are particularly important in memory, this does not mean that all memories are stored in one place. The American psychologist Karl Lashley (1929) attempted to determine where memories were stored in the brain by teaching rats how to run mazes, and then lesioning different brain structures to see if they were still able to complete the maze. This idea seemed straightforward, and Lashley expected to find that memory was stored in certain parts of the brain. Instead, he discovered that no matter where he removed brain tissue, the rats retained at least some memory of the maze, leading him to conclude that memory is not located in a single place in the brain, but rather is distributed around it.

Drugs and Memory

Most people are familiar with the negative effects some drugs, including alcohol, can have on our memories. However, our knowledge of the role of biology in memory suggests that it might also be possible to use drugs to improve our memories. Americans spend several hundred million dollars per year on memory supplements with the hope of doing just that. Yet controlled studies

comparing memory enhancers, including Ritalin, ginkgo biloba, and amphetamines, with placebo drugs find very little evidence for their effectiveness (Gold, Cahill, & Wenk, 2002; McDaniel, Maier, & Einstein, 2002). This is not to say that we cannot someday create drugs that will significantly improve our memory. It is likely that this will occur in the future, but the implications of these advances are as yet unknown (Farah et al., 2004; Turner & Sahakian, 2006).

Although the most obvious potential use of drugs is to attempt to improve memory, drugs might also be used to help us forget. This might be desirable in some cases, such as for those suffering from posttraumatic stress disorder (PTSD) who are unable to forget disturbing memories.

Although there are no existing therapies that involve using drugs to help people forget, it is possible that they will be available in the future (Wickelgren, 2012). These possibilities will raise some important ethical issues: Is it ethical to erase memories, and if it is, is it desirable to do so? Perhaps the experience of emotional pain is a part of being a human being, and the experience of emotional pain may help us cope with the trauma.

Key Takeaways

- Memories are stored in connected synapses through the process of long-term potentiation (LTP). In addition to the cortex, other parts of the brain, including the hippocampus, cerebellum, and the amygdala, are also important in memory.
- Memory is influenced by chemicals including glutamate, serotonin, and epinephrine.
- Damage to the brain may result in retrograde amnesia or anterograde amnesia. Case studies of patients with amnesia can provide information about the brain structures involved in different types of memory.
- Studies comparing memory enhancers with placebo drugs find very little evidence for their effectiveness.

Cues to Improving Memory

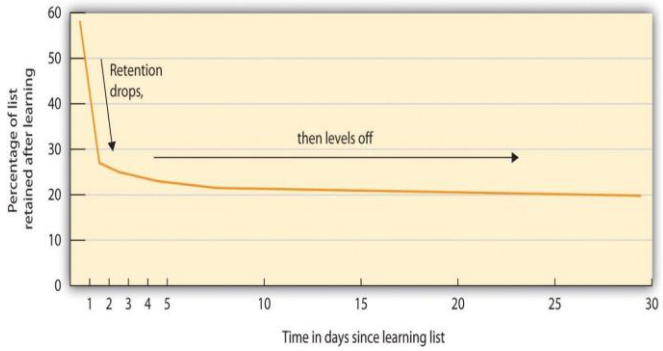
Learning Objectives

1. Differentiate between the success of massed practice and distributed practice.
2. Explain what is meant by a mnemonic.

Psychological research has produced a great deal of knowledge about long-term memory, and this research can be useful as you try to learn and remember new material. Hermann Ebbinghaus (1850–1909) was a pioneer of the study of memory. In his research, in which he was the only research participant, Ebbinghaus practiced memorizing lists of nonsense syllables, such as the following: DIF, LAJ, LEQ, MUV, WYC, DAL, SEN, KEP, NUD

You can imagine that because the material that he was trying to learn was not at all meaningful, it was not easy to do. Ebbinghaus plotted how many of the syllables he could remember against the time that had elapsed since he had studied them. He discovered an important principle of memory: Memory decays rapidly at first, but the amount of decay levels off with time (see Figure 5.14).

Figure 5.14 Ebbinghaus Forgetting Curve

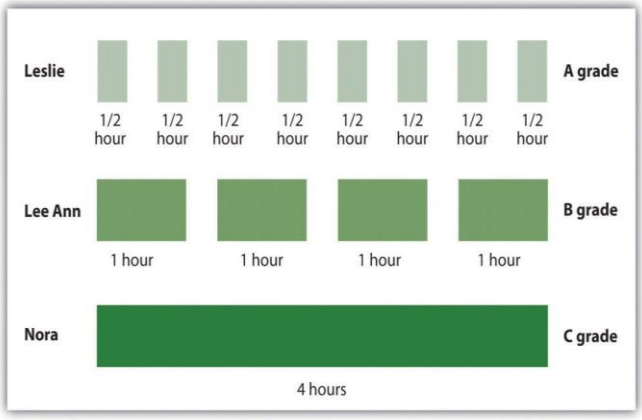


Hermann Ebbinghaus found that memory for information drops off rapidly at first but then levels off after time.

Although Ebbinghaus looked at forgetting after days had elapsed, the same effect occurs on longer and shorter time scales. Bahrick (1984) found that students who took a Spanish language course forgot about one half of the vocabulary that they had learned within three years, but that after that time their memory remained pretty much constant. Forgetting also drops off quickly on a shorter time frame. This suggests that you should try to review the material you have already studied right before you take an exam; you will be more likely to remember the material during the exam.

Ebbinghaus also discovered another important principle of learning, known as the spacing effect. The **spacing effect, also known as distributed practice**, refers to *improved learning when the same amount of studying is spread out over periods of time, then when it occurs closer together, known as* **massed practice**. This means that you will learn more if you study a little bit every day throughout the semester than if you wait to cram at the last minute (see Figure 5.15).

Figure 5.15 Effects of Massed Versus Distributed Practice on Learning



The spacing effect refers to the fact that memory is better when it is distributed rather than massed. Leslie, Lee Ann, and Nora all studied for four hours total, but the students who spread out their learning into smaller study sessions did better on the exam.

Ebbinghaus also considered the role of **overlearning**; that is, *continuing to practice and study even when we think that we have mastered the material*. Ebbinghaus and other researchers have found that overlearning helps encoding (Driskell, Willis, & Copper, 1992). Students frequently think that they have already mastered the material, but then discover when they get to the exam that they have not. Try to keep studying and reviewing, even if you think you already know all the material.

If you are having difficulty remembering a particular piece of information, it never hurts to try using a **mnemonic** or *memory aid*. Many people use rhyming, for example, to remember the number of days in each month: "thirty days hath September, April, June, and November." The "first-letter" technique uses the first letter of each word in a list to form a new word. For example, HOMES can represent the five great lakes: Huron, Ontario, Michigan, Erie, and Superior. These techniques are primarily used for simple memorization such as lists and names. Table 5.1 lists some helpful techniques to improve memory.

Table 5.1 Helpful Memory Techniques Based on Psychological Research

Technique	Description	Useful example
Use elaborative encoding.	Material is better remembered if it is processed more fully.	Think about how new information relates to prior knowledge.
Make use of self-reference.	Material is better recalled if it is linked to thoughts about the self.	Connect new information about memory strategies to your study habits.
Be aware of the forgetting curve.	Information that we have learned drops off rapidly with time.	Review the material that you have already studied right before the exam to increase the likelihood it will remain in memory.
Make use of the spacing effect	Information is learned better when it is studied in shorter periods spaced over time.	Study a little bit every day; do not cram at the last minute.
Rely on overlearning.	We can continue to learn even after we think we know the information perfectly.	Keep studying, even if you think you already have it down.
Use context-dependent retrieval.	We have better retrieval when it occurs in the same situation in which we learned the material.	If possible, study under conditions similar to the conditions in which you will take the exam.
Use state-dependent retrieval.	We have better retrieval when we are in the same psychological state as we were when we learned the material.	Do not study under the influence of drugs or alcohol because they will affect your retrieval.

Key Takeaways

- Hermann Ebbinghaus made important contributions to the study of memory, including modeling the forgetting curve, the superiority of distributive practice over massed practice, and the benefits of overlearning.
- There are several methods that can be used to improve memory performance.

Exercises and Critical Thinking

1. Plan a course of action to help you study for your next exam, incorporating as many of the techniques mentioned in this section as possible. Try to implement the plan.
2. In the film "Eternal Sunshine of the Spotless Mind," the characters undergo a medical procedure designed to erase their memories of a painful romantic relationship. Would you engage in such a procedure if it was safely offered to you?

Activities

1. Go to this website to try some memory games illustrating key concepts in this chapter. The site was designed for kids, but it is fun for anyone. http://faculty.washington.edu/chudler/chmemory.html
2. Review the genetic basis for cognition and disorders at this interactive website: http://www.g2conline.org/

Cognition and Cognitive Biases

Learning Objectives

1. Define cognition.
2. Describe the role of cognitive biases in memory.

Imagine all of your thoughts as if they were physical entities, swirling rapidly inside your mind. How is it possible that the brain is able to move from one thought to the next in an organized, orderly fashion? The brain is endlessly perceiving, processing, planning, organizing, and remembering; it is always active. Yet, you do not notice most of your brain's activity as you move throughout your daily routine. This is only one facet of the complex processes involved in cognition. Simply put, cognition is thinking, and it encompasses the processes associated with perception, knowledge, problem solving, judgment, language, and memory. Scientists who study cognition are searching for ways to understand how we integrate, organize, and utilize our conscious cognitive experiences without being aware of all of the unconscious work that our brains are doing (Kahneman, 2011). Exceptionally complex, cognition is an essential feature of human consciousness, yet not all aspects of cognition are consciously experienced.

Accuracy and Inaccuracy in Memory and Cognition

She Was Certain, but She Was Wrong: In 1984 Jennifer Thompson was a 22-year-old college student in North Carolina. One night a man broke into her apartment, put a knife to her throat, and raped her. According to her own account, Ms. Thompson studied her rapist throughout the incident with great determination to memorize his face. She said:

> *I studied every single detail on the rapist's face. I looked at his hairline; I looked for scars, for tattoos, for anything that would help me identify him. When and if I survived.*

Ms. Thompson went to the police that same day to create a sketch of her attacker, relying on what she believed was her detailed memory. Several days later, the police constructed a photographic lineup. Thompson identified Ronald Cotton as the rapist, and she later testified against him at trial. She was positive it was him, with no doubt in her mind.

> *I was sure. I knew it. I had picked the right guy, and he was going to go to jail. If there was the possibility of a death sentence, I wanted him to die. I wanted to flip the switch.*

As positive as she was, it turned out that Jennifer Thompson was wrong. But it was not until after Mr. Cotton had served 11 years in prison for a crime he did not commit that conclusive DNA evidence indicated that Bobby Poole was the actual rapist, and Cotton was released from jail.

Jennifer Thompson's memory had failed her, resulting in a substantial injustice. It took definitive DNA testing to shake her confidence, but she now knows that despite her confidence in her identification, it was wrong. Consumed by guilt, Thompson sought out Cotton when he was released from prison, and they have since become friends (Innocence Project, n.d.; Thompson, 2000).

Jennifer Thompson is not the only person to have been fooled by her memory of events. Over the past 10 years, almost 400 people have been released from prison when DNA evidence confirmed that they could not have committed the crime for which they had been convicted, and in more than three-quarters of these cases, the cause of the innocent people being falsely convicted was erroneous eyewitness testimony (Wells, Memon, & Penrod, 2006).

As we have seen, our memories are not perfect. They fail in part due to our inadequate encoding and storage, and in part due to our inability to accurately retrieve stored information. Memory is also influenced by the setting in which it occurs, by the events that occur to us after we have experienced an event, and by the cognitive processes that we use to help us remember. Although our cognition allows us to attend to, rehearse, and organize information, cognition may also lead to distortions and errors in our judgments and our behaviors.

In this section we consider some of the cognitive biases that are known to influence humans. **Cognitive biases** are *errors in memory or judgment that are caused by the inappropriate use of cognitive processes* (see Table 5.2). The study of cognitive biases is important both because it relates to the important psychological theme of accuracy versus inaccuracy in perception, and because being aware of the types of errors that we may make can help us avoid them and therefore improve our decision-making skills.

Overconfidence

One of the most remarkable aspects of Jennifer Thompson's mistaken identity of Ronald Cotton was her certainty. But research reveals a pervasive cognitive bias toward **overconfidence**, which is *the tendency for people to be too certain about their ability to accurately remember events and to make judgments*. Eichenbaum (1999) and Dunning, Griffin, Milojkovic, and Ross (1990) asked college students to predict how another student would react in various situations. Some participants made predictions about a fellow student whom they had just met and interviewed, and others made predictions about their roommates whom they knew very well. In both cases, participants reported their confidence in each prediction, and accuracy was determined by the responses of the people themselves. The results were clear: Regardless of whether they judged a stranger or a roommate, the participants consistently overestimated the accuracy of their own predictions.

Table 5.2 Cognitive Processes That Pose Threats to Accuracy

Cognitive process	Description	Potential threat to accuracy
Overconfidence	When we are more certain that our memories and judgments are accurate than we should be	Eyewitnesses may be very confident that they have accurately identified a suspect, even though their memories are incorrect.
Source monitoring	The ability to accurately identify the source of a memory	Uncertainty about the source of a memory may lead to mistaken judgments.
Misinformation effect	Errors in memory that occur when new, but incorrect information influences existing accurate memories	Eyewitnesses, based on the questions asked by the police, may change their memories of what they observed at the crime scene.
Confirmation bias	The tendency to verify and confirm our existing memories rather than to challenge and disconfirm them	Once beliefs become established, they become self-perpetuating and difficult to change.
Functional fixedness	When schemas prevent us from seeing and using information in new and nontraditional ways	Creativity may be impaired by the overuse of traditional, expectancy-based thinking.
Salience	When some stimuli, (e.g., those that are colorful, moving, or unexpected) grab our attention and make them more likely to be remembered	We may base our judgments on a single salient event while we ignore hundreds of other equally informative events that we do not see.
Representativeness heuristic	Tendency to make judgments according to how well the event matches our expectations	After a coin has come up head many times in a row, we may erroneously think that the next flip is more likely to be tails. This is known as the gambler's fallacy.
Availability heuristic	Idea that things that come to mind easily are seen as more common	We may overestimate the crime statistics in our own area, because these crimes are so easy to recall.

Eyewitnesses to crimes are also frequently overconfident in their memories, and there is only a small correlation between how accurate and how confident an eyewitness is. The witness who claims to be absolutely certain about his or her identification (e.g., Jennifer Thompson) is not much more likely to be accurate than one who appears much less sure, making it almost impossible to determine whether a particular witness is accurate or not (Wells & Olson, 2003).

When we experience a situation with a great deal of emotion, we may form a **flashbulb memory**, which is *a vivid and emotional memory of an unusual event that people believe they remember very well* (Brown & Kulik, 1977). People are very certain of their memories of these important events, and are typically overconfident. Talarico and Rubin (2003) tested the accuracy of flashbulb memories by asking students to write down their memory of how they had heard the news about

either the September 11, 2001, terrorist attacks or about an everyday event that had occurred to them during the same time frame. These recordings were made on September 12, 2001. Then the participants were asked again, either 1, 6, or 32 weeks later, to recall their memories. The participants became less accurate in their recollections of both the emotional event and the everyday events over time, but the participants' confidence in the accuracy of their memory of learning about the attacks did not decline over time. After 32 weeks the participants were overconfident; they were much more certain about the accuracy of their flashbulb memories than they should have been. Schmolck, Buffalo, and Squire (2000) found similar distortions in memories of news about the verdict in the O. J. Simpson trial.

Source Monitoring: Did It Really Happen?

One potential error in memory involves mistakes in differentiating the sources of information. **Source monitoring** refers to *the ability to accurately identify the source of a memory*. Perhaps you have had the experience of wondering whether you really experienced an event or only dreamed or imagined it. If so, you would not be alone. Rassin, Merkelbach, and Spaan (2001) reported that up to 25% of college students reported being confused about real versus dreamed events. Studies suggest that people who are fantasy-prone are more likely to experience source monitoring errors (Winograd, Peluso, & Glover, 1998), and such errors also occur more often for both children and the elderly, than for adolescents and younger adults (Jacoby & Rhodes, 2006).

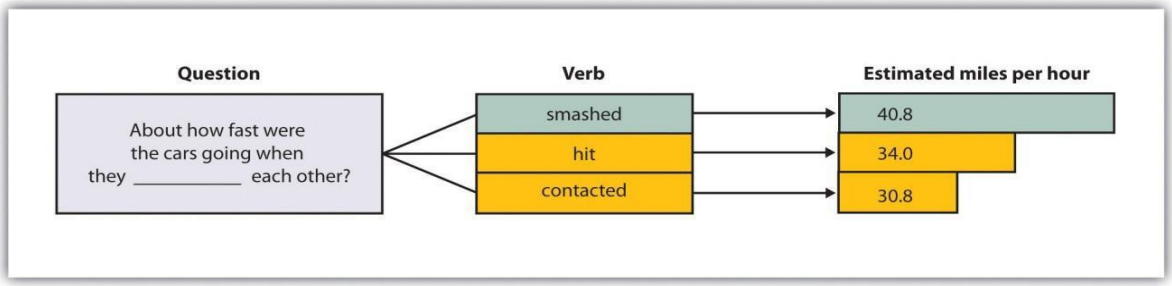
In other cases we may be sure that we remembered the information from real life, but be uncertain about exactly where we heard it. Imagine that you read a news story in a tabloid magazine such as the *National Enquirer*. Probably you would have discounted the information because you know that its source is unreliable. What if later you were to remember the story, but forget the source of the information? If this happens, you might become convinced that the news story is true because you forgot to discount the source. The **sleeper effect** refers to *attitude change that occurs over time when we forget the source of information* (Pratkanis, Greenwald, Leippe, & Baumgardner, 1988).

Misinformation Effects

A particular problem for eyewitnesses, such as Jennifer Thompson, is that our memories are often influenced by the things that occur to us after we have learned the information (Erdmann, Volbert, & Böhm, 2004; Loftus, 1979; Zaragoza, Belli, & Payment, 2007). This new information can distort our original memories such that we are no longer sure what is the real information and what was provided later. The **misinformation effect** refers to *errors in memory that occur when new information influences existing memories*.

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

Figure 5.16 Misinformation Effect



Participants viewed a film of a traffic accident and then answered a question about the accident. According to random assignment, the verb in the question was filled by either "hit," "smashed," or "contacted" each other. The wording of the question influenced the participants' memory of the accident.

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

As you can see in Figure 5.16, although all the participants saw the same accident, their estimates of the cars' speed varied by condition. Participants who had been asked about the cars "smashing" each other estimated the highest average speed, and those who had been asked the "contacted" question estimated the lowest average speed.

In addition to distorting our memories for events that have actually occurred, misinformation may lead us to falsely remember information that never occurred. Loftus and her colleagues asked parents to provide them with descriptions of events that did, such as moving to a new house, and did not, suc as being lost in a shopping mall, happen to their children. Then without telling the children which events were real or made-up, the researchers asked the children to imagine both types of events. The children were instructed to think real hard about whether the events had occurred (Ceci, Huffman, Smith, & Loftus, 1994). More than half of the children generated stories regarding at least one of the made-up events, and they remained insistent that the events did in fact occur, even when told by the researcher that they could not possibly have occurred (Loftus & Pickrell, 1995). Even college students are susceptible to manipulations that make events that did not actually occur seem as if they did (Mazzoni, Loftus, & Kirsch, 2001).

The ease with which memories can be created or implanted is particularly problematic when the events to be recalled have important consequences. Some therapists argue that patients may repress memories of traumatic events they experienced as children, such as childhood sexual abuse, and then recover the events years later as the therapist leads them to recall the information by using techniques, such as dream interpretation and hypnosis (Brown, Scheflin, & Hammond, 1998).

Other researchers argue that painful memories, such as sexual abuse, are usually very well remembered, that few memories are actually repressed, and that even if they are it is virtually impossible for patients to accurately retrieve them years later (McNally, Bryant, & Ehlers, 2003; Pope, Poliakoff, Parker, Boynes, & Hudson, 2007). These researchers have argued that the procedures used by the therapists to "retrieve" the memories are more likely to actually implant false memories, leading the patients to erroneously recall events that did not actually occur. Because hundreds of people have been accused, and even imprisoned, on the basis of claims about recovered memory of child sexual abuse, the accuracy of these memories has important societal

implications. Many psychologists now believe that most of these claims of recovered memories are due to implanted, rather than real, memories (Loftus & Ketcham, 1994).

Distortions Based on Expectations

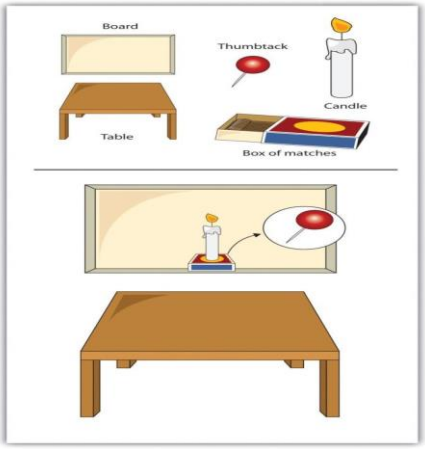
We have seen that schemas help us remember information by organizing material into coherent representations. However, although schemas can improve our memories, they may also lead to cognitive biases. Using schemas may lead us to falsely remember things that never happened to us and to distort or misremember things that did. For one, schemas lead to the **confirmation bias**, which is *the tendency to verify and confirm our existing memories rather than to challenge and disconfirm them*. The confirmation bias occurs because once we have schemas, they influence how we seek out and interpret new information. The confirmation bias leads us to remember information that fits our schemas better than we remember information that disconfirms them (Stangor & McMillan, 1992), a process that makes our stereotypes very difficult to change. We also ask questions in ways that confirm our schemas (Trope & Thompson, 1997). If we think that a person is an extrovert, we might ask her about ways that she likes to have fun, thereby making it more likely that we will confirm our beliefs. In short, once we begin to believe in something, such as a stereotype about a group of people, it becomes very difficult to later convince us that these beliefs are not true; the beliefs become self-confirming.

Darley and Gross (1983) demonstrated how schemas about social class could influence memory. In their research they gave participants a picture and some information about a fourth-grade girl named Hannah. To activate a schema about her social class, Hannah was pictured sitting in front of a nice suburban house for one-half of the participants and pictured in front of an impoverished house in an urban area for the other half. Then the participants watched a video that showed Hannah taking an intelligence test. As the test went on, Hannah got some of the questions right and some of them wrong, but the number of correct and incorrect answers was the same in both conditions. Then the participants were asked to remember how many questions Hannah got right and wrong. Demonstrating that stereotypes had influenced memory, the participants who thought that Hannah had come from an upper-class background remembered that she had gotten more correct answers than those who thought she was from a lower-class background.

Schemas can not only distort our memory, but our reliance on schemas can also make it more difficult for us to "think outside the box." Wason (1960) asked college students to determine the rule that was used to generate the numbers 2-4-6 by asking them to generate possible sequences and then telling them if those numbers followed the rule. The first guess that students made was usually "consecutive ascending even numbers," and they then asked questions designed to confirm their hypothesis: ("Does 102-104-106 fit?" "What about 404-406-408?"). Upon receiving information that those guesses did fit the rule, the students stated that the rule was "consecutive ascending even numbers." But the students' use of the confirmation bias led them to ask only about instances that confirmed their hypothesis, and not about those that would disconfirm it. They never bothered to ask whether 1-2-3 or 3-11-200 would fit, and if they had they would have learned that the rule was not "consecutive ascending even numbers," but simply "any three ascending numbers." Again, you can see that once we have a schema, we continually retrieve that schema from memory rather than other relevant ones, leading us to act in ways that tend to confirm our beliefs.

Functional fixedness occurs when *people's schemas prevent them from using an object in new and nontraditional ways*. Duncker (1945) gave participants a candle, a box of thumbtacks, and a book of matches, and asked them to attach the candle to the wall so that it did not drip onto the table below (see Figure 5.17). Few of the participants realized that the box could be tacked to the wall and used as a platform to hold the candle. The problem again is that our existing memories are powerful, and they bias the way we think about new information. Because the participants were fixated on the box's normal function of holding thumbtacks, they could not see another use.

Figure 5.17 Functional Fixedness



In the candle-tack-box problem, functional fixedness may lead us to see the box only as a box and not as a potential candleholder

Salience and Cognitive Accessibility

Still another potential for bias in memory occurs because we are more likely to attend to, and thus make use of and remember, some information more than other information. For one, we tend to attend to and remember things that are highly **salient**, meaning that *they attract our attention*. Things that are unique, colorful, bright, moving, and unexpected are more salient (McArthur & Post, 1977; Taylor & Fiske, 1978). In one relevant study, Loftus, Loftus, and Messo (1987) showed people images of a customer walking up to a bank teller and pulling out either a pistol or a checkbook. By tracking eye movements, the researchers determined that people were more likely to look at the gun than at the checkbook, and that this reduced their ability to accurately identify the criminal in a lineup that was given later. The salience of the gun drew people's attention away from the face of the criminal.
The salience of the stimuli in our social worlds has a big influence on our judgment, and in some cases, may lead us to behave in ways that we might better not have. Imagine that you wanted to buy a new car for yourself. You checked *Consumer Reports* online and found that, after reviewing price, gas mileage, safety, and options, you decided to purchase a particular vehicle. That night you go to a party, and a friend shows you her brand new car. You check it out, and it seems really cool. You tell her that you were thinking of buying a different model, and she tells you that you are crazy. She says she knows someone who had that car and it had a lot of problems, and she would never buy one. Would you still buy that car, or would you switch your plans?

If you think about this question logically, the information that you just got from your friend is not really all that important. You now know the opinion of one more person cannot change the overall rating of cars very much. On the other hand, the information your friend gives you is highly salient, whereas the statistical information from *Consumer Reports* is not as salient. Typically in cases such as this, people frequently ignore the less salient, but more important information, such as that coming from *Consumer Reports*, in favor of the more salient, but less important, report from a friend.

Heuristic Processing: Availability and Representativeness

Another way that our information processing may be biased occurs when we use **heuristics**, which are *information-processing strategies that are useful in many cases but may lead to errors*

when misapplied. Let us consider two of the most frequently applied heuristics: The representativeness heuristic and the availability heuristic.

In many cases we *base our judgments on information that seems to represent, or match, what we expect will happen, while ignoring other potentially more relevant statistical information*, and when we do so, we are using the **representativeness heuristic**. Consider, for instance, the puzzle presented in Table 5.3. Say that you went to a hospital, and you checked the records of the babies that were born today. Which pattern of births do you think you are most likely to find?

Table 5.3 The Representativeness Heuristic

List A		List B	
6:31 a.m.	Girl	6:31 a.m.	Boy
8:15 a.m.	Girl	8:15 a.m.	Girl
9:42 a.m.	Girl	9:42 a.m.	Boy
1:13 p.m.	Girl	1:13 p.m.	Girl
3:39 p.m.	Boy	3:39 p.m.	Girl
5:12 p.m.	Boy	5:12 p.m.	Boy
7:42 p.m.	Boy	7:42 p.m.	Girl
11:44 p.m.	Boy	11:44 p.m.	Boy

Using the representativeness heuristic may lead us to incorrectly believe that some patterns of observed events are more likely to have occurred than others. In this case, list B seems more random, and thus is judged as more likely to have occurred, but statistically both lists are equally likely.

Most people think that list B is more likely, probably because list B looks more random, and thus matches or is representative of our ideas about randomness. However, statisticians know that any pattern of four girls and four boys is mathematically equally likely. The problem is that we have a schema of what randomness should be like, which does not always match what is mathematically the case. Similarly, people who see a flipped coin come up heads five times in a row will frequently predict, and perhaps even wager money, that tails will be next. This behavior is known as the gambler's fallacy. Mathematically, the gambler's fallacy is an error: The likelihood of any single coin flip being tails is always 50%, regardless of how many times it has come up heads in the past.

Our judgments can also be influenced by how easy it is to retrieve a memory. *The tendency to make judgments of the frequency or likelihood that an event occurs on the basis of the ease with which it can be retrieved from memory* is known as the **availability heuristic** (MacLeod & Campbell, 1992; Tversky & Kahneman, 1973). Imagine you were asked to indicate whether there are more words in the English language that begin with the letter "R" or have the letter "R" as the third letter. You would probably answer this question by trying to think of words that have each of the characteristics, thinking of all the words you know that begin with "R" and all that have "R" in the third position. Because it is much easier to retrieve words by their first letter than by their third, we may incorrectly guess that there are more words that begin with "R," even though there are in fact more words that have "R" as the third letter. The availability heuristic may also operate on episodic memory. We may think that our friends are nice people, because we see and remember them primarily when they are around us being nice. The traffic might seem worse in our own

neighborhood than we think it is in other places, in part because nearby traffic jams are more easily retrieved than are traffic jams that occur somewhere else.

Psychology in Everyday Life: Cognitive Biases in the Real World

Perhaps you are thinking that the kinds of errors that we have been talking about do not seem that important. After all, who really cares if we think there are more words that begin with the letter "R" than there actually are. These are not big problems in the overall scheme of things, but it turns out that what seem to be relatively small cognitive biases on the surface can have profound consequences for people.

Why would so many people continue to purchase lottery tickets, buy risky investments in the stock market, or gamble their money in casinos when the likelihood of them ever winning is so low? One possibility is that they are victims of salience; they focus their attention on the salient likelihood of a big win, forgetting that the base rate of the event occurring is very low. The belief in astrology, which all scientific evidence suggests is not accurate, is probably driven in part by the salience of the occasions when the predictions are correct. When a horoscope comes true, which will sometimes happen by chance, the correct prediction is highly salient and may allow people to maintain the overall false belief.

People may also take more care to prepare for unlikely events than for more likely ones, because the unlikely ones are more salient. For instance, people may think that they are more likely to die from a terrorist attack or a homicide than they are from diabetes, stroke, or tuberculosis, but the odds are much greater of dying from the latter than the former. People are frequently more afraid of flying than driving, although the likelihood of dying in a car crash is hundreds of times greater than dying in a plane crash. Because people do not accurately calibrate their behaviors to match the true potential risks, sucha as they drink and drive or do not wear their seatbelts, the individual and societal level costs are often quite large (Slovic, 2000).

Salience and accessibility also color how we perceive our social worlds, which may have a big influence on our behavior. For instance, people who watch a lot of violent television shows also view the world as more dangerous (Doob & Macdonald, 1979), probably because violence becomes more cognitively accessible for them. We also unfairly overestimate our contribution to joint projects (Ross & Sicoly, 1979), perhaps in part because our own contributions are highly accessible, whereas the contributions of others are much less so.

Even people who should know better are subject to cognitive biases. Economists, stock traders, managers, lawyers, and even doctors make the same kinds of mistakes in their professional activities that people make in their everyday lives (Gilovich, Griffin, & Kahneman, 2002). Just like us, these people are victims of overconfidence, heuristics, and other biases. Furthermore, every year thousands of individuals, such as Ronald Cotton, are charged with and often convicted of crimes based largely on eyewitness evidence. When eyewitnesses testify in courtrooms regarding their memories of a crime, they often are completely sure that they are identifying the right person, but the most common cause of innocent people being falsely convicted is erroneous eyewitness testimony (Wells, Wright, & Bradfield, 1999). The many

people who were convicted by mistaken eyewitnesses prior to the advent of forensic DNA and who have now been exonerated by DNA tests have certainly paid for all-too-common memory errors (Wells, Memon, & Penrod, 2006).

Although cognitive biases are common, they are not impossible to control, and psychologists and other scientists are working to help people make better decisions. One possibility is to provide people with better feedback about their judgments. Weather forecasters, for instance, learn to be quite accurate in their judgments because they have clear feedback about the accuracy of their predictions. Other research has found that accessibility biases can be reduced by leading people to consider multiple alternatives rather than focus only on the most obvious ones, and particularly by leading people to think about opposite possible outcomes than the ones they are expecting (Lilienfeld, Ammirtai, & Landfield, 2009). Forensic psychologists are also working to reduce the incidence of false identification by helping police develop better procedures for interviewing both suspects and eyewitnesses (Steblay, Dysart, Fulero, & Lindsay, 2001).

Key Takeaways

- A variety of cognitive biases may lead us to falsely remember things that never happened to us and to distort or misremember things that did.
- Cognitive biases can also influence the accuracy of our judgments.

Exercises and Critical Thinking

1. Consider a time when you were uncertain if you really experienced an event or only imagined it. What impact did this have on you, and how did you resolve it?
2. Consider again some of the cognitive schemas that you hold in your memory. How do these knowledge structures bias your information processing and behavior, and how might you prevent them from doing so?
3. Imagine that you were involved in a legal case in which an eyewitness claimed that he had seen a person commit a crime. Based on your knowledge about memory and cognition, what techniques would you use to reduce the possibility that the eyewitness was making a mistaken identification?

Videos

1. These video segments from Scientific American discuss some special topics related to memory http://chedd-angier.com/frontiers/season14.html (Episode 2)

Problem-Solving Strategies

Learning Objective

1. Describe the different types of problem-solving.

When you are presented with a problem, whether it is a complex mathematical problem or a broken printer, how do you solve it? Before finding a solution to the problem, the problem must first be clearly identified. After that, one of many problem solving strategies can be applied, hopefully resulting in a solution.

A **problem-solving strategy** is a *plan of action used to find a solution* (OpenStax College, 2014). Different strategies have different action plans associated with them. For example, a well-known strategy is **trial and error,** which is *continually trying different solutions until the problem is solved*. The old adage, "If at first you don't succeed, try, try again" describes trial and error. In terms of your broken printer, you could try checking the ink levels, and if that does not work, you could check to make sure the paper tray is not jammed, or maybe the printer is not actually connected to your laptop. Although trial and error is not typically one of the most time-efficient strategies, it is a commonly used one.

Another type of strategy is an algorithm. An **algorithm** is a *problem-solving formula, such as a mathematical equation, that provides you with step-by-step instructions used to achieve a desired outcome* (Kahneman, 2011). You can think of an algorithm as a recipe with highly detailed instructions that produce the same result every time they are performed. Algorithms are used frequently in our everyday lives, especially in computer science. When you run a search on the Internet, search engines like Google use algorithms to decide which entries will appear first in your list of results. Facebook also uses algorithms to decide which posts to display on your newsfeed. Can you identify other situations in which algorithms are used?

As previously indicated, a heuristic is an information processing strategy. While an algorithm must be followed exactly to produce a correct result, a **heuristic** *is a general problem-solving framework* (Tversky & Kahneman, 1974). You can think of these as mental shortcuts that are used to solve problems. A "rule of thumb" is an example of a heuristic. Such a rule saves the person time and energy when making a decision, but despite its time-saving characteristics, it is not always the best method for making a rational decision.

Working backwards is a useful heuristic in which you *begin solving the problem by focusing on the end result*. Consider this example: You live in Washington, D.C. and have been invited to a wedding at 4 PM on Saturday in Philadelphia. Knowing that Interstate 95 tends to back up any day of the week, you need to plan your route and time your departure accordingly. If you want to be at the wedding service by 3:30 PM, and it takes 2.5 hours to get to Philadelphia without traffic, what time should you leave your house? You use the working backwards heuristic to plan the events of your day, probably without even thinking about it.

Another useful heuristic is **Sub-goaling**, which is *the practice of accomplishing a large goal or task by breaking it into a series of smaller steps*. Students often use this common method to complete a large research project or long essay for school. For example, students typically brainstorm, develop a thesis or main topic, research the chosen topic, organize their information into an outline, write a rough draft, revise and edit the rough draft, develop a final draft, organize the references list, and proofread their work before turning in the project. The large task becomes less overwhelming when it is broken down into a series of small steps.

Chapter Summary

Memory and cognition are the two major interests of cognitive psychologists. The cognitive perspective was influenced in large part by the development of the computer. The computer is the model for information processing theory. Psychologists conceptualize memory in terms of processes, stages, and types.

Memory is not like a video recording, but rather is a reconstructive process that is prone to error.

The three processes of memory include encoding, storage, and retrieval.

Sensory memory, including iconic and echoic memory, is a memory buffer that lasts only very briefly and then, unless it is attended to and passed on for more processing, is forgotten.

Information that we turn our attention to may move into short-term memory (STM). STM is limited in both the length and the amount of information it can hold. Working memory is a set of memory procedures or operations that operates on the information in STM. Working memory's central executive directs the strategies used to keep information in STM, such as maintenance rehearsal, visualization, and chunking.

Long-term memory (LTM) is memory storage that can hold information for days, months, and years. The information that we want to remember in LTM must be encoded and stored, and then retrieved.

Explicit/declarative memory is assessed using measures in which the individual being tested must consciously attempt to remember the information. Explicit memory includes semantic and episodic memory. Explicit memory tests include free recall memory tests, cued recall memory tests, recognition memory tests, and measures of relearning.

Implicit /nondeclarative memory refers to the influence of experience on behavior, even if the individual is not aware of those influences. Implicit memory is made up of procedural memory, classical conditioning effects, and priming. An important characteristic of implicit memories is that they are frequently formed and used automatically, without much effort or awareness on our part.

Memories that are stored in LTM are not isolated, but rather are linked together into categories and schemas. Schemas are important because they help us encode and retrieve information by providing an organizational structure for it. However, they can lead to biases.

The ability to maintain information in LTM involves a gradual strengthening of the connections among the neurons in the brain, known as long-term potentiation (LTP). The hippocampus is important in explicit memory, the cerebellum is important in implicit memory, and the amygdala is important in emotional memory. A number of neurotransmitters are important in consolidation and memory. Evidence for the role of different brain structures in different types of memories comes in part from case studies of patients who suffer from amnesia.

Some strategies for improving LTM include making use of the forgetting curve, the spacing effect which finds that distributed practice is superior to massed practice, overlearning, and being aware of context-dependent and state-dependent retrieval effects. Lists, names, and simple facts might be learned more easily by using mnemonics.

Cognitive biases are errors in memory or judgment that are caused by the inappropriate use of cognitive processes. These biases are caused by the overuse of schemas, the reliance on salience, and the use of rule-of-thumb strategies known as heuristics. These biases include errors in source monitoring, the confirmation bias, functional fixedness, the misinformation effect, and overconfidence. These biases are one cause of inaccuracy in the reconstruction of memory. Understanding the potential cognitive errors we frequently make can help us make better decisions and engage in more appropriate behaviors.

Problem-solving involves several strategies, including algorithms, heuristics, trial-and-error and subgoaling. Different problems will require different plans of action to reach a solution.

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Chapter 6 Intelligence and Language

Learning Objective

1. Define intelligence and language.

In this chapter, we consider how psychologists conceptualize and measure human **intelligence,** *the ability to think, learn from experience, solve problems, and adapt to new situations*. We will consider whether intelligence involves a single ability or many different abilities, how we measure intelligence, and what intelligence predicts. We will also consider how intelligence is represented in the brain, in terms of nature versus nurture, and the meaning of group differences in intelligence.

Our vast intelligence also allows us to have **language**, *a system of communication that uses symbols in a regular way to create meaning*. Language gives us the ability to communicate our intelligence to others by talking, reading, and writing. As the psychologist Steven Pinker put it, language is the the jewel in the crown of cognition (Pinker, 1994). Although other species have at least some ability to communicate, none of them have language. In the last section of this chapter, we will consider the structure and development of language, as well as its vital importance to human beings.

Defining and Measuring Intelligence

Learning Objectives

1. List the different types of intelligences psychologists study.
2. Summarize the characteristics of a scientifically valid intelligence test.
3. Outline the biological and environmental determinants of intelligence.

General (g) Versus Specific (s) Intelligences

In the early 1900s, the French psychologist Alfred Binet (1857–1911) and his colleague Theodore Simon (1872–1961) began working on behalf of the French government to develop a measure that would differentiate students who were expected to be better learners from students who were expected to be slower learners. The goal was to help teachers better educate these two groups of students. Binet and Simon developed what most psychologists today regard as the first intelligence test, which consisted of a wide variety of questions that included the ability to name objects, define words, draw pictures, complete sentences, compare items, and construct sentences.

Figure 6.1 Alfred Binet

Source

Binet and Simon (Binet, Simon, & Town, 1915; Siegler, 1992) believed that the questions they asked their students, even though they were on the surface dissimilar, all assessed the basic abilities to understand, reason, and make judgments. It turned out that the correlations among these different types of measures were in fact all positive; students who got one item correct were more likely to also get other items correct, even though the questions themselves were very different.

On the basis of these results, Charles Spearman (1863–1945) hypothesized that there must be a single underlying construct that all items measure. He called *the construct that the different abilities and skills measured on intelligence tests have in common* the **general intelligence factor (g).** Many psychologists believe that there is a generalized intelligence factor, "g", that relates to abstract thinking and includes the abilities to acquire knowledge, reason abstractly, adapt to novel situations, and benefit from instruction and experience (Gottfredson, 1997; Sternberg, 2003). According to "g", people with higher general intelligence learn faster.

Soon after Binet and Simon introduced their test, the American psychologist Lewis Terman at Stanford University (1877–1956) developed an American version of Binet's test that became known as the Stanford-Binet Intelligence Test. **The Stanford-Binet Intelligence Test** is a *measure of general intelligence made up of a wide variety of tasks including vocabulary, memory for pictures, naming of familiar objects, repeating sentences, and following commands.*

In addition to "g", there is also evidence for **specific intelligence** (s), *or measures of specific skills in narrow domains*. One empirical result in support of the idea of "s" comes from intelligence tests themselves. Although the different types of questions do correlate with each other, some items correlate more highly with each other than do other items such that they form clusters or clumps of intelligences.

Crystalized versus Fluid Intelligence

One distinction in specific intelligences is between **fluid intelligence**, *which refers to the capacity to learn new ways of solving problems and performing activities quickly and abstractly*, and **crystallized intelligence**, *which refers to the accumulated knowledge of the world we have acquired throughout our lives* (Salthouse, 2004). These intelligences must be different because crystallized intelligence increases with age, while fluid intelligence tends to decrease with age (Horn, Donaldson, & Engstrom, 1981; Salthouse, 2004).

Research demonstrates that older adults have more crystallized intelligence, as reflected in semantic knowledge, vocabulary, and language. As a result, older adults generally outperform younger people on measures of history, geography, and even on crossword puzzles, where this information is useful (Salthouse, 2004). This superior knowledge, combined with a slower and more complete processing style and sophisticated understanding of the workings of the world, gives those older an advantage, despite greater fluid intelligence in those younger (Baltes, Staudinger, & Lindenberger, 1999; Scheibe, Kunzmann, & Baltes, 2009). The differential changes in crystallized versus fluid intelligence also explains why those older do not necessarily show poorer performance on tasks that require experience, although they show poorer memory overall. A young chess player may think more quickly, but a more experienced chess player has more knowledge to draw on.

Triarchic Theory

Figure 6.2
Test your divergent thinking. How many uses for a paper clip can you think of? © Thinkstock

Another advocate of specific intelligences, or multiple intelligences, is the psychologist Robert Sternberg. Sternberg has proposed a **triarchic (three-part) theory of intelligence** that proposes that *people may display more or less analytical intelligence, creative intelligence, and practical intelligence*. Sternberg (1985, 2003) defined the three intelligences as:

- **Analytical intelligence** or *the ability to perform academic problem solving*
- **Creative intelligence** or *the ability to adapt to new situations and create new ideas*
- **Practical intelligence** or *the ability to demonstrate street smarts and common sense*

Analytical intelligence is measured on traditional intelligence tests and assessses finding the single correct answer to a problem. Research has found that creativity is not highly correlated with analytical intelligence (Furnham & Bachtiar, 2008) and exceptionally creative scientists, artists, mathematicians, and engineers do not score higher on intelligence tests than do their less creative peers (Simonton, 2000). Furthermore, the brain areas that are associated with **convergent thinking**, *thinking that is directed toward finding the correct answer to a given problem*, are different from those associated with **divergent thinking**, *the ability to generate many different ideas for or solutions to a single problem* (Tarasova, Volf, & Razoumnikova, 2010). On the other hand, being creative reflects basic abilities measured by "g", including the abilities to learn from experience, to remember information, and to think abstractly (Bink & Marsh, 2000). Ericsson (1998), Weisberg (2006), Hennessey and Amabile (2010) and Simonton (1992) studied creative people and identified at least five components that are likely to be important for creativity as listed in Table 6.1.

Table 6.1 Important Components for Creativity

Component	Description
Expertise	Creative people have studied and know a lot about a topic
Imaginative Thinking	Creative people view problems in new and different ways
Risk Taking	Creative people take on new, but potentially risky approaches
Intrinsic Interest	Creative people take on projects for interest not money
Working in Creative Environments	The most creative people are supported, aided, and challenged by other people working on similar projects

The last aspect of the triarchic model, practical intelligence, refers primarily to intelligence that cannot be gained from books or formal learning. Practical intelligence represents a type of street smarts or common sense that is learned from life experiences. Although a number of tests have been devised to measure practical intelligence (Sternberg, Wagner, & Okagaki, 1993; Wagner & Sternberg, 1985), research has not found much evidence that practical intelligence is distinct from "g" or that it is predictive of success at any particular tasks (Gottfredson, 2003). Practical intelligence may include, at least in part, certain abilities that help people perform well at specific jobs, and these abilities may not always be highly correlated with general intelligence (Sternberg et al., 1993).

Theory of Multiple Intelligences

Figure 6.3

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Another champion of the idea of specific types of intelligences is the psychologist Howard Gardner (1983, 1999) who developed a theory of multiple intelligences. Gardner argued that it would be evolutionarily functional for different people to have different talents and skills, and proposed that there are eight intelligences that can be differentiated from each other. A potential ninth intelligence; that is, existential still needs empirical support. See Table 6.2 for a list of Gardner's eight specific intelligences. Gardner noted that some evidence for multiple intelligences comes from the abilities of **autistic savants**, *people who score low on intelligence tests overall, but who nevertheless may have exceptional skills in a given domain*, such as math, music, art, or in being able to recite statistics in a given sport (Treffert & Wallace, 2004).

Table 6.2 Howard Gardner's Specific Intelligences

Intelligence	Description
Linguistic	The ability to speak and write well
Logical-mathematical	The ability to use logic and mathematical skills to solve problems
Spatial	The ability to think and reason about objects in three dimensions
Musical	The ability to perform and enjoy music
Kinesthetic (body)	The ability to move the body in sports, dance, or other physical activities
Interpersonal	The ability to understand and interact effectively with others
Intrapersonal	The ability to have insight into the self
Naturalistic	The ability to recognize, identify, and understand animals, plants, and other living things
Existential (Possible)	The ability to identify and ponder the fundamental questions of human existence

Source: Adapted from Gardner, H. (1999). *Intelligence reframed: Multiple intelligences for the 21st century*. New York, NY: Basic Books.

Figure 6.4
Although intelligence is often conceptualized in a general way (as the "g" factor), there is a variety of specific skills that can be useful for particular tasks. © Thinkstock

The idea of multiple intelligences has been influential in the field of education, and teachers have used these ideas to try to teach differently to different students. For instance, to teach math problems to students who have particularly good kinesthetic intelligence, a teacher might encourage the students to move their bodies or hands according to the numbers. On the other hand, some have argued that these intelligences sometimes seem more like abilities or talents rather than real intelligence. There is no clear conclusion about how many intelligences there are. Are sense of humor, artistic skills, dramatic skills, and so forth also separate intelligences? Further, demonstrating the underlying power of a single intelligence, the many different intelligences show some correlations with each other, and thus represent, in part, "g" (Brody, 2003).

Measuring Intelligence: Standardization and the Intelligence Quotient

The goal of most intelligence tests is to measure "g", the general intelligence factor. Good intelligence tests are **reliable,** *meaning that they are consistent over time,* and also demonstrate **validity,** *meaning that they actually measure intelligence rather than something else*. Because intelligence is such an important individual difference dimension, psychologists have invested substantial effort in creating and improving measures of intelligence, and these tests are now considered the most accurate of all psychological tests. In fact, the ability to accurately assess intelligence is one of the most important contributions of psychology to everyday public life.

Intelligence changes with age. A 3-year-old who could accurately multiply 183 by 39 would certainly be intelligent, but a 25-year-old who could not do so would be seen as unintelligent. Thus, understanding intelligence requires that we know the norms or standards in a given population of people at a given age. The **standardization** of a test involves *giving it to a large number of people at different ages and computing the average score on the test at each age level*.

It is important that intelligence tests be standardized on a regular basis, because the overall level of intelligence in a population may change over time. The **Flynn effect** refers to *the observation that scores on intelligence tests worldwide have increased substantially over the past decades* (Flynn, 1999). Although the increase varies somewhat from country to country, the average increase is about 3 IQ points every 10 years. There are many explanations for the Flynn effect, including better nutrition, increased access to information, and more familiarity with multiple-choice tests (Neisser, 1998), but whether people are actually getting smarter is debatable (Neisser, 1997).

Once the standardization has been accomplished, we have a picture of the average abilities of people at different ages and can calculate a person's **mental age**, which is *the age at which a person is performing intellectually*. If we compare the mental age of a person to the person's chronological age, the result is the **Intelligence Quotient (IQ),** *a measure of intelligence that is adjusted for age.* A simple way to calculate IQ is by using the following formula:

IQ = mental age ÷ chronological age × 100.

Thus a 10-year-old child who does as well as the average 10-year-old child has an IQ of 100 (10 ÷ 10 × 100), whereas an 8-year-old child who does as well as the average 10-year-old child would have an IQ of 125 (10 ÷ 8 × 100). Most modern intelligence tests are based on the relative position of a person's score among people of the same age, rather than on the basis of this formula, but the idea of an intelligence quotient provides a good description of the score's meaning.

Intelligence Scores and Life Outcomes

Intelligence has been associated with educational, occupational, economic, and social outcomes. Scores on intelligence tests predict academic and military performance, as well as success in a wide variety of jobs (Ones, Viswesvaran, & Dilchert, 2005; Schmidt & Hunter, 1998). Intelligence is positively correlated with health-related outcomes, including longevity (Gottfredson, 2004; Gottfredson & Deary, 2004). At least some of this latter relationship may be due to more intelligent are better able to predict and avoid accidents and to understand and follow instructions from doctors or on drug labels. Simonton (2006) also found that among U.S. presidents, the ability to effectively lead was well predicted by ratings of the president's intelligence. Intelligence is also negatively correlated with criminal behaviors as the average IQ of delinquent adolescents is about 7 points lower than that of other adolescents (Wilson & Herrnstein, 1985)

The advantages of having a higher IQ increase as life settings become more complex. The correlation between IQ and job performance is higher in more mentally demanding occupations, such as physician or lawyer, than in less mentally demanding occupations, like clerk or newspaper delivery person (Salgado et al., 2003). Although some specific personality traits, talents, and physical abilities are important for success in some jobs, intelligence predicts performance across all types of jobs.

Wechsler Scales

A number of scales are based on the IQ. The **Wechsler Adult lntelligence Scale (WAIS)** is *the most widely used intelligence test for adults* (Watkins, Campbell, Nieberding, & Hallmark, 1995). The current version of the WAIS, the WAIS-IV, was standardized on 2,200 people ranging from 16 to 90 years of age. It consists of 15 different tasks, each designed to assess intelligence, including working memory, arithmetic ability, spatial ability, and general knowledge about the world. The WAIS-IV yields scores on four domains: verbal, perceptual, working memory, and processing speed. The reliability of the test is high (more than 0.95), and it shows substantial construct validity. The WAIS-IV is correlated highly with other IQ tests such as the Stanford-Binet, as well as with criteria of academic and life success, including college grades, measures of

work performance, and occupational level. It also shows significant correlations with measures of everyday functioning among people with intellectual disabilities.

The Wechsler scale has also been adapted for preschool children in the form of the *Wechsler Primary and Preschool Scale of Intelligence-Fourth Edition (WPPSI-IV)* and for older children and adolescents in the form of the *Wechsler Intelligence Scale for Children-Fifth Edition (WISC-V)*. Figure 6.5 illustrates items from the WAIS.

Figure 6.5 Sample Items from the Wechsler Adult Intelligence Scale (WAIS)
https://www.flickr.com/search/?q=wechsler+scale

Aptitude Tests

The intelligence tests that you may be most familiar with are **aptitude tests**, *which are designed to measure one's ability to perform a given task, for instance, to do well in college or in postgraduate training.* Most U.S. colleges and universities require students to take the Scholastic Assessment Test (SAT) or the American College Test (ACT), and postgraduate schools require the Graduate Record Examination (GRE), Medical College Admissions Test (MCAT), or the Law School Admission Test (LSAT). These tests are useful for selecting students because they predict success in the programs that they are designed for, particularly in the first year of the program (Kuncel, Hezlett, & Ones, 2010). These aptitude tests also measure, in part, intelligence. Frey and Detterman (2004) found that the SAT correlated highly (between about $r = .7$ and $r = .8$) with standard measures of intelligence.

Brain Functioning and Intelligence

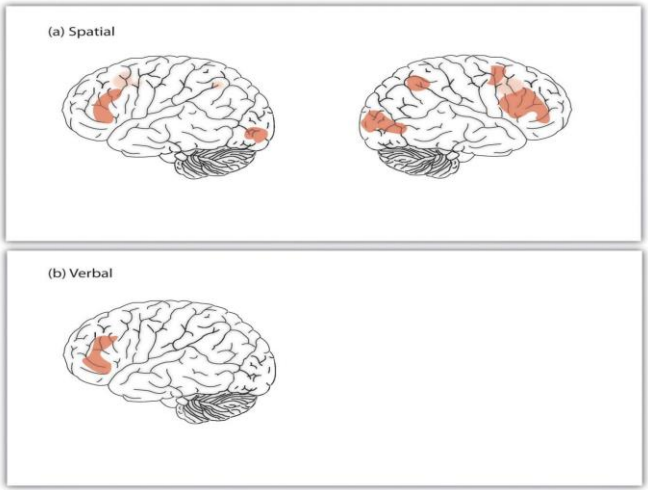
The brain processes underlying intelligence are not completely understood, but current research has focused on four potential factors: brain size, sensory ability, speed and efficiency of neural transmission, and working memory capacity.

There is at least some truth to the idea that smarter people have bigger brains. Studies that have measured brain volume using neuroimaging techniques find that larger brain size is correlated with intelligence (McDaniel, 2005), and intelligence has also been found to be correlated with the number of neurons in the brain and with the thickness of the cortex (Haier, 2004; Shaw et al., 2006). It is important to remember that these correlational findings do not mean that having more brain volume causes higher intelligence. It is possible that growing up in a stimulating

environment that rewards thinking and learning may lead to greater brain growth (Garlick, 2003), and it is also possible that a third variable, such as better nutrition, causes both brain volume and intelligence.

Another possibility is that the brains of more intelligent people operate more efficiently and faster than the brains of the less intelligent. Some evidence supporting this idea comes from data showing that people who are more intelligent frequently show less brain activity (suggesting that they need to use less capacity) than those with lower intelligence when they work on a task (Haier, Siegel, Tang, & Abel, 1992). Additionally, the brains of more intelligent people also seem to run faster than the brains of the less intelligent. Research has found that the speed with which people can perform simple tasks, such as determining which of two lines is longer or pressing, as quickly as possible, one of eight buttons that is lighter, is predictive of intelligence (Deary, Der, & Ford, 2001). Intelligence scores also correlate at about $r = .5$ with measures of working memory (Ackerman, Beier, & Boyle, 2005), and working memory is now used as a measure of intelligence on many tests.

Figure 6.6 Where Is Intelligence?



Although intelligence is not located in a specific part of the brain, it is more prevalent in some brain areas than others. Duncan et al. (2000) administered a variety of intelligence tasks and observed the places in the cortex that were most active. Although different tests created different patterns of activation, as you can see in Figure 6.6, these activated areas were primarily in the outer parts of the cortex, the area of the brain most involved in planning, executive control, and short-term memory.

Emotional Intelligence

Although most psychologists have considered intelligence a cognitive ability, people also use their emotions to help them solve problems and relate effectively to others.
Emotional intelligence refers to *the ability to accurately identify, assess, and understand emotions, as well as to effectively control one's own emotions* (Feldman-Barrett & Salovey, 2002; Mayer, Salovey, & Caruso, 2000).

The idea of emotional intelligence is seen in Howard Gardner's **interpersonal intelligence**, the capacity to understand the emotions, intentions, motivations, and desires of other people, and **intrapersonal intelligence**, *the capacity to understand oneself, including one's emotions*. Public interest in, and research on, emotional intelligence became widely prevalent following the publication of Daniel Goleman's best-selling book, *Emotional Intelligence: Why It Can Matter More Than IQ* (Goleman, 1998).

There are a variety of measures of emotional intelligence (Mayer, Salovey, & Caruso, 2008; Petrides & Furnham, 2000). One problem with emotional intelligence tests is that they often do not show a great deal of reliability or validity (Føllesdal & Hagtvet, 2009). Although it has been found that people with higher emotional intelligence are also healthier (Martins, Ramalho, & Morin, 2010), findings are mixed about whether emotional intelligence predicts life success, for instance, job performance (Harms & Credé, 2010). Furthermore, other researchers have questioned the construct validity of the measures, arguing that emotional intelligence really measures knowledge about what emotions are, but not necessarily how to use those emotions (Brody, 2004). Others argue that emotional intelligence is actually a personality trait, a part of "g", or a skill that can be applied in some specific academic and work situations (Landy, 2005).

Although measures of the ability to understand, experience, and manage emotions may not predict effective behaviors, another important aspect of emotional intelligence is emotion regulation. **Emotion regulation** *refers to the ability to control and productively use one's emotions*. Research has found that people who are better able to override their impulses to seek immediate gratification and who are less impulsive also have higher cognitive and social intelligence. They have better SAT scores, are rated by their friends as more socially adept, and cope with frustration and stress better than those with less skill at emotion regulation (Ayduk et al., 2000; Eigsti et al., 2006; Mischel & Ayduk, 2004). Because emotional intelligence seems so important, many school systems have designed programs to teach it to their students. However, the effectiveness of these programs has not been rigorously tested, and we do not yet know whether emotional intelligence can be taught, or if learning it would improve the quality of people's lives (Mayer & Cobb, 2000).

Is Intelligence Nature or Nurture?

Intelligence has both genetic and environmental causes, and these have been systematically studied through a large number of twin and adoption studies (Neisser et al., 1996; Plomin, DeFries, Craig, & McGuffin, 2003). These studies have found that between 40% and 80% of the variability in IQ is due to genetics, meaning that overall genetics plays a bigger role than does environment in creating IQ differences among individuals (Plomin & Spinath, 2004). The IQs of identical twins correlate very highly (r = .86), much higher than do the scores of fraternal twins who are less genetically similar (r = .60). And the correlations between the IQs of parents and their biological children (r = .42) is significantly greater than the correlation between parents and adopted children (r = .19). The role of genetics gets stronger as children get older. The intelligence of very young children (less than 3 years old) does not predict adult intelligence, but by age 7 it does, and IQ scores remain very stable in adulthood (Deary, Whiteman, Starr, Whalley, & Fox, 2004).

However, there is also evidence for the role of nurture, indicating that individuals are not born with fixed, unchangeable levels of intelligence. Twins raised together in the same home have more similar IQs than do twins who are raised in different homes, and fraternal twins have more similar IQs than do nontwin siblings, which is likely due to the fact that they are treated more similarly than are nontwin siblings.

The fact that intelligence becomes more stable as we get older provides evidence that early environmental experiences matter more than later ones. Environmental factors also explain a greater proportion of the variance in intelligence for children from lower-income households than they do for children from upper-income households (Turkheimer, Haley, Waldron, D'Onofrio, &

Gottesman, 2003). This is because most upper-income households tend to provide a safe, nutritious, and supporting environment for children, whereas these factors are more variable in lower-income households.

Social and economic deprivation can adversely affect IQ. Children from households in poverty have lower IQs than do children from households with more resources, even when other factors, such as education, race, and parenting, are controlled (Brooks-Gunn & Duncan, 1997). Poverty may lead to diets that are under-nourishing or lacking in appropriate vitamins, and poor children may also be more likely to be exposed to toxins, such as lead in drinking water, dust, or paint chips (Bellinger & Needleman, 2003). These factors can slow brain development and reduce intelligence.

If impoverished environments can harm intelligence, we might wonder whether enriched environments can improve it. Government-funded after-school programs, such as Head Start, are designed to help children learn. Research has found that attending such programs may increase intelligence for a short time, but these increases rarely last after the programs end (McLoyd, 1998; Perkins & Grotzer, 1997). However, other studies suggest that Head Start and similar programs may improve emotional intelligence and reduce the likelihood that children will drop out of school or be held back a grade (Reynolds, Temple, Robertson, & Mann 2001).

Intelligence is improved by education; the number of years a person has spent in school correlates at about $r = .6$ with IQ (Ceci, 1991). In part, this correlation may be due to the fact that people with higher IQ scores enjoy taking classes more than people with low IQ scores, and they are more likely to stay in school, but education also has a causal effect on IQ.

Comparisons between children who are almost exactly the same age, but who just make or do not make a deadline for entering school in a given school year, show that those who enter school a year earlier have a higher IQ score than those who have to wait until the next year to begin school (Baltes & Reinert, 1969; Ceci & Williams, 1997). Children's IQs tend to drop significantly during summer vacations (Huttenlocher, Levine, & Vevea, 1998), a finding that suggests that a longer school year, as is used in Europe and East Asia, is beneficial.

It is important to remember that the relative roles of nature and nurture can never be completely separated. For instance, a child with a higher than average intelligence will be treated differently than a child with a lower than average intelligence, and these differences in treatment will likely amplify initial differences in intelligence. This means that modest genetic differences can be multiplied into big differences over time.

Key Takeaways

- Intelligence is the ability to think, learn from experience, solve problems, and adapt to new situations.
- Psychologists believe that there is a construct that accounts for the overall differences in intelligence among people, known as general intelligence "g".
- There is also evidence for specific intelligences "s". These are measures of specific skills in narrow domains, including fluid and crystalized intelligence.
- Other specific intelligences include the Triarchic Theory, that focuses on analytical, creative and practical intelligence, and the Theory of Multiple Intelligences, which identifies eight, possibly nine, intelligences.
- Intelligence tests need to be reliable, valid, and regularly standardiazed due to the Flynn effect.
- The intelligence quotient (IQ) is a measure of intelligence that is adjusted for age. The Wechsler scales and the Stanford-Binet are the most widely used intelligence tests.
- Emotional intelligence refers to the ability to identify, assess, manage, and control one's emotions. People who are better able to regulate their behaviors and emotions are also more successful in their personal and social encounters.
- Brain volume, speed of neural transmission, and working memory capacity are related to IQ.
- Between 40% and 80% of the variability in IQ is due to genetics, meaning that overall genetics plays a bigger role than does environment in creating IQ differences among individuals.
- Intelligence is improved by education and may be hindered by environmental factors, such as poverty.

Exercises and Critical Thinking

1. Consider your own IQ. Are you smarter than the average person? What specific intelligences do you think you excel in?
2. Did your parents try to improve your intelligence? Do you think their efforts were successful?
3. Consider the meaning of the Flynn effect. Do you think people are really getting smarter?
4. Give some examples of how emotional intelligence, or the lack of it, influences your everyday life and the lives of other people you know.

Group Differences in Intelligence

Learning Objectives

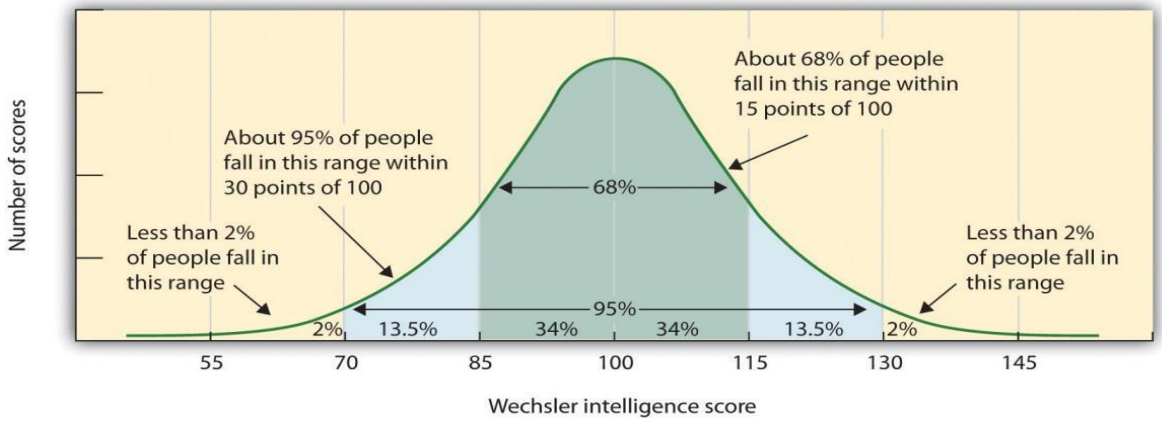
1. Explain IQ and how the bell curve distributes IQ scores in the general population.
2. Explain how individuals with very high and very low IQ scores are characterized.
3. Describe the biological and environmental explanations for sex and race differences in IQ.
4. Define stereotype threat and explain how it might influence scores on intelligence tests.

Extremes of Intelligence: Intellectual Disability and Giftedness

The results of studies assessing the measurement of intelligence show that IQ is distributed in the population in the form of a **bell curve,** also known as **a normal distribution,** which is *the pattern of scores usually observed in a variable that clusters around its average*. In a normal distribution, the bulk of the scores fall toward the middle, with many fewer scores falling at the extremes. The normal distribution of intelligence shows that on IQ tests, as well as on most other measures, the majority of people cluster around the average. As can be seen in Figure 6.7, the average IQ score is 100, and fewer scores are very high or very low. About 2% of people score above an IQ of 130, which is often considered the threshold for giftedness. Because the standard deviation of an IQ test is 15 points, this IQ score would be two standard deviations above the mean and infrequently found in the population. About the same percentage score below an IQ of 70, which is two standard deviations below the mean.

Although Figure 6.7 presents a single distribution, the actual IQ distribution varies by sex such that the distribution for men is more spread out than is the distribution for women. These sex differences mean that about 20% more men than women fall in the extremes; that is very high or very low ends of the distribution (Johnson, Carothers, & Deary, 2009).

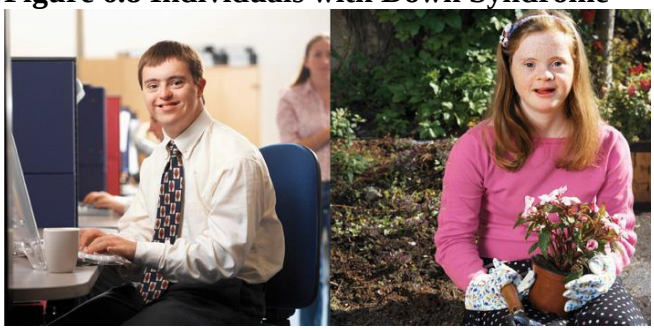
Figure 6.7 Distribution of IQ Scores in the General Population



Extremely Low Intelligence

One end of the distribution of intelligence scores is defined by people with very low IQ. An **Intellectual Disability** or **Intellectual Developmental Disorder** *are terms used to identify those possessing low IQ and adaptive functioning.* The severity of the disability is based on **adaptive functioning,** *or how well the person handles everyday life tasks*. About 1% of the United States population, most of them males, fulfill the criteria for intellectual developmental disorder, but some children who are given this diagnosis lose the classification as they get older and better learn to function in society. A particular vulnerability of people with low IQ is that they may be taken advantage of by others, and this is an important aspect of the definition of intellectual developmental disorder (Greenspan, Loughlin, & Black, 2001).

Figure 6.8 Individuals with Down Syndrome



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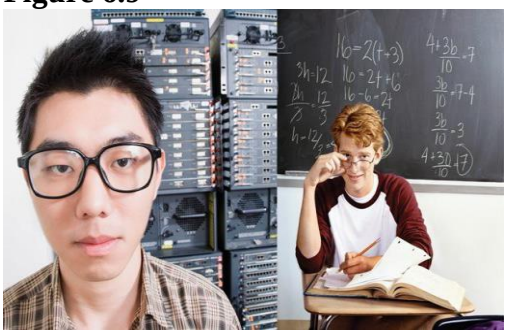
One cause of intellectual developmental disorder is **Down syndrome**, *a chromosomal disorder caused by the presence of all or part of an extra 21st chromosome*. The incidence of Down syndrome is estimated at 1 per 800 to 1,000 births, although its prevalence rises sharply in those born to older mothers. People with Down syndrome typically exhibit a distinctive pattern of physical features, including a flat nose, upwardly slanted eyes, a protruding tongue, and a short neck (see Figure 6.8).

Societal attitudes toward individuals with intellectual disabilities have changed over the past decades. We no longer use terms such as "retarded," "moron," "idiot," or "imbecile" to describe these people, although these were the official psychological terms used to describe degrees of what was referred to as mental retardation in the past. Laws such as the Americans with Disabilities Act (ADA) have made it illegal to discriminate on the basis of mental and physical disability, and there has been a trend to bring people with mental disabilities out of institutions and into our workplaces and schools. Using the DSM-IV term, in 2002 the U.S. Supreme Court ruled that: the execution of people with "mental retardation" is "cruel and unusual punishment," thereby ending this practice (Atkins v. Virginia, 2002).

Extremely High Intelligence

Having extremely high IQ is clearly less of a problem than having extremely low IQ, but there may also be challenges to being particularly smart. It is often assumed that schoolchildren who are labeled as gifted may have adjustment problems that make it more difficult for them to create social relationships. To study gifted children, in 1921 Terman and Oden (1959) selected about 1,500 high school students who scored in the top 1% on IQ tests, meaning they had IQs of about 135 or higher. Terman tracked them for more than seven decades, and found that these students were not unhealthy or poorly adjusted, but rather were above average in physical health and were taller and heavier than individuals in the general population. The students also had above average social relationships. For example, they were less likely to divorce than the average person (Seagoe, 1975).

Figure 6.9



The popular stereotype of highly intelligent people as physically uncoordinated and unpopular is not true. © Thinkstock

Terman's study also found that many of these students went on to achieve high levels of education and entered prestigious professions, including medicine, law, and science. Of the sample, 7% earned doctoral degrees, 4% earned medical degrees, and 6% earned law degrees. These numbers are all considerably higher than what would have been expected from a more general population at the time. Another study of young adolescents who had even higher IQs found that these students ended up attending graduate school at a rate more than 50 times higher than that in the general population (Lubinski & Benbow, 2006).

As you might expect based on our discussion of intelligence, children who are gifted have higher scores on general intelligence "g", but there are also different types of giftedness. Some children are particularly good at math or science, some at automobile repair or carpentry, some at music or art, some at sports or leadership, and so on. There is a lively debate among scholars about whether it is appropriate or beneficial to label some children as gifted and talented in school and to provide them with accelerated special classes and other programs that are not available to everyone. Although doing so may help the gifted kids (Colangelo & Assouline, 2009), it also may isolate them from their peers and make such provisions unavailable to those who are not classified as gifted.

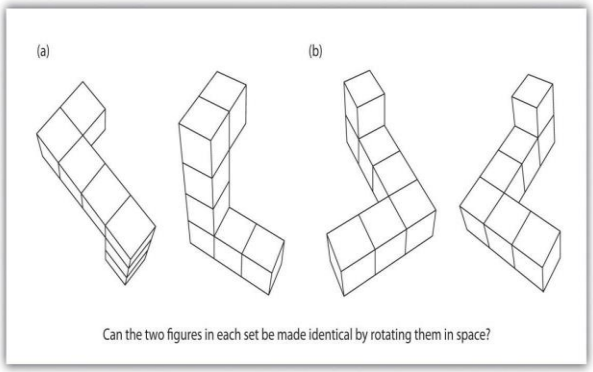
Sex Differences in Intelligence

Research demonstrates that men and women have almost identical intelligence as measured by standard IQ and aptitude tests (Hyde, 2005). However, there is variability in intelligence, in that more men than women have very high, as well as very low, intelligence. There are also observed sex differences on some types of tasks. Women tend to do better than men on some verbal tasks, including spelling, writing, and pronouncing words (Halpern et al., 2007; Nisbett et al., 2012), and they have better emotional intelligence in the sense that they are better at detecting and recognizing the emotions of others (McClure, 2000).

On average, men do better than women on tasks requiring spatial ability, such as the mental rotation tasks shown in Figure 6.10 (Nisbett et al., 2012; Voyer, Voyer, & Bryden, 1995). Males tend to do better than females on both geography and geometry tasks (Vogel, 1996). Historically, males have earned higher scores on the math part of the Scholastic Assessment Test (SAT). Three decades ago, boys with scores of 700 or above outnumbered girls by more than 10 to 1 (Benbow & Stanley, 1983). However, more females are now being exposed to higher level math courses, and recent research indicates that the ratio of males to females earning scores above 700 are now 3 to 1 or 4 to 1 (Nisbett et al, 2012).

Although these differences are real, the average difference between men and women is small compared to the average difference within each sex. There are many women who are better than the average man on spatial tasks, and many men who score higher than the average women in terms of emotional intelligence. Sex differences in intelligence allow us to make statements only about average differences and do not say much about any individual person.

Figure 6.10 Mental Rotation Task



Source

Differences between men and women may be in part genetically determined, perhaps by differences in brain lateralization or by hormones (Kimura & Hampson, 1994; Voyer, Voyer, & Bryden, 1995), but nurture is also important (Newcombe & Huttenlocker, 2006). As infants, boys and girls show no or few differences in spatial or counting abilities, suggesting that the differences occur at least in part due to socialization (Spelke, 2005). Consequently, a biopsychological explanation has been proposed for explaining sex differences in intelligence. Exactly how hormones, brain structures, and the environment affect intelligence is not well understood (Nisbett et al, 2012).

Racial Differences in Intelligence

Although their bell curves overlap considerably, there are also differences in which members of different racial and ethnic groups cluster along the IQ line. The bell curves for some groups, including those who are Jewish and East Asian, are centered somewhat higher than for Whites in general (Lynn, 1996; Neisser et al., 1996). Other groups, including Blacks and Hispanics, have averages somewhat lower than those of Whites (Hunt & Carlson, 2007).

One explanation for race differences in IQ is that intelligence tests are biased against some groups and in favor of others. **Bias** means that *a test predicts outcomes, such as grades or occupational success, better for one group than it does for another*. If IQ is a better predictor of school grade point average for Whites than it is for Asian Americans, then the test would be biased against Asian Americans, even though the average IQ scores for Asians might be higher. However, Brody (1992) found that IQ tests do not seem to be racially biased because the observed correlations between IQ tests and both academic and occupational achievement are about equal across races.

Another way that tests might be biased is if questions are framed such that they are easier for people from one culture to understand than for people from other cultures. For example, even a very smart person will not do well on a test if he or she is not fluent in the language in which the test is administered, or does not understand the meaning of the questions being asked. To counteract bias, modern intelligence tests are designed to be culturally neutral, and group differences are found even on tests that only ask about spatial intelligence. Although some researchers still are concerned about the possibility that intelligence tests are culturally biased, it is probably not the case that the tests are creating all of the observed group differences (Suzuki & Valencia, 1997).

Although there is no definitive answer to why IQ scores differ across racial and ethnic groups,

most experts believe that environmental factors, and not genetic factors, are the reason (Nisbett et al., 2012). It is important to realize that, although IQ is partly heritable, this does not mean that group differences are caused by genetics. Although some people are naturally taller than others, as height is heritable, people who get plenty of nutritious food are taller than people who do not, and this difference is clearly due to environment. This is a reminder that group differences may be created by environmental variables but also able to be reduced through appropriate environmental actions, such as educational and training programs.

Stereotype Threat

Although intelligence tests may not be culturally biased, the situation in which one takes a test may be. An important environmental factor that may affect how individuals perform and achieve is their expectations about their ability at a task. In some cases, these beliefs may be positive, and they have the effect of making us feel more confident and thus better able to perform tasks. For instance, research has found that because Asian students are aware of the cultural stereotype that "Asians are good at math," reminding them of this fact before they take a difficult math test can improve their performance on the test (Walton & Cohen, 2003). On the other hand, sometimes these beliefs are negative, and they create negative self-fulfilling prophecies such that we perform more poorly just because of our knowledge about the stereotypes.

In 1995 Steele and Aronson tested the hypothesis that the differences in performance on IQ tests between Blacks and Whites might be due to the activation of negative stereotypes (Steele & Aronson, 1995). These negative stereotypes about their intelligence, might create a negative expectation for black students that could interfere with their performance on intellectual tests through fear of confirming that stereotype.

In support of this hypothesis, the experiments revealed that Black college students performed worse, in comparison to their prior test scores, on standardized test questions when this task was described to them as being diagnostic of their verbal ability, and thus when the stereotype was relevant. In contrast, their performance was not influenced when the same questions were described as an exercise in problem solving. In another study, the researchers found that when Black students were asked to indicate their race before they took a math test, again activating the stereotype, they performed more poorly than they had on prior exams, whereas White students were not affected by first indicating their race.

Steele and Aronson argued that thinking about negative stereotypes that are relevant to a task that one is performing creates **stereotype threat**, or *performance decrements that are caused by the knowledge of cultural stereotypes*. That is, they argued that the negative impact of race on standardized tests may be caused, at least in part, by the performance situation itself. Because the threat is considered, Black students may be negatively influenced by it.

Figure 6.11 Do Stereotypes affect Test Performance?

Source

Over 200 research studies have found that stereotype threat effects can help explain a wide variety of performance decrements among those who are targeted by negative stereotypes Nisbett et al., 2012). For instance, when a math task is described as diagnostic of intelligence, Latinos and Latinas perform more poorly than do Whites (Gonzales, Blanton, & Williams, 2002). Similarly, when stereotypes are activated, children with low socioeconomic status perform more poorly in math than do those with high socioeconomic status, and psychology students perform more poorly than do natural science students (Brown, Croizet, Bohner, Fournet, & Payne, 2003; Croizet & Claire, 1998). Even groups who typically enjoy advantaged social status can be made to experience stereotype threat. White men perform more poorly on a math test when they are told that their performance will be compared with that of Asian men (Aronson, Lustina, Good, Keough, & Steele, 1999), and Whites perform more poorly than Blacks on a sport-related task when it is described to them as measuring their natural athletic ability (Stone, 2002; Stone, Lynch, Sjomeling, & Darley, 1999).

Both cognitive and emotional factors have been found to affect stereotype threat (Schmader, Johns, & Forbes, 2008). On the cognitive side, individuals who are experiencing stereotype threat show an increased vigilance toward the environment, as well as, increased attempts to suppress stereotypic thoughts. Engaging in these behaviors takes cognitive capacity away from the task. On the affective side, stereotype threat occurs when there is a discrepancy between our positive concept of our own skills and abilities and the negative stereotypes that suggest poor performance. These discrepancies create stress and anxiety, and these emotions make it harder to perform well on the task.

Stereotype threat is not, however, absolute; we can get past it if we try. What is important is to reduce the self-doubts that are activated when we consider the negative stereotypes. Manipulations that affirm positive characteristics about the self or one's social group are successful at reducing stereotype threat (Marx & Roman, 2002; McIntyre, Paulson, & Lord, 2003). In fact, just knowing that stereotype threat exists and may influence our performance can help alleviate its negative impact (Johns, Schmader, & Martens, 2005).

Psychology's Shameful Past: Eugenics

The observed average differences in intelligence between groups has at times led to malicious and misguided attempts to try to correct for them through discriminatory treatment of people from different races, ethnicities, and nationalities (Lewontin, Rose, & Kamin, 1984). One of the most egregious was the spread of **eugenics**, *the proposal that one could improve the human species by encouraging or permitting reproduction of only those people with genetic characteristics judged desirable*.

Eugenics became immensely popular in the United States in the early 20th century and was supported by many prominent psychologists, including Sir Francis Galton. Dozens of universities, including those in the Ivy League, offered courses in eugenics, and the topic was presented in most high school and college biology texts (Selden, 1999). Belief in the policies of eugenics led the U.S. Congress to pass laws designed to restrict immigration from other countries supposedly marked by low intelligence, particularly those in eastern and southern Europe. Further, because more than one-half of the U.S. states passed laws requiring the sterilization of low-IQ individuals, more than 60,000 Americans, mostly African Americans and other poor minorities, underwent forced sterilizations. Fortunately, the practice of sterilization was abandoned between the 1940s and the 1960s, although sterilization laws remained on the books in some states until the 1970s.

Key Takeaways

- IQ is distributed in the population in the form of a normal distribution frequently known as a bell curve.
- Intellectual developmental disorder or intellectual disability is a generalized disorder ascribed to people who have an IQ below 70, who have experienced deficits since childhood, and who have trouble with basic life skills, such as dressing and feeding oneself and communicating with others. One cause of intellectual disability is Down syndrome.
- Extremely intelligent individuals are not unhealthy or poorly adjusted, but rather are above average in many dimensions than individuals in the general population.
- Men and women have almost identical intelligence, but men have more variability in their IQ scores than do women.
- On average, men do better than women on tasks requiring spatial ability, whereas women do better on verbal tasks and score higher on emotional intelligence.
- Although their bell curves overlap considerably, there are also average group differences for members of different racial and ethnic groups.
- These group differences have been attributed to environmental factors.
- The situation in which one takes a test may create stereotype threat, or performance decrements caused by the knowledge of cultural stereotypes.
- The observed average differences in intelligence between racial and ethnic groups has at times led to malicious attempts to correct for them, such as the eugenics movement in the early part of the 20th century.

Exercises and Critical Thinking

1. Do you think that we should give intelligence tests? Why or why not?
2. Give your ideas about the practice of providing accelerated classes to children listed as gifted in high school. What are the potential positive and negative outcomes of doing so? What research evidence has helped you form your opinion?
3. Consider the observed sex and racial differences in intelligence. What implications do you think the differences have had for education and career choices?

The Development and Use of Language

Learning Objectives

1. Review the components and structure of language.
2. Explain the biological underpinnings of language.
3. Outline the theories of language development.

Language involves both the ability to comprehend spoken and written words and to create communication in real time when we speak or write. Most languages are oral, generated through speaking. Speaking involves a variety of complex cognitive, social, and biological processes including operation of the vocal cords, and the coordination of breath with movements of the throat and mouth, and tongue. Other languages are sign languages, in which the communication is expressed by movements of the hands. The most common sign language is American Sign Language (ASL), currently used by more than 500,000 people in the United States alone.

Although language is often used for the transmission of information, this is only its most mundane function. Language also allows us to access existing knowledge, to draw conclusions, to set and accomplish goals, and to understand and communicate complex social relationships. Language is fundamental to our ability to think, and without it we would be less intelligent.

The Components of Language

Language can be conceptualized in terms of sounds, meaning, and the environmental factors that help us understand it. These include phonemes, morphemes, semantics, syntax, pragmatics and contextual information.

Phoneme: A **phoneme** is *the smallest unit of sound that makes a meaningful difference in a language*. The word "bit" has three phonemes. In spoken languages, phonemes are produced by the positions and movements of the vocal tract, including our lips, teeth, tongue, vocal cords, and throat, whereas in sign languages phonemes are defined by the shapes and movement of the hands.

There are hundreds of unique phonemes that can be made by human speakers, but most languages only use a small subset of the possibilities. English contains about 45 phonemes, and some have more than 60. In contrast, the Hawaiian language contains only a dozen phonemes, including 5 vowels (a, e, i, o, and u) and 7 consonants (h, k, l, m, n, p, and w).

Infants are born able to understand all phonemes, but they lose their ability to do so as they get older. By 10 months of age, a child's ability to recognize phonemes becomes very similar to that of the adult speakers of the native language. Phonemes that were initially differentiated come to be treated as equivalent (Werker & Tees, 2002).

Morpheme and Semantics: Whereas phonemes are the smallest units of sound in language, a **morpheme** is *a string of one or more phonemes that makes up the smallest units of meaning in a language*. Most morphemes are made up of combinations of phonemes. Some morphemes are prefixes and suffixes used to modify other words. For example, the syllable "re-" as in "rewrite" or "repay" means "to do again," and the suffix "-est" as in "happiest" or "coolest" means "to the maximum." **Semantics** refers to *the set of rules we use to obtain meaning from morphemes*. For example, adding "ed" to the end of a verb makes it past tense.

Syntax: Each language has a different **syntax,** which is *the set of rules of a language by which we construct sentences*. The syntax of the English language requires that each sentence have a noun and a verb, each of which may be modified by adjectives and adverbs. Some syntaxes make use of the order in which words appear. For example, in English "The man bites the dog" is different from "The dog bites the man."

Pragmatics: The social side of language is expressed through **pragmatics**, or *how we communicate effectively and appropriately with others.* Examples of pragmatics include turn-taking, staying on topic, volume and tone of voice, and appropriate eye contact.

Context: Lastly, words do not possess fixed meanings but change their interpretation as a function of the context in which they are spoken. We use **contextual information**; that is, *the information surrounding language to help us interpret it*. Examples of contextual information include the circumstances and setting in which the communication takes place, and nonverbal expressions, such as facial expressions, postures, and gestures. Misunderstandings can easily arise if people are not attentive to contextual information or if some of it is missing, such as newspaper headlines or in text messages.

The Biology and Development of Language

Anyone who has tried to master a second language as an adult knows the difficulty of language learning. Yet children learn languages easily and naturally. Psychologists believe for language there is a **critical period,** known as *a time in which learning can easily occur*, lasting between infancy and puberty in which language learning becomes more difficult or impossible (Lenneberg, 1967; Penfield & Roberts, 1959). Children who are not exposed to language early in their lives will likely never learn one. Case studies, including Victor the "Wild Child," who was abandoned as a baby in France and not discovered until he was 12, and Genie, a child whose parents kept her locked in a closet from 18 months until 13 years of age, are two of the only known examples of these deprived children. Both of these children made some progress in socialization after they were rescued, but neither

Figure 6.12 Victor of Aveyon

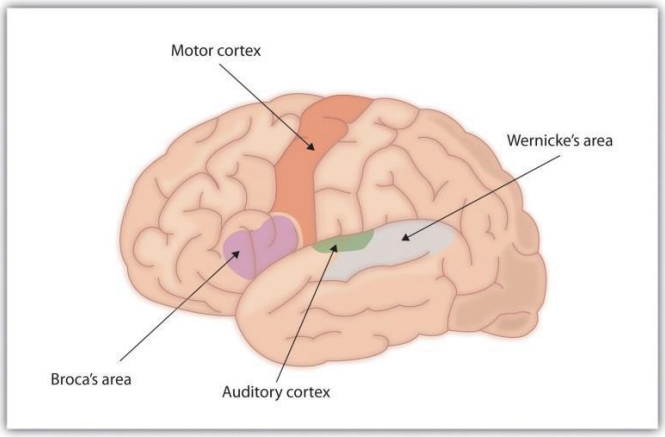
Source

of them ever developed language (Rymer, 1993). This is also why it is important to determine quickly if a child is deaf and to begin immediately to communicate in sign language. Deaf children who are not exposed to sign language during their early years will likely never learn it (Mayberry, Lock, & Kazmi, 2002).

Brain Areas for Language

For the 90% of people who are right-handed, language is stored and controlled by the left cerebral cortex, although for some left-handers this pattern is reversed. These differences can easily be seen in the results of neuroimaging studies that show that listening to and producing language creates greater activity in the left hemisphere than in the right. **Broca's area**, *is responsible for language production* and is located in the left hemisphere near the motor cortex. This area was first localized in the 1860s by the French physician Paul Broca, who studied patients with lesions to various parts of the brain. **Wernicke's area** *is responsible for language comprehension* and is in the left hemisphere next to the auditory cortex (see Figure 6.13).

Figure 6.13 Drawing of Brain Showing Broca's and Wernicke's Areas



For most people the left hemisphere is specialized for language. Broca's area, near the motor cortex, is involved in language production, whereas Wernicke's area, near the auditory cortex, is specialized for language comprehension.

Evidence for the importance of Broca's and Wernicke's areas in language is seen in patients who experience **aphasia**, *a condition in which language functions are severely impaired*. People with Broca's aphasia have difficulty producing speech, whereas people with damage to Wernicke's area can produce speech, but what they say makes no sense and they have trouble understanding spoken language.

Research Focus: When Can We Best Learn Another Language?

An important study by Jacqueline Johnson and Elissa Newport (1989) using Chinese and Korean speakers who had learned English as a second language provided the first insight. The participants were all adults who had immigrated to the United States between 3 and 39 years of age and who were tested on their English skills by being asked to detect grammatical errors in sentences. Johnson and Newport found that the participants who had begun learning English before they were 7 years old learned it as well as native English speakers, but that the ability to learn English dropped off gradually for the participants who had started later. Newport and Johnson also found a correlation between the age of acquisition and the variance in the ultimate learning of the language. While early learners were almost all successful in acquiring their

language to a high degree of proficiency, later learners showed much greater individual variation.

Johnson and Newport's finding that children who immigrated before they were 7 years old learned English fluently seemed consistent with the idea of a critical period in language learning, but their finding of a gradual decrease in proficiency for those who immigrated between 8 and 39 years of age was not. Rather, it suggested that there might not be a single critical period of language learning that ended at puberty, as early theorists had expected, but that language learning at later ages is simply better when it occurs earlier. This idea was reinforced in research by Hakuta, Bialystok, and Wiley (2003), who examined U.S. census records of language learning in millions of Chinese and Spanish speakers living in the United States. The census form asks respondents to describe their own English ability using one of five categories: "not at all," "not well," "well," "very well," and "speak only English." The results of this research showed that regardless of what year was used as a cutoff point for the end of the critical period, there was no evidence for any discontinuity in language-learning potential. Rather, the results showed that the degree of success in second-language acquisition declined steadily throughout the respondent's life span. The difficulty of learning language as one gets older is probably due to the fact that, with age, there is a reduction in brain plasticity or its ability to develop new neural connections.

Language Stages

Language learning begins even before birth, because the fetus can hear muffled versions of speaking from outside the womb. Moon, Cooper, and Fifer (1993) found that infants only two days old sucked harder on a pacifier when they heard their mothers' native language being spoken than when they heard a foreign language, even when strangers were speaking the languages. Babies are also aware of the patterns of their native language. They show surprise when they hear speech that has a different pattern of phonemes than those they are used to hearing (Saffran, Aslin, & Newport, 2004).

During the first year or so after birth, and long before they speak their first words, infants are already learning language. One aspect of this learning is practice in producing speech. By the time they are 6 to 8 weeks old, babies start making **coos** or *vowel sounds*, such as "ooohh," "aaahh," "goo", as well as a variety of cries and squeals to help them practice.

Figure 6.14

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At about six months, infants begin **babbling**, engaging in *intentional consonant-vowel repetitions that lack specific meaning*. For example, infants will repeat "bababa and dadada". Children babble as practice in creating specific sounds, and by the time they are ten months, the babbling reflects the sounds of the language they are learning (de Boysson-Bardies, Sagart, & Durand, 1984). These vocalizations have a conversational tone that sounds meaningful, even though it is not. Babbling also helps children understand the social, communicative function of

language. Children who are exposed to sign language babble in sign by making hand movements that represent real signs (Petitto & Marentette, 1991).

At the same time that infants are practicing their speaking skills by babbling, they are also learning to better understand sounds and eventually the words of language. One of the first words that children understand is their own name, usually by about 6 months, followed by commonly used words like "bottle," "mama," and "doggie" by ten to twelve months (Mandel, Jusczyk, & Pisoni, 1995). The infant usually produces his or her first words at about one year of age. It is at this point that the child first understands that words are more than sounds, and that they refer to particular objects and ideas. By the time children are two years old, they have a vocabulary of several hundred words, and by age six their vocabularies have increased to approximately 10,000 words (Byrnes & Wasik, 2009).

Language Errors

The early utterances of children contain many errors, for instance, confusing /b/ and /d/, or /c/ and /z/. The words that children create are often simplified, in part because they are not yet able to make the more complex sounds of the real language (Dobrich & Scarborough, 1992). Children may say "keekee" for kitty, "nana" for banana, and "vesketti" for spaghetti in part because it is easier. Often these early words are accompanied by gestures that may also be easier to produce than the words themselves. Children's pronunciations become increasingly accurate between one and three years, but some problems may persist until school age.

Most of a child's first words are nouns, and early sentences may include only the noun. "Ma" may mean "more milk please" and "da" may mean "look, there's Fido." Eventually the length of the utterances increases to two words, such as "mo ma" or "da bark", and these primitive sentences begin to follow the appropriate syntax of the native language.

Because language involves the active categorization of sounds and words into higher level units, children make some mistakes in interpreting what words mean and how to use them. In particular, they often make **overextensions** of concepts by *using a given word in a broader context than appropriate*. A child might at first call all adult men "daddy" or all animals "doggie." Additionally, they make **underextensions** of concepts *by using a given word too narrowly*. The word "dog" is used only for the family dog and not any other dogs.

Children also use contextual information, particularly the cues that parents provide, to help them learn language. Children learn that people are usually referring to things that they are looking at when they are speaking (Baldwin, 1993), and that that the speaker's emotional expressions are related to the content of their speech. Infants are frequently more attuned to the tone of voice of the person speaking than to the content of the words themselves, and are aware of the target of speech. Werker, Pegg, and McLeod (1994) found that infants listened longer to a woman who was speaking to a baby than to a woman who was speaking to another adult. This *higher pitched speech with simple words* is referred to as **child directed speech** and is preferred by infants (Clark, 2009).

Theories of Language Acquisition

Psychological theories of language learning differ in terms of the importance they place on nature and nurture. Yet, it is clear that both matter. Children are not born knowing language; they learn to speak by hearing what happens around them. On the other hand, human brains, unlike those of any other animal, are prewired in a way that leads them, almost effortlessly, to learn language. Broca's and Wernicke's areas, critical periods, and a reduction in brain plasticity as one ages support the importance of nature for explaining language.

Behavioral Perspective

Perhaps the most straightforward explanation of language development is that it occurs through principles of learning, including association, reinforcement, and the observation and imitation of others (Skinner, 1965). There must be at least some truth to the idea that language is learned, because children learn the language that they hear spoken around them rather than some other language. Also supporting this idea is the gradual improvement of language skills with time. It seems that children modify their language through imitation, reinforcement, and shaping, as would be predicted by learning theories.

However, language cannot be entirely learned. For one, children learn words too fast for them to be learned through reinforcement. Between the ages of 18 months and 5 years, children learn up to 10 new words every day (Anglin, 1993). More importantly, language is more generative than it is imitative**.** **Generativity** refers to *the fact that speakers of a language can compose sentences to represent new ideas that they have never before been exposed to*. Language is not a predefined set of ideas and sentences that we choose when we need them, but rather a system of rules and procedures that allows us to create an infinite number of statements, thoughts, and ideas, including those that have never previously occurred. When a child says that she "swimmed" in the pool, for instance, she is showing generativity. No adult speaker of English would ever say "swimmed," yet it is easily generated from the normal system of producing language.

Deaf children, whose parents do not speak ASL very well, nevertheless are able to learn it perfectly on their own, and may even make up their own language if they need to (Goldin-Meadow & Mylander, 1998). A group of deaf children in a school in Nicaragua, whose teachers could not sign, invented a way to communicate through made-up signs (Senghas, Senghas, & Pyers, 2005). The development of this new Nicaraguan Sign Language has continued and changed as new generations of students have come to the school and started using the language. Although the original system was not a real language, it is becoming closer and closer every year, showing the development of a new language in modern times.

Evolutionary Perspective

The linguist Noam Chomsky is a believer in the nature approach to language, arguing that human brains contain a **language acquisition device** that includes a *universal grammar* that underlies all human language (Chomsky, 1965, 1972). According to this approach, each of the 7099 languages spoken today (Simons & Feenig, 2017) is an individual example of the same underlying set of procedures that are hardwired into human brains. Chomsky's account proposes that children are born with a knowledge of general rules of syntax that determine how sentences are constructed.

Chomsky differentiates between the **deep structure** of an idea, or *how the idea is represented in the fundamental universal grammar that is common to all languages*, and the **surface structure** of the idea, or *how it is expressed in any one language*. Once we hear or express a thought in surface structure, we generally forget exactly how it happened. At the end of a lecture, you will remember a lot of the deep structure, or the ideas expressed by the instructo), but you cannot reproduce the surface structure, or the exact words that the instructor used to communicate the ideas.

Although there is general agreement among psychologists that babies are genetically programmed to learn language, there is still debate about Chomsky's idea that there is a universal grammar that can account for all language learning. Evans and Levinson (2009) surveyed the world's languages and found that none of the presumed underlying features of the language acquisition device were entirely universal. In their search they found languages that did not have noun or verb phrases, that did not have tenses (e.g., past, present, future), and even some that did not have nouns or verbs at all, even though a basic assumption of a universal grammar is that all languages should share these features.

Bilingualism and Cognitive Development

Although it is less common in the United States than in other countries, **bilingualism,** *the ability to speak two languages*, is becoming more and more frequent in the modern world. Nearly 50% of the world's population is bilingual (Ansaldo, Marcotte, Scherer, & Raboyeau, 2008). In recent years many U.S. states have passed laws outlawing bilingual education in schools. These laws are in part based on the idea that students will have a stronger identity with the school, the culture, and the government if they speak only English, and in part based on the idea that speaking two languages may interfere with cognitive development.

Some early psychological research showed that, when compared with monolingual children, bilingual children performed more slowly when processing language, and their verbal scores were lower. These tests were frequently given in English, however, even when this was not the child's first language, and the children tested were often of lower socioeconomic status than the monolingual children (Andrews, 1982).

More current research that has controlled for these factors has found that, although bilingual children may in some cases learn language somewhat slower than do monolingual children (Oller & Pearson, 2002), bilingual and monolingual children do not significantly differ in the final depth of language learning, nor do they generally confuse the two languages (Nicoladis & Genesee, 1997). In fact, participants who speak two languages have been found to have better cognitive functioning, cognitive flexibility, and analytic skills in comparison to monolinguals (Bialystok, 2009). Research has also found that learning a second language produces changes in the area of the brain in the left hemisphere that is involved in language, such that this area is denser and contains more neurons (Mechelli et al., 2004). Furthermore, the increased density is stronger in those individuals who are most proficient in their second language and who learned the second language earlier. Thus, rather than slowing language development, learning a second language seems to increase cognitive abilities.

Can Animals Learn Language?

Nonhuman animals have a wide variety of systems of communication. Some species communicate using scents; others use visual displays, such as baring the teeth, puffing up the fur, or flapping the wings; and still others use vocal sounds. Male songbirds, such as canaries and finches, sing songs to attract mates and to protect territory, and chimpanzees use a combination of facial expressions, sounds, and actions, such as slapping the ground, to convey aggression (de Waal, 1989). Honeybees use a waggle dance to direct other bees to the location of food sources (von Frisch, 1956). The language of vervet monkeys is relatively advanced in the sense that they use specific sounds to communicate specific meanings. Vervets make different calls to signify that they have seen a leopard, or a snake, or a hawk (Seyfarth & Cheney, 1997).

Despite their wide abilities to communicate, efforts to teach animals to use language have had only limited success. One of the early efforts was made by Catherine and Keith Hayes, who raised a chimpanzee named Viki in their home along with their own children, but Viki learned little and could never speak (Hayes & Hayes, 1952). Researchers speculated that Viki's difficulties might have been in part because the she could not create the words in her vocal cords, and so subsequent attempts were made to teach primates to speak using sign language or by using boards on which they can point to symbols.

Allen and Beatrix Gardner worked for many years to teach a chimpanzee named Washoe to sign using ASL. Washoe, who lived to be 42 years old, could label up to 250 different objects and make simple requests and comments, such as "please tickle" and "me sorry" (Fouts, 1997). Washoe's adopted daughter Loulis, who was never exposed to human signers, learned more than 70 signs simply by watching her mother sign.

The most proficient nonhuman language speaker is Kanzi, a bonobo who lives at the Language Learning Center at Georgia State University (Savage-Rumbaugh, & Lewin, 1994). Kanzi has a propensity for language that is in many ways similar to humans. He learned faster when he was younger than when he got older, he learns by observation, and he can use symbols to comment on social interactions, rather than simply for food treats. Kanzi can also create elementary syntax and understand relatively complex commands. Kanzi can make tools and can even play Pac-Man. The bonobo Kanzi is the most proficient known nonhuman language speaker.

Figure 6.15 Do animals have language?

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Yet, even Kanzi does not have a true language in the same way that humans do. Human babies learn words faster and faster as they get older, but Kanzi does not. Each new word he learns is almost as difficult as the one before. Kanzi usually requires many trials to learn a new sign, whereas human babies can speak words after only one exposure. Kanzi's language is focused primarily on food and pleasure and only rarely on social relationships. Although he can combine words, he

generates few new phrases and cannot master syntactic rules beyond the level of about a 2-year-old human child (Greenfield & Savage-Rumbaugh, 1991).

In sum, although many animals communicate, none of them have a true language. With some exceptions, the information that can be communicated in nonhuman species is limited primarily to displays of liking or disliking, and related to basic motivations of aggression and mating. Humans also use this more primitive type of communication, in the form of nonverbal behaviors such as eye contact, touch, hand signs, and interpersonal distance, to communicate their like or dislike for others, but they, unlike animals, also supplant this more primitive communication with language. Although other animal brains share similarities to ours, only the human brain is complex enough to create language. What is perhaps most remarkable is that although language never appears in nonhumans, language is universal in humans. All humans, unless they have a profound brain abnormality or are completely isolated from other humans, learn language.

Key Takeaways

- Language involves both the ability to comprehend spoken and written words and to speak and write. Some languages are sign languages, in which the communication is expressed by movements of the hands.
- Phonemes are the elementary sounds of our language, morphemes are the smallest units of meaningful language, semantics is making menaing out of morphemes, syntax is the grammatical rules that control how words are put together, pragmatics is the social side of language, and contextual information is the elements of communication that help us understand its meaning.
- A critical period is important for learing a first language.
- Recent research suggests that there is not a single critical period for second language learning, but that language learning is simply better when it occurs earlier.
- Broca's area is responsible for language production, while Wernicke's area is responsible for language comprehension.
- Language learning begins even before birth. An infant usually produces his or her first words at about 1 year of age.
- One explanation of language development is that it occurs through principles of learning, including association, reinforcement, and imitation.
- Noam Chomsky argues that human brains contain a language acquisition device that includes a universal grammar that underlies all human language. Chomsky differentiates between the deep structure and the surface structure of an idea.
- Bilingual children have better cognitive functioning, cognitive flexibility, and analytic skills compared to monolingual children.
- Although other animals communicate and may be able to express ideas, only the human brain is complex enough to create real language.

Exercises and Critical Thinking

1. What languages do you speak? Did you ever try to learn a new one? What problems did you have when you did this? Would you consider trying to learn a new language?
2. Some animals, such as Kanzi, display at least some language. Do you think that this means that they are intelligent?

Videos

1. Howard Gardner discusses his theory of multiple intelligences on a PBS special. http://video.pbs.org/video/1906079430/
2. Daniel Goleman discusses emotional intelligence and compassion.http://www.ted.com/talks/daniel_goleman_on_compassion.html
3. Language Recognition in Bonobos https://www.youtube.com/watch?v=2Dhc2zePJFE

Chapter Summary

Intelligence is the ability to think, learn from experience, solve problems, and adapt to new situations. It is more strongly related than any other individual difference variable to successful educational, occupational, economic, and social outcomes.

The French psychologist Alfred Binet and his colleague Theodore Simon developed the first intelligence test in the early 1900s. Charles Spearman called the construct that the different abilities and skills measured on intelligence tests have in common the general intelligence factor, or simply "g."

There is also evidence for specific intelligences "s", measures of specific skills in narrow domains. Robert Sternberg has proposed a triarchic (three-part) theory of intelligence, and Howard Gardner has proposed that there are eight different specific intelligences referred to as multiple intelligences.

Good intelligence tests both are reliable and have construct validity. Intelligence tests are the most accurate of all psychological tests, and they are standardized, which allows calculation of mental age and the intelligence quotient (IQ),

The Wechsler Adult lntelligence Scale (WAIS) is the most widely used intelligence test for adults. Other intelligence tests include aptitude tests such as the Scholastic Assessment Test (SAT), American College Test (ACT), and Graduate Record Examination (GRE), and structured tests used for personnel selection.

Smarter people have somewhat larger brains, which operate more efficiently and faster than the brains of the less intelligent. Although intelligence is not located in a specific part of the brain, the outer cortex, involved in planning, executive control, and short-term memory, is more utilized than other areas.

Emotional intelligence refers to the ability to identify, assess, manage, and control one's emotions. However, tests of emotional intelligence are often unreliable, and emotional intelligence may be a part of g, or a skill that can be applied in some specific work situations.

Intelligence has both genetic and environmental causes, and between 40% and 80% of the variability in IQ is heritable. Social and economic deprivation, including poverty, can adversely affect IQ, and intelligence is improved by education.

About 2% of Americans score above an IQ of 130, which is the threshold for giftedness, and about the same percentage score below an IQ of 70, which is the threshold for intellectual disability. Males are about 20% more common in these extremes than are women.

Women and men show overall equal intelligence, but there are sex differences on some types of tasks. There are also differences in which members of different racial and ethnic groups cluster along the IQ line. The causes of these differences are not completely known. These differences have at times led to malicious, misguided, and discriminatory attempts to try to correct for them, such as eugenics.

Language involves both the ability to comprehend spoken and written words and to create communication in real time when we speak or write. Language can be conceptualized in terms of phonemes, morphemes, semantics, syntax, pragmatics and contextual information. Language is best learned during a critical period.

Broca's area, an area of the brain in front of the left hemisphere near the motor cortex, is responsible for language production, and Wernicke's area, an area of the brain next to the auditory cortex, is responsible for language comprehension.

Children learn language quickly and naturally, progressing through stages. Children often make overextensions and underextensions of concepts.

Some theories of language learning are based on principles of learning, including association, reinforcement, and imitation. Noam Chomsky argues that human brains contain a language acquisition device that includes a universal grammar that underlies all human language and that allows generativity. Chomsky differentiates between the deep structure and the surface structure of an idea.

Bilingualism is becoming more frequent in the modern world. Bilingual children show more cognitive functioning, cogntive flexibility, and analytic skills than do monolingual children. Nonhuman animals have a wide variety of systems of communication, but efforts to teach animals to use human language have had only limited success. Although many animals communicate, none of them have a true language.

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Chapter 7 Lifespan Development

Learning Objectives

1. Define development and describe the age periods.
2. Describe the three stages of prenatal development.
3. Discuss the role of teratogens in prenatal development.
4. Explain the causes and effects of fetal alcohol spectrum disorders.

The goal of this chapter is to investigate the fundamental, complex, and essential processes of human development. **Development** refers to *the physiological, behavioral, cognitive, and social-emotional changes that occur throughout human life, which are guided by both genetic predispositions (nature) and environmental influences (nurture).* We will begin our study of development at the moment of conception, when the sperm unites with the egg, and then consider prenatal development in the womb. Next, we will focus on the age periods described in Table 7.1. Each of the age periods of development has its unique physical, cognitive, and emotional changes that define that period of life. Finally, we will consider the grief process and eventual facing of death.

Table 7.1 Age Periods of Development

Age Period	Description
Prenatal	*Begins at conception and continues to birth*
Infancy	*Begins at birth and continues to one year of age*
Childhood	*The period between infancy and the onset of puberty*
Adolescence	*The period between the onset of puberty and the beginning of adulthood*
Emerging Adulthood	*The period between ages 18 and 25*
Early Adulthood	*The period between ages 25 and 45*
Middle Adulthood	*The period between ages 45 and 65*
Late Adulthood	*Ages 65 and older*

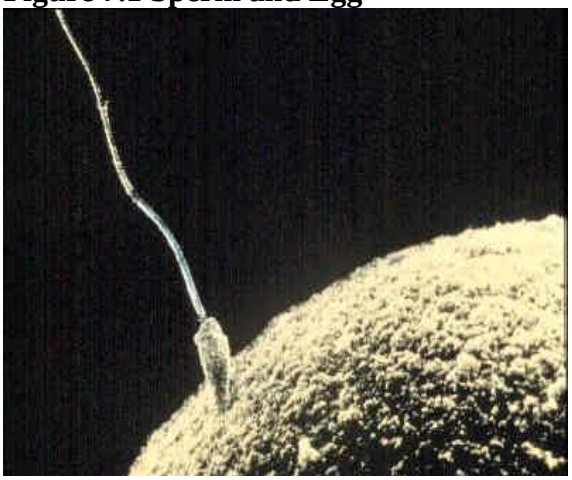
As we progress through this chapter, we will see that nature plays a substantial role in development. For example, children around the world reach major language stages in a similar order (Parish-Morris, Golinkoff, & Hirsh-Pasek, 2013). However, nurture is also important. We begin to be influenced by our environments, even while still in the womb, and these influences remain with us throughout our development. Furthermore, we will see that we play an active role in shaping our own lives. Our own behavior influences how and what we learn, how people respond to us, and how we develop as individuals. As you read the chapter, you will see how we learn and adapt to life's changes, and this new knowledge may help you better understand and guide your own personal life journey.

Conception and Prenatal Development

Conception *occurs when an egg is fertilized by a sperm*. As soon as one of the millions of sperm enters the egg's coating, the egg immediately responds by both blocking out all other challengers and at the same time pulling in the single successful sperm.

The Germinal Stage: Within several hours, *the 23 chromosomes from the egg and the 23 chromosomes from the sperm fuse together, creating a* **zygote.** This is the beginning of the **germinal stage**, *which lasts from conception to implantation in the uterine wall, approximately 10-14 days.* The zygote continues to travel down the fallopian tube to the uterus. Fewer than half of zygotes survive beyond this earliest stage of development. If the zygote is no longer viable, it will be flushed out in the woman's menstrual cycle, but if it is still viable when it completes the journey, the zygote will attach itself to the wall of the uterus.

Figure 7.1 Sperm and Egg



During the germinal stage, the cells in the zygote rapidly divide. Soon the cells begin to differentiate, each taking on a separate function. The earliest differentiation is between cells on the inside of the zygote and the cells on the outside. The cells on the inside will begin to form the developing human being. The cells on the outside will form the protective environment that will provide support for the new life throughout the pregnancy.

The Embryonic Stage: *Once the zygote attaches to the wall of the uterus, it is known as the* **embryo.** During the **embryonic stage** *the major internal and external organs are formed.* This stage will last for the next 6 weeks, and changes in the embryo's appearance will continue rapidly from this point until birth.

Figure 7.2 Embryo

Photo by Lunar Caustic

While the inner layer of embryonic cells is busy forming the embryo itself, the outer layer is forming the surrounding protective environment that will help the embryo survive the pregnancy. This environment consists of three major structures: The **amniotic sac** is *the fluid-filled reservoir in which the embryo (soon to be known as a fetus) will live until birth, and which acts as both a cushion against outside pressure and as a temperature regulator*. The **placenta** is *an organ that allows the exchange of nutrients between the embryo and the mother, while at the same time filtering out harmful material*. Finally, the **umbilical cord** *links the embryo directly to the placenta and transfers all material to the fetus*. Thus, the placenta and the umbilical cord protect the fetus from many foreign agents in the mother's system that might pose a threat.

The Fetal Stage: Beginning in the 9th week after conception, the embryo becomes a fetus and the fetal stage begins. *Growth is the defining characteristic of the* **fetal stage**. All the major aspects of the growing organism have been formed in the embryonic phase, and now the fetus has approximately seven months to go from weighing less than an ounce to weighing an average of 6 to 8 pounds.

Figure 7.3 Fetus

Source

The fetus begins to take on many of the characteristics of a human being, including sleeping, swallowing, breathing and moving. By the third month, the fetus is able to curl and open its fingers, form fists, and wiggle its toes (Berk & Myers, 2016). The fetus begins to develop its senses, becoming able to distinguish tastes and respond to sounds. Research has found that the fetus even develops some initial preferences. A newborn prefers the mother's voice to that of a stranger, the languages heard in the womb over other languages (DeCasper & Fifer, 1980; Moon, Cooper, & Fifer, 1993), and even the kinds of foods that the mother ate during the pregnancy (Mennella, Jagnow, & Beauchamp, 2001). If all goes well, a baby is born sometime around the 38-40th week of pregnancy.

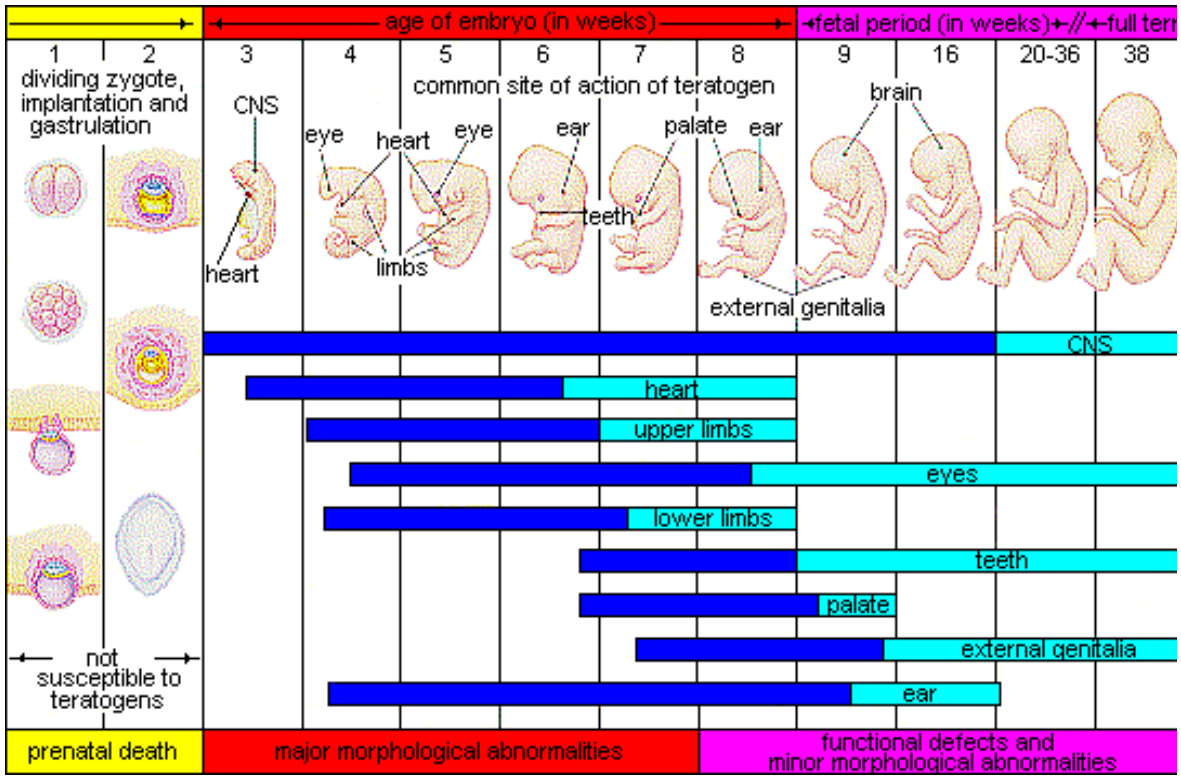
How the Environment Can Affect the Vulnerable Fetus

Prenatal development is a complicated process and may not always go as planned. About 45% of pregnancies result in a miscarriage, often without the mother ever being aware a pregnancy had occurred (Moore & Persaud, 1993). Although the amniotic sac and the placenta are designed to protect the embryo, **teratogens**, *substances that can harm the fetus*, may cause problems. Teratogens include general environmental factors, such as air pollution and radiation, but also the cigarettes, alcohol, and drugs that the mother may use.

Cigarette smoking, for example, reduces the blood oxygen for both the mother and fetus and is correlated with the infant being born underweight. Another serious threat, **Fetal Alcohol Spectrum Disorders (FASD),** *is an umbrella term given to a group of conditions that can result from maternal alcohol drinking and is associated with numerous detrimental developmental effects.* The most serious of these conditions is Fetal Alcohol Syndrome (FAS), which can result in limb, facial, and genital abnormalities, as well as intellectual disabilities. One in about every 500 babies in the United States is born with FAS, and it is considered one of the leading preventable causes of intellectual disability in the world today (Maier & West, 2001; Niccols, 1994). There is no known safe level of alcohol consumption during pregnancy, and consequently the U.S. Centers for Disease Control and Prevention (CDC) caution against drinking while pregnant (CDC, 2005). Fathers' alcohol use has also been correlated with teratogenic defects (Champagne, 2010). Additionally, maternal drug abuse is of major concern, and is considered one of the greatest risk factors facing unborn children (March of Dimes, 2015).

Teratogens do not always harm the fetus. They are more likely to do so when they occur in larger amounts, for longer time periods, and during the more sensitive phases, as when the fetus is growing most rapidly (Berger, 2005). The most vulnerable period for many of the fetal organs is very early in the pregnancy during the embryonic stage, often before the mother even knows she is pregnant. Figure 7.2 illustrates the timing of teratogen exposure and the types of structural defects that can occur during the prenatal period.

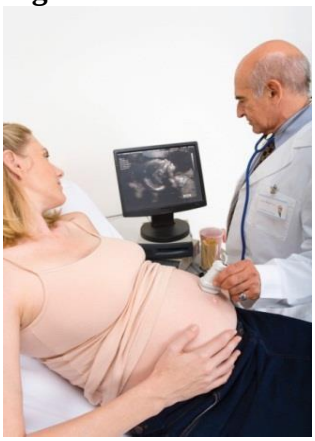
Figure 7.4 The Effects of Teratogenic Exposure According to Prenatal Age



Source: http://angel.southseattle.edu

The environment in which the mother is living also has a major impact on infant development (Duncan & Brooks-Gunn, 2000; Haber & Toro, 2004). Children born into homelessness or poverty are more likely to have mothers who are malnourished, who suffer from domestic violence, stress, and other psychological problems, and who smoke or abuse drugs. Children born into poverty are also more likely to be exposed to teratogens. Poverty's impact may also amplify other issues, creating substantial problems for healthy child development (Evans & English, 2002; Gunnar & Quevedo, 2007).

Figure 7.5



Thinkstock

Mothers normally receive genetic and blood tests during the first months of pregnancy to determine the health of the embryo or fetus. They may undergo sonogram, ultrasound, amniocentesis, or other testing. The **ultrasound** *is a test in which sound waves are used to examine the fetus*, and it is one of the main screening tests. Ultrasounds are used to check the fetus for defects or problems including neural tube defects, chromosomal abnormalities (such as Down syndrome), genetic diseases, and other potentially dangerous conditions. It can also find out the age of the fetus, location of the placenta, fetal position, movement, breathing and heart rate, amount of amniotic fluid in the uterus, and number of fetuses. Most women have at least one ultra sound during pregnancy, but if problems are noted, additional ultrasounds may be recommended. Early diagnosis of prenatal problems can allow medical treatment to improve the health of the fetus.

Key Takeaways

- Development refers to the physical, cognitive, and social-emotional changes that occur throughout life, which are influenced by both nature and nurture.
- Development begins at the moment of conception, when the sperm merges with the egg.
- Within a span of 40 weeks, development progresses from a zygote to an embryo and finally a fetus.
- The fetus is connected to the mother through the umbilical cord and the placenta, which allows the mother to provide nourishment and remove waste. The fetus is protected by the amniotic sac.
- The embryo and fetus are vulnerable and may be harmed by the presence of teratogens.
- Smoking, alcohol use, and drug use are all likely to be harmful to the developing embryo or fetus, and the mother should refrain from these behaviors during pregnancy or if she expects to become pregnant.
- Other environmental factors, especially homelessness and poverty, have a substantial negative effect on healthy development.

Exercises and Critical Thinking

1. What behaviors must a woman avoid engaging in when she decides to try to become pregnant, or when she finds out she is pregnant? Do you think the ability of a mother to engage in healthy behaviors should influence her choice to have a child?
2. Given the negative effects of poverty on human development, what steps do you think that societies should take to try to reduce poverty?
3. Watch the following video and consider whether a textbook or a video presentation is better able to explain prenatal development.
   http://www.pbs.org/wgbh/nova/miracle/program.html

Videos and Activities

1. A free online video program, Seasons of Life, can be accessed at http://www.learner.org/resources/series54.html. This program includes 5 one-hour videos covering the lifespan from infancy through old age.
2. Click through the prenatal development milestones at http://www.visembryo.com/baby/index.html

Physical Development across the Lifespan

Learning Objectives

1. Describe the skills of the newborn.
2. Distinguish between fine and gross motor skills.
3. Define puberty and distinguish between primary and secondary sexual characteristics.
4. Describe the physical changes in adulthood.

The Newborn

Figure 7.6

Source: http://commons.wikimedia.org/wiki/Category:Newborn_infant#mediaviewer/File:Newborn_infant_by_Bonnie_Gruenberg.JPG

Newborns are biologically prepared to face the world they are about to experience. Babies are equipped with a variety of reflexes, such as grasping and sucking, that will help them survive their first few months of life. As they continue to learn new routines and manipulate their environments, these newborn reflexes will dimish.

In addition to reflexes, newborns have preferences. They like sweet tasting foods at first, while becoming more open to salty items by 4 months of age (Beauchamp, Cowart, Menellia, & Marsh, 1994; Blass & Smith, 1992). Newborns also prefer the smell of their mothers. An infant only 6 days old is significantly more likely to turn toward its own mother's breast pad than to the breast pad of another baby's mother (Porter, Makin, Davis, & Christensen, 1992), and within hours of birth an infant also shows a preference for the face of its own mother (Bushnell, 2001; Bushnell, Sai, & Mullin, 1989).

Although infants are born ready to engage in some activities, they also contribute to their own development. The child's knowledge and abilities increase as it babbles, crawls, tastes, grasps, and interacts with objects in the environment (Gibson, Rosenzweig, & Porter, 1988; Gibson & Pick, 2000; Smith & Thelen, 2003). Parents may help in this process by providing a variety of activities and experiences for the child. Research has found that animals reared in environments with more novel objects and that engage in a variety of stimulating activities have more brain synapses and larger cerebral cortexes. They perform better on learning tasks than animals raised in more impoverished environments (Juraska, Henderson, & Müller, 1984). Similar effects are likely

occurring in children who have opportunities to play, explore, and interact with their environments (Soska, Adolph, & Johnson, 2010).

Infancy and Childhood

During infancy reflexes make way for deliberate actions. *Large movements that often involve several parts of the body* are called **gross motor skills**. These include actions such as sitting, crawling, and walking. By 3 months most babies have enough muscle control that they can sit supported in someone's lap. By 6 months they can sit unsupported. Most infants can walk by holding on to someone or something at 9 months, and by 12 months many can walk independently.

Figure 7.7

Children jumping rope in Korea at the first full moon of the lunar calendar, one of the biggest traditional holidays.
Source:

Small movements, such as those involving the fingers, hands, tongue or lips, care called **fine motor skills**. Hand-eye coordination is limited in young infants, such that 3-month olds can touch objects, but often cannot grab objects efficiently unless the object is placed directly in their hand. Even at 4 months of age, grabbing things can be tricky as babies may overreach an object, or grab too soon or too late. By 6 months. infants have mastered this skill.

Both gross and fine motor skills continue to improve in childhood as children learn to master the movement of their body enabling them to draw and write, button coats and tie shoe laces (fine motor skills), roller skate and ride a bicycle (gross motor skills).

Adolescence

Adolescence begins with the onset of **puberty**, *a developmental period in which hormonal changes cause rapid physical alterations in the body, culminating in sexual maturity*. Although the timing varies to some degree across cultures, the average age range for reaching puberty is between 9 and 14 years for girls and between 10 and 17 years for boys (Marshall & Tanner, 1986).

Puberty begins when the pituitary gland begins to stimulate the production of the male sex hormone testosterone in boys and the female sex hormones estrogen and progesterone in girls. The release of these sex hormones triggers the development of the **primary sexual characteristics**, *the sex organs concerned with reproduction.* These changes include the enlargement of the testicles and the penis in boys, and further development of the ovaries, uterus, and vagina in girls. In addition, **secondary sexual characteristics** appear, *or those outward changes that indicate physical maturation, but are not involved in reproduction*. These include an enlarged Adam's apple, a deeper voice, and pubic and underarm hair in boys, and enlargement of the breasts, hips, and the appearance of pubic and underarm hair in girls. Both boys and girls experience a rapid growth spurt during this stage. The growth spurt for girls usually begins at about age 9. For boys, this occurs 2 years later at age 11 (Abbassi, 1998).

A major milestone in puberty for girls is **menarche**, *the first menstrual period*, which typically occurs at around 12 or 13 years of age (Anderson, Dannal, & Must, 2003). The age of menarche varies substantially and is determined by genetics, as well as, by diet and lifestyle, since a certain amount of body fat is needed to attain menarche. Girls who are very slim, who engage in strenuous athletic activities, or who are malnourished may begin to menstruate later. Even after menstruation begins, girls whose level of body fat drops below the critical level may stop having their periods.

The sequence of events for puberty is more predictable than the age at which they occur. Some girls may begin to grow pubic hair at age 10, but not attain menarche until age 15. In boys, facial hair may not appear until ten years after the initial onset of puberty. The timing of puberty in both boys and girls can have significant psychological consequences. Boys who mature earlier attain some social advantages because they are taller and stronger, and therefore often more popular (Lynne, Graber, Nichols, Brooks-Gunn, & Botvin, 2007). At the same time, however, early-maturing boys are at greater risk for delinquency and are more likely than their peers to engage in antisocial behaviors, including drug and alcohol use, truancy, and precocious sexual activity. Girls who mature early may find their maturity stressful, particularly if they experience teasing or sexual harassment (Mendle, Turkheimer, & Emery, 2007; Pescovitz & Walvoord, 2007). Early-maturing girls are also more likely to have a lower self-image, and higher rates of depression, anxiety, and disordered eating than their peers (Ge, Conger, & Elder, 1996).

Emerging, Early, and Middle Adulthood

Emerging adulthood *is the period between the late teens and early twenties.* Those in their early twenties are probably at the peak of their physiological development, including muscle strength, reaction time, sensory abilities, and cardiac functioning. The reproductive system, motor skills, strength, and lung capacity are all operating at their best. Most professional athletes are at the top of their game during this stage (Boundless, 2016).

The aging process actually begins during early adulthood. However, compared with childhood and adolescence, the physical changes that occur in adulthood are less dramatic. As individuals pass into their 30s and 40s, their recovery from muscular strain becomes more prolonged, and their sensory abilities may become somewhat diminished, at least when compared with their prime years, during the teens and early 20s (Panno, 2004). Visual acuity diminishes somewhat, and many people in their late 30s and early 40s notice that their eyes are changing and they need eyeglasses, especially for close work such as reading (*presbyopia*). Adults in their 30s and 40s may also begin to suffer some hearing loss (*prebycusis*) because of damage to the hair cells (*cilia*) in the inner ear (Lacher-Fougëre & Demany, 2005). It is also during middle adulthood that many people first begin to suffer from ailments, such as high cholesterol and high blood pressure, as well as, low bone density (Shelton, 2006). Corresponding to changes in our physical abilities, our sensory abilities show some, but not dramatic, decline during this stage.

The stages of both early and middle adulthood bring about a gradual decline in fertility, particularly for women. Eventually, women experience **menopause**, *the cessation of the menstrual cycle*, which usually occurs at around age 50. Menopause occurs because of the gradual decrease in the production of the female sex hormones estrogen and progesterone, which slows the production and release of eggs into the uterus. Women whose menstrual cycles have stopped for 12 consecutive months are considered to have entered menopause (Minkin & Wright, 2004).

Researchers have found that women's responses to menopause are social, as well as physical, and these responses vary substantially across both individuals and cultures. Some women may react more negatively to menopause, worrying that they have lost their femininity and that their final chance to bear children is over. Other women may regard menopause more positively, focusing on the new freedom from menstrual discomfort and unwanted pregnancy. Most American women go through menopause with few problems (Carroll, 2016). In India, where older women enjoy more social privileges than do younger ones, menopause is typically positively regarded (Avis & Crawford, 2008). Overall, menopause is not seen as universally distressing (Lachman, 2004).

Menopause may have evolutionary benefits. Infants have better chances of survival when their mothers are younger and have more energy to care for them, and the presence of older women who do not have children of their own to care for, but who can help out with raising grandchildren, can be beneficial to the family group. Also, consistent with the idea of an evolutionary benefit of menopause, the decline in fertility occurs primarily for women who do most of the child care and who need the energy of youth to accomplish it. If older women were able to have children, they might not be as able to effectively care for them.

Most men never completely lose their fertility, but they do experience a gradual decrease in testosterone levels, sperm count, and speed of erection and ejaculation. Reduced strength and energy may also accompany this decrease in testosterone. Men, as well as women, respond psychologically to the physical changes of mid-life, however, experiencing a "midlife crisis" is not well supported by research. Results of a 10-year study conducted by the MacArthur Foundation Research Network on Successful Midlife Development, based on telephone interviews with over 3,000 midlife adults, suggest that the years between 40 and 60 are ones marked by a sense of well-being. Only 23% of their participants reported experiencing a midlife crisis. These crises tended to occur among the highly educated and were triggered by a major life event rather than out of a fear of aging (Research Network on Successful Midlife Development, 2007).

Late Adulthood

All body systems become slower and decline in function with advanced age. As the heart and vascular system become less efficient, blood pressure rises and increases the risk for heart attack and stroke. In late adulthood, a drop-in lung capacity results in lower levels of oxygen in the blood. The body also becomes less able to absorb nutrients as the digestive system slows, making a healthy diet especially important in late adulthood.

A big concern for many older adults is the loss of sensory abilities. The majority of people over age 65 need glasses. **Cataracts** *defined as a thickening of the lens causing cloudy and distorted vision,* **glaucoma** *or an excessive eye pressure causing damage to the optic nerve,* and **macular degeneration**, *a deterioration of the center of the retina,* are some visual problems in older adults (Lally & Valentine-French, 2017). Additionally, almost 1 in 4 adults aged 65 to 74 and 1 in 2 aged 75 and older have disabling hearing loss (NIH, 2016). Pride and fear of looking "old" makes many older adults reluctant to wear a hearing aid. Yet the inability to follow conversations due to hearing loss can make the person appear cognitively deficient and can also isolate the elderly from social interaction. Although there are physical and sensory changes as we age, there is considerable variation, with some people retaining their abilities well into their senior years.

Key Takeaways

- Babies are born with a variety of skills and abilities that contribute to their survival, and they also actively learn by engaging with their environments.
- Reflexes transition into deliberate gross motor and fine motor skills, which continue to be refined during childhood.
- Puberty is a developmental period in which hormonal changes cause rapid physical alterations in the body and sexual maturation.
- After peaking in emerging adulthood, muscle strength, reaction time, cardiac output, and sensory abilities begin to decline in early and middle adulthood.
- One of the key signs of aging in women is the decline in fertility, culminating in menopause, which is marked by the cessation of the menstrual period.
- All body systems become less efficient in late adulthood.

Exercises and Critical Thinking

1. Watch the first two sections of this video and think about the interactions between teen brains and their behavior.
   http://www.pbs.org/wgbh/pages/frontline/shows/teenbrain/view/

Videos

1. This free-online program, *Growing Old in a New Age*, includes 13 one-hour videos on a variety of topics related to aging. http://www.learner.org/resources/series84.html.

Cognitive Development across the Lifespan

Learning Objectives

1. Explain Piaget's concepts of assimilation and accommodation.
2. Describe Piaget's stages of cognitive development.
3. Describe the cognitive changes in adolescence and adulthood.
4. Define Alzheimer's disease and describe the risk factors for its development.
5. Explain Kohlberg's theory of moral reasoning.

Piaget's Theory of Cognitive Development

Neurological changes during childhood provide children the ability to do some things at certain ages, and yet make it impossible for them to do other things. This fact was made apparent through the groundbreaking work of the Swiss psychologist Jean Piaget. During the 1920s, Piaget was administering intelligence tests to children to determine the kinds of logical thinking in which children were capable. In the process of testing the children, Piaget became intrigued, not so much by the answers that the children got right, but more by the answers they got wrong. Piaget believed that the incorrect answers that the children gave were not mere shots in the dark, but rather represented specific ways of thinking unique to the children's developmental stage. Just as almost all babies learn to roll over before they learn to sit up by themselves, and learn to crawl before they learn to walk, Piaget believed that children gain their cognitive ability in a developmental order. His insights that children at different ages think in fundamentally different ways led to his stage model of cognitive development.

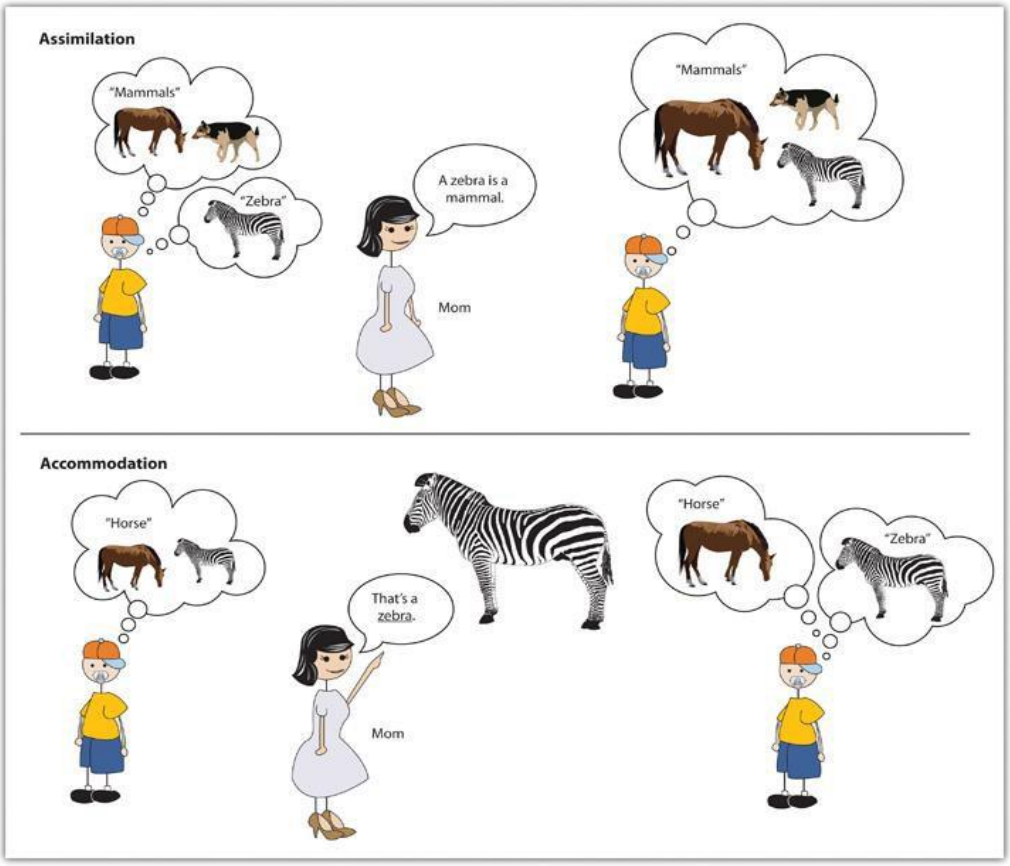
Figure 7.8 Jean Piaget

Source

Piaget argued that children do not just passively learn, but also actively try to make sense of their worlds. He argued that, as they learn and mature, children develop **schemas** or *patterns of knowledge in long-term memory that help them remember, organize, and respond to information*. Furthermore, Piaget thought that when children experience new things, they attempt to reconcile the new knowledge with existing schemas. Piaget believed that the children use two distinct methods. He called these methods assimilation and accommodation.

When children employ assimilation, they *use already developed schemas to understand new information*. If children have learned a schema for horses, then they may call the striped animal they see at the zoo a horse rather than a zebra. In this case, children fit the existing schema to the new information and label the new information with the existing knowledge. Accommodation, in contrast, involves *learning new information, and thus changing the schema*. When a mother says, "No, honey, that's a zebra, not a horse," the child may adapt the schema to fit the new stimulus, learning that there are different types of four-legged animals, only one of which is a horse (see Figure 7.9).

Figure 7.9 Assimilation and Accommodation



Source

Piaget's most important contribution to understanding cognitive development, and the fundamental aspect of his theory, was the idea that development occurs in unique and distinct stages, with each stage occurring at a specific time, in a sequential manner, and in a way, that allows the child to think about the world using new capacities. Piaget's stages of cognitive development are summarized in Table 7.2.

The first developmental stage for Piaget was the **sensorimotor stage**, *the cognitive stage that begins at birth and lasts until around the age of 2. It is defined by the direct physical interactions that babies have with the objects around them*. During this stage, babies form their first schemas by using their primary senses, that is they stare at, listen to, reach for, hold, shake, and taste the things in their environments.

Table 7.2 Piaget's Stages of Cognitive Development

Stage	Approximate Age Range	Characteristics	Stage Attainment
Sensorimotor	Birth to about 2 years	The child experiences the world through reflexes, the fundamental senses of seeing, hearing, touching, and tasting and motor movements.	Object permanence
Preoperational	2 to 7 years	Children acquire the ability to internally represent the world through language and mental imagery. They also view the world from their own perspectives.	Loss of egocentrism
Concrete operational	7 to 11 years	Children become able to think logically, but not abstractly. They can increasingly perform operations on objects.	Conservation
Formal operational	11 years to adulthood	Adolescents can think systematically, can reason about abstract concepts, and can understand ethics and scientific reasoning.	Abstract logic

During the sensorimotor stage, babies' use of their senses to perceive the world is so central to their understanding that whenever babies do not directly perceive objects, as far as they are concerned, the objects do not exist. Piaget found, for instance, that if he first interested babies in a toy and then covered the toy with a blanket, children who were younger than 6 months of age would act as if the toy had disappeared completely. They never tried to find it under the blanket, but would nevertheless smile and reach for it when the blanket was removed. Piaget found that it was not until about 8 months that the children realized that the object was merely covered and not gone. Piaget used the term **object permanence** to refer to *the child's ability to know that an object exists even when the object cannot be perceived*. Children younger than about 8 months of age do not understand object permanence.

At about 2 years of age, and until about 7 years of age, children internally represent the world through language and mental imagey and move into the **preoperational stage**. During this stage, new language skills and symbolic thinking fuel an explosion of communication and "pretend" play. However, the child's understanding of events is intuitive rather than based on logical reasoning. The thinking is **preoperational** *meaning that the child lacks the ability to operate on or transform objects mentally*. In one study that showed the extent of this inability, DeLoache (1987) showed children a room within a small dollhouse. Inside the room, a small toy was visible behind a small couch. The researchers took the children to another lab room, which was an exact replica of the dollhouse room, but full-sized. When children who were 2.5 years old were asked to find the toy, they did not know where to look. They were simply unable to make the transition across the changes in room size. Three-year-old children, on the other hand, immediately looked for the toy behind the couch, demonstrating that they were improving their operational skills.

The inability of young children to view transitions also leads them to be **egocentric** or *unable to readily see and understand other people's viewpoints.* Piaget's classic experiment on egocentrism involved showing children a three-dimensional model of a mountain and asking them to describe what a doll that is looking at the mountain from a different angle might see (see Figure 7.10). Children tend to choose a picture that represents their own, rather than the doll's view. By age 7 children are less self-centered. However, even younger children when speaking to others tend to use different sentence structures and vocabulary when addressing a younger child or an older adult. This indicates some awareness of the views of others.

Figure 7.10 "What does Dolly see?"

Source

However, more recent developmental psychologists have challenged Piaget's belief in the egocentrity of young children, and instead support **theory of mind** or *the ability to take another person's viewpoint,* which increases rapidly during early childhood. In one demonstration of the development of theory of mind, a researcher shows a child a video of another child (let's call her Anna) putting a ball in a red box. Then Anna leaves the room, and the video shows that while she is gone, a researcher moves the ball from the red box into a blue box. As the video continues, Anna comes back into the room. The child is then asked to point to the box where Anna will probably look to find her ball. Children who are younger than 4 years of age typically are unable to understand that Anna does not know that the ball has been moved, and they predict that she will look for it in the blue box. By 5 years of age the majority of children realize that different people can have different viewpoints, and although she will be wrong, Anna will nevertheless think that the ball is still in the red box.

The **concrete operational stage**, *occurring at around 7 years of age, is characterized by more frequent and more accurate use of logical transformations and operations. In addition, the child can think more logically about physical reality.* A fourth grader understands that transforming a ball of clay from a snake to a ball does not change the amount of clay. School age children understand operations can be reversed, so they can learn to check their subtraction problems by adding. For example, 2+3 = 5, so 5 - 3 should = 2.

An important milestone during the concrete operational stage is the development of **conservation** *or the understanding that changes in the form of an object do not necessarily mean changes in the quantity of the object.* Children younger than 7 years generally think that a glass of milk that is tall holds more milk than a glass of milk that is shorter and wider, and they continue to believe this even when they see the same milk poured back and forth between the glasses. This is because young children exhibit **centration** *whereby they focus only on one dimension* (the height of the liquid in the glass) *and ignore the other dimension* (the width of the glass). However, when children reach the concrete operational stage, their abilities to understand such transformations make them aware that, although the milk looks different in the different glasses, the amount must be the same. Children in the stage of concrete operations decenter and use a process called **reversibility** *or the understanding that some things that have been changed can be returned to their original state* to think about transitions and achieve conservation.

Figure 7.11

Two glasses with an equal amount of liquid
Source:
http://en.wikipedia.org/wiki/Piaget%27s_concepts_of_conservation#mediaviewer/File:Conservation1.jpeg

Figure 7.12

The liquid from one of the short glasses has been poured into a taller, skinnier glass. A child that cannot conserve would assume the taller glass has more liquid than the shorter glass
Source:
http://en.wikipedia.org/wiki/Piaget%27s_concepts_of_conservation#mediaviewer/File:Conservation2.jpeg

At about 11 years of age, children enter the **formal operational stage**, *which is marked by the ability to think in abstract terms and to use scientific and philosophical lines of thought*. Children in the formal operational stage are better able to systematically test alternative ideas to determine their influences on outcomes. For instance, rather than haphazardly changing different aspects of a situation that allows no clear conclusions to be drawn, they systematically make changes in one thing at a time and observe what difference that particular change makes. They learn to use deductive reasoning, such as "if this, then that," and they become capable of imagining situations that "might be," rather than just those that actually exist. They can test hypotheses mentally rather than through trial and error.

Piaget's theories have made a substantial and lasting contribution to developmental psychology. His contributions include the idea that children are not merely passive receptacles of information, but rather actively engage in acquiring new knowledge and making sense of the world around them. This general idea has generated many other theories of cognitive development, each designed to help us better understand the development of the child's information-processing skills (Klahr & McWinney, 1998; Shrager & Siegler, 1998). Furthermore, the extensive research that Piaget's theory has stimulated has generally supported his beliefs about the order in which cognition develops. Piaget's work has also been applied in many domains. For instance, many teachers make use of Piaget's stages to develop educational approaches aimed at the level for which children are developmentally prepared (Driscoll, 1994; Levin, Siegler, & Druyan, 1990).

Over the years, Piagetian ideas have been refined. For example, it is now believed that object permanence develops gradually, rather than more immediately, as a true stage model would predict, and that it can sometimes develop much earlier than Piaget expected. Baillargeon and her colleagues (Baillargeon, 2004; Wang, Baillargeon, & Brueckner, 2004) had babies watch a rotating screen, which moved like a drawbridge back and forth. Then a wooden box was placed in the path of the rotating screen. The researchers had two scenarios. In the "possible event" the screen moved

upward hiding the box and then stopped part way, then rotated back down revealing the box again. In the "impossible event" the screen rotated upward hiding the box, but instead of stopping it went all the way back and then rotated forward again revealing the box. Babies who saw the impossible event looked longer than did babies who witnessed the possible event. These data suggest that the babies were aware that the object still existed even though it was hidden behind the screen, and thus that they were displaying object permanence as early as 3 ½ months of age, rather than at 8 months, as Piaget suggested.

Another factor that might have surprised Piaget is the extent to which a child's social surroundings influence learning. In some cases, children progress to new ways of thinking and retreat to old ones depending on the type of task they are performing, the circumstances they find themselves in, and the nature of the language used to instruct them (Courage & Howe, 2002).
Children in different cultures show somewhat different patterns of cognitive development. Dasen (1972) found that children in non-Western cultures moved to the next developmental stage about a year later than did children from Western cultures, and that level of schooling also influenced cognitive development. In short, Piaget's theory probably understated the contribution of social environmental factors to cognitive development.

Cognitive Development in Adolescence

Although the most rapid cognitive changes occur during childhood, the brain continues to develop throughout adolescence and adulthood (Weinberger, Elvevåg, & Giedd, 2005). During adolescence, the brain continues to form new neural connections, but also casts off unused neurons and connections (Blakemore, 2008). As teenagers mature, the prefrontal cortex, the area of the brain responsible for reasoning, planning, and problem solving, also continues to develop (Goldberg, 2001). Myelin, the fatty tissue that forms around axons and neurons and helps speed transmissions between different regions of the brain, also continues to grow (Rapoport et al., 1999).

Adolescents often seem to act impulsively, rather than thoughtfully, and this may be, in part, because the development of the prefrontal cortex is slower than the development of the emotional parts of the brain, including the limbic system (Blakemore, 2008). Furthermore, the hormonal surge that is associated with puberty, which primarily influences emotional responses, may create strong emotions and lead to impulsive behavior. It has been hypothesized that adolescents may engage in risky behavior, such as smoking, drug use, dangerous driving, and unprotected sex, in part, because they have not yet fully acquired the mental ability to curb impulsive behavior or to make entirely rational judgments (Steinberg, 2007).

The new cognitive abilities that are attained during adolescence may also give rise to new feelings of egocentrism. One type of adolescent egocentrism is the **personal fable** *in which adolescents construct a fantasy of their personal future*. They may imagine themselves as a famous actress or fighter pilot. This personal fable makes them more likely to take risks, since they do not imagine themselves dying or injured. They also may not listen to their parent's advice about avoiding danger (Elkind, 1978).

Teenagers are also likely to be highly self-conscious, often creating an **imaginary audience** *in that they feel that everyone is constantly watching them* (Goossens, Beyers, Emmen, & van Aken, 2002). Because teens are egocentric, they mistakenly believe that others must be thinking about

them too (Rycek, Stuhr, McDermott, Benker, & Swartz, 1998). Worrying about what others are thinking can sometimes lead adolescents to negative emotions and behavior.

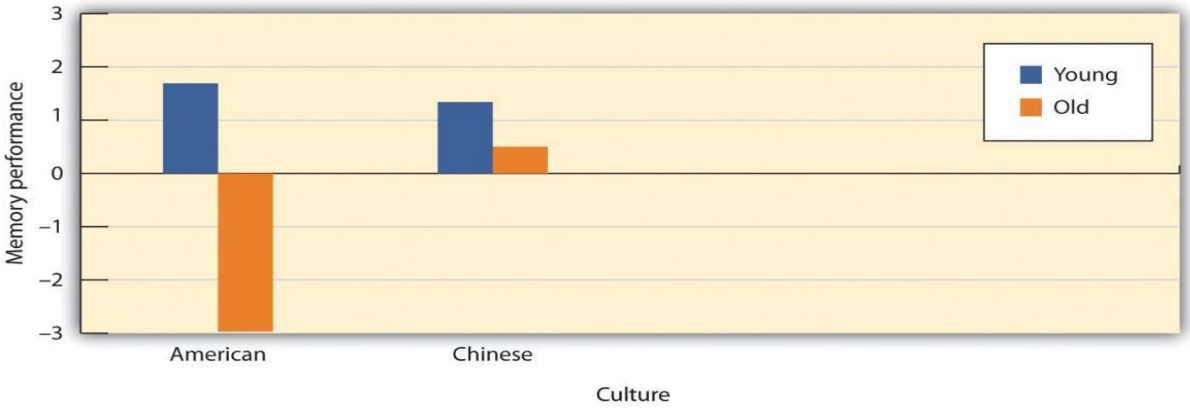
Cognitive Development in Adulthood

Cognitive development continues during early and middle adulthood. Formal operations, the abstract, hypothetical thinking that emerged in adolescence, are focused on problem solving, while the postformal thinking of adulthood is more reflective. **Postformal thinking** *includes problem finding* (Arlin, 1975) *and dialectical reasoning* (Riegel, 1973). A "solution" can be evaluated by looking for the possible problems that may result from that action. A new solution may emerge from this evaluation. For example, a teen in formal operations may decide to join the military so that college tuition can be paid. An adult in postformal operations would also evaluate all of the possible problems with this solution. This evaluation might lead to a new solution.

Adult thinkers are also better able to integrate intuition, emotion, and experience into their abstract reasoning. For example, a person might consider whether divorce is a valid response to an unhappy marriage. A teen in formal operations might reason using an abstract concept. This concept might be an individual's right to the "pursuit of happiness" as guaranteed by the constitution. A more mature thinker might also evaluate the emotions involved and consider how much of the unhappiness is related to other causes. This adult reasoning would also include an intuitive understanding of how the divorce might impact each individual. Based on past experience, the adult might also consider whether or not the unhappiness is temporary and correctable within the marriage. Individuals using formal and postformal thinking may reach the same conclusions, but the reasoning process of the mature thinker might include more variables. This ability to engage in multidimensional, reflective thinking may be related to biological maturation. The prefrontal cortex of the brain continues to mature until at least the age of 25. Research evidence suggests that this biological maturation parallels the cognitive maturation that is taking place in early adulthood (Yurgelun-Todd, 2007).

An important factor in our cognitive abilities as we age appears to be our expectations. In one important study concerning the role of expectations on memory, Levy and Langer (1994) found that, although young American and Chinese students performed equally well on cognitive tasks, older Americans performed significantly more poorly on those tasks than did their Chinese counterparts. Furthermore, this difference was explained by beliefs about aging. In both cultures, the older adults who believed that memory declined with age also showed more actual memory declines than did the older adults who believed that memory did not decline with age. In addition, more older Americans than older Chinese believed that memory declined with age, and as you can see in Figure 7.13, older Americans performed more poorly on the memory tasks.

Figure 7.13



Is Memory Influenced by Cultural Stereotypes? Levy and Langer (1994) found that although younger samples did not differ, older Americans performed significantly more poorly on memory tasks than did older Chinese, and that these differences were due to different expectations about memory in the two cultures.

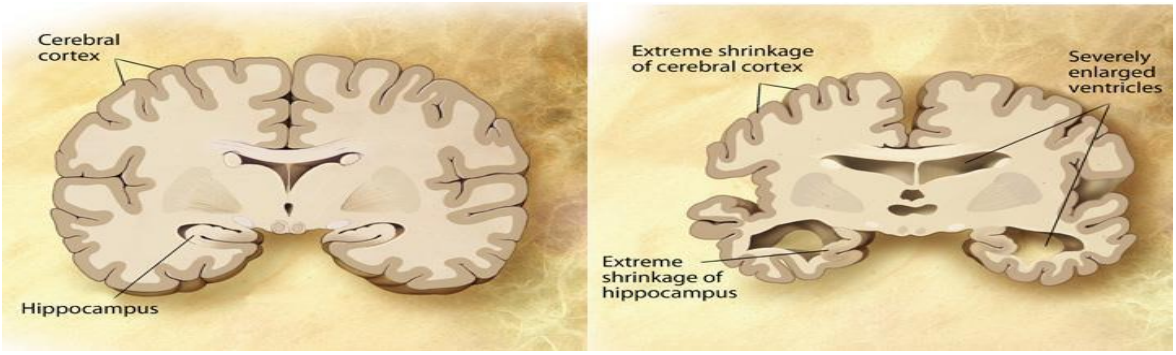
Source: Adapted from Levy, B., & Langer, E. (1994). Aging free from negative stereotypes: Successful memory in China among the American deaf. *Journal of Personality and Social Psychology*, *66*(6), 989–997.

Whereas it was once believed that almost all older adults suffered from a generalized memory loss, research now indicates that healthy older adults actually experience only some particular types of memory deficits, while other types of memory remain relatively intact or may even improve with age. Older adults do seem to process information more slowly as it may take them longer to evaluate information and to understand language. It takes them longer than it does younger people to recall a word that they know, even though they are perfectly able to recognize the word once they see it (Burke, Shafto, Craik, & Salthouse, 2008). Older adults also have more difficulty inhibiting and controlling their attention (Persad, Abeles, Zacks, & Denburg, 2002) making them, for example, more likely to talk about topics that are not relevant to the topic at hand when conversing (Pushkar et al., 2000).

Neurocognitive Disorder and Alzheimer's Disease

Some older adults suffer from biologically based cognitive impairments in which the brain is so adversely affected by aging, that it becomes very difficult for the person to continue to function effectively. A **Neurocognitive disorder** is defined as *a progressive neurological disease that includes loss of cognitive abilities significant enough to interfere with everyday behaviors*. **Alzheimer's disease** is *a form of this disorder that, over a period of years, leads to a loss of emotions, cognitions, and physical functioning, and is ultimately fatal*. Neurocognitive disorders and Alzheimer's disease are most likely to be observed in individuals who are 65 and older (Hebert et al., 1995). Neurocognitive disorders and Alzheimer's disease both produce a gradual decline in functioning of the brain cells that produce the neurotransmitter acetylcholine. Without this neurotransmitter, the neurons are unable to adequately communicate, leaving the brain less and less functional. Neurocognitive disorders can be diagnosed as either major or mild. Mild neurocognitive disorders are an earlier and possibly more treatable form of the disorder.

Figure 7.14 A Healthy Brain (Left) Versus a Brain with Advanced Alzheimer's Disease (Right)



Neurocognitive disorders and Alzheimer's are, in part, heritable, but there is increasing evidence that the environment also plays a role. A Western diet, high in saturated fats and simple carbohydrates, is associated with developing Alzheimer's disease (Kanoski & Davidson, 2011). Current research is helping us understand many things that older adults may be able to do that will help them slow down or prevent the negative cognitive outcomes of aging, including neurocognitive disorders and Alzheimer's (Pushkar, Bukowski, Schwartzman, Stack, & White, 2007). Older adults who continue to keep their minds active by engaging in cognitive activities, such as reading or doing crossword puzzles, who maintain social interactions with others, and who keep themselves physically fit have a greater chance of maintaining their mental acuity than those who do not (Cherkas et al., 2008; Verghese et al., 2003).

Most research on this topic, however, is correlational. Although behavioral factors may predict who is mentally healthy, there is insufficient evidence that you can control cognitive decline in old age by staying active (Plassman, Williams, Burke, Holsinger, & Benjamin, 2010). Staying active will not hurt, though. Since it contributes to overall health and quality of life, participating in social, physical, and mental activity is a good plan for anyone. Exercise, in particular, will increase blood flow to the brain and improve almost anyone's cognitive performance.

Developing Moral Reasoning: Kohlberg's Theory

The independence that comes with adolescence and adulthood requires independent thinking, as well as the development of **morality** *defined as standards of behavior that are generally agreed on within a culture to be right or proper.* Just as Piaget believed that children's cognitive development follows specific patterns, Lawrence Kohlberg (1984) argued that we learn our moral values through active thinking and reasoning, and that moral development follows a series of stages. Kohlberg's six stages are generally organized into three levels of moral reasons. To study moral development, Kohlberg posed moral dilemmas to children, teenagers, and adults, such as the following:

> *A man's wife is dying of cancer and there is only one drug that can save her. The only place to get the drug is at the store of a pharmacist who is known to overcharge people for drugs. The man can only pay $1,000, but the pharmacist wants $2,000, and refuses to sell it to him for less, or to let him pay later. Desperate, the man later breaks into the pharmacy and steals the medicine. Should he have done that? Was it right or wrong? Why?*

Kohlberg concluded, on the basis of their responses to the moral questions, that as we develop intellectually we can pass through different stages of moral reasoning. In the first stage, moral reasoning is based on concepts of punishment. The child believes that if the consequence for an action is punishment, then the action was wrong. In the second, slightly more advanced stage, children base their thinking on self-interest and reward. "You scratch my back, I'll scratch yours." Adults can also fall into these stages, particularly when they are under pressure. Together, these two stages constitute a level Kohlberg described as **preconventional morality** or *morality that focuses on self-interest. Punishment is avoided and rewards are sought.*

In the second level, **conventional morality**, *people care about the effect of their actions on others*. Older children, some adolescents, and adults use this reasoning. In the third stage, the person wants to please others. At a slightly more advanced stage four, the person acknowledges the importance of social norms or laws and wants to be a good member of the group or society.

In the third level, **postconventional morality**, *abstract reasons are used to determine right and wrong*. In the fifth stage, laws are recognized as social contracts established for the good of everyone and that can transcend the self and social convention. For example, the man should break into the store because, even if it is against the law, the wife needs the drug and her life is more important than the consequences the man might face for breaking the law. The reasons for the laws, like justice, equality, and dignity, are used to evaluate decisions and interpret laws. In the sixth stage, individually determined universal ethical principles are weighed to make moral decisions. Kohlberg said that few adults ever reach this stage. Kohlberg's stages are reviewed in Table 7.3.

Although research has supported Kohlberg's idea that moral reasoning changes from an early emphasis on punishment and social rules and regulations to an emphasis on more general ethical principles, as with Piaget's approach, Kohlberg's stage model is probably too simple. For one, people may use higher levels of reasoning for some types of problems, but revert to lower levels in situations where doing so is more consistent with their goals or beliefs (Rest, 1979). Second, it has been argued that the stage model is particularly appropriate for Western, rather than non-Western, samples in which allegiance to social norms (such as respect for authority) may be particularly important (Haidt, 2001). In addition, there is frequently little correlation between how we score on the moral stages and how we behave in real life.

Perhaps the most important critique of Kohlberg's theory is that it may describe the moral development of males better than it describes that of females. Gilligan (1982) has argued that, because of differences in their socialization, males tend to value principles of justice and rights, whereas females value caring for and helping others. Although there is little evidence for a gender difference on Kohlberg's stages of moral development (Turiel, 1998), it is true that girls and women tend to focus more on issues of caring, helping, and connecting with others than do boys and men (Jaffee & Hyde, 2000).

Table 7.3 Lawrence Kohlberg's Levels of Moral Reasoning

Age	Moral Level	Description
Young children-usually prior to age 9	**Preconventional morality**	**Stage 1**: Focus is on self-interest and punishment is avoided. The man shouldn't steal the drug, as he may get caught and go to jail. **Stage 2:** Rewards are sought. A person at this level will argue that the man should steal the drug because he does not want to lose his wife who takes care of him.
Older children, adolescents, and most adults	**Conventional morality**	**Stage 3:** Focus is on how situational outcomes impact others and wanting to please and be accepted. The man should steal the drug because that is what good husbands do. **Stage 4:** People make decisions based on laws or formalized rules. The man should obey the law because stealing is a crime.
Rare with adolescents and few adults	**Postconventional morality**	**Stage 5**: Individuals employ abstract reasoning to justify behaviors. The man should steal the drug because laws can be unjust and you have to consider the whole situation. **Stage 6:** Moral behavior is based on self-chosen ethical principles. The man should steal the drug because life is more important than property.

Key Takeaways

- Piaget's theory of cognitive development proposes that children use both assimilation and accommodation to develop functioning schemas of the world.
- According to Piaget, children develop in a specific series of sequential stages: Sensorimotor, preoperational, concrete operational and formal operational.
- Piaget's theories have had a major impact, but they have also been negatively critiqued and expanded.
- The cerebral cortex continues to develop during adolescence and early adulthood, enabling improved reasoning, judgment, impulse control, and long-term planning.
- The thinking of adults is more reflective and is able to integrate intuition, emotion, and experience into their abstract reasoning.
- Expectancies about change in aging vary across cultures and may influence how people respond to getting older.
- A portion of the elderly suffer from age-related brain diseases, such as a neurocognitive disorder that includes significant loss of cognitive abilities, and Alzheimer's disease, a fatal form of a neurocognitive disorder that is related to changes in the cerebral cortex.

- Kohlberg's theory proposes that moral reasoning is divided into the following levels: Preconventional morality, conventional morality, and postconventional morality.
- Kohlberg's theory of morality has been expanded and challenged, particularly by Gilligan, who has focused on differences in morality between males and females.

Exercises and Critical Thinking

1. Give an example of a situation in which you or someone else might show cognitive assimilation and cognitive accommodation. In what cases do you think each process is most likely to occur?
2. Based on what you learned in this chapter, do you think that people should be allowed to drive at age 16? Why or why not? At what age do you think they should be allowed to vote and to drink alcohol?
3. Based on the information you have read in this chapter, what would you tell your parents about how they can best maintain healthy physical and cognitive function into late adulthood?

Videos

1. This free, online video series, *The Whole Child*, provides information on a variety of topics related to caring for children ages 0-5 years. http://www.learner.org/resources/series59.html
2. Video clip of Renee Baillargeon's research on object permanence https://www.youtube.com/watch?v=hwgo2O5Vk_g
3. Video Clip: People Being Interviewed About Kohlberg's Stages http://www.youtube.com/v/zY4etXWYS84

Social Development across the Lifespan

Learning Objectives

1. List and describe Erik Erikson's psychosocial developmental crises.
2. Explain the needs for contact comfort and for attachment for infants.
3. Describe the patterns of attachment between infants and their caregivers according to Ainsworth.
4. Explain the difference between longitudinal and cross-sectional research designs.
5. Describe identity development in adolescence.
6. Describe the use of authoritarian, authoritative, permissive, and rejecting-neglecting parenting styles.
7. Describe the factors that may lead to a more positive retirement.
8. Describe the five phases of grief according to Kübler-Ross.

Childhood is a time in which changes occur quickly. During this time the child learns to actively manipulate and control the environment, and is first exposed to the requirements of society. According to Erik Erikson (1963), children need to learn to control themselves, to explore the world, to become self-reliant, and to make their own way in the environment.

Figure 7.15 Erik Erikson

The psychologist and psychoanalyst Erik Erikson (1963) proposed a model of life-span development that provides a useful guideline for thinking about the changes we experience throughout life. Erikson broke with Freud's emphasis on sexuality as the cornerstone of social-emotional development, and instead suggested that social relationships fostered development. Erikson proposed that *each period of life has a unique challenge or crisis that the person who reaches it must face. This is referred to as a* **psychosocial crisis.** According to Erikson, successful development involves dealing with and resolving the goals and demands of each of these crises in a positive way. These crises are usually called *stages*, although that is not the term Erikson used. If a person does not resolve a crisis successfully, it may hinder their ability to deal with later crises. For example, the person who does not develop a sense of trust (Erikson's first crisis) may find it challenging as an adult to form a positive intimate relationship (Erikson's sixth crisis). Or an individual who does not develop a clear sense of purpose and identity (Erikson's fifth crisis) may become self-absorbed and stagnate rather than working toward the betterment of others (Erikson's seventh crisis). However, most individuals are able to successfully complete the eight crises of his theory (see Table 7.4).

Table 7.4 Crises of Development as Proposed by Erik Erikson

Age Range	Psychosocial Crisis	Positive Resolution of Crisis
Birth to 12 to 18 months	Trust versus Mistrust	The infant develops a feeling of trust in his or her caregivers.
18 months to 3 years	Autonomy versus Shame and Doubt	The child learns what he or she can and cannot control and develops a sense of free will.
3 to 6 years	Initiative versus Guilt	The child learns to become independent by exploring, manipulating, and taking action.
6 to 12 years	Industry versus Inferiority	The child learns to do things well or correctly according to standards set by others, particularly in school.
12 to 18 years	Identity versus Role Confusion	The adolescent develops a well-defined and positive sense of self in relationship to others.
18 to 40 years	Intimacy versus Isolation	The adult develops the ability to give and receive love and to make long-term commitments.
40 to 65 years	Generativity versus Stagnation	The adult develops an interest in guiding the development of the next generation, often by becoming a parent.
65 to death	Ego Integrity versus Despair	The older adult develops acceptance of his or her life as it was lived.

Erikson's theory of psychosocial development will be used as the framework for understanding subsequent topics in social-emotional development across the lifespan, including attachment, identity formation, parenting, retirement, and death and dying.

Social Development in Childhood: Attachment

The development of close and meaningful social relationships is one of the most important features of childhood. *The emotional bonds that we develop with those with whom we feel closest, and particularly the bonds that an infant develops with the mother or primary caregiver*, are referred to as **attachment** (Cassidy & Shaver, 1999).

Figure 7.16

Children develop appropriate attachment styles through their interactions with caregivers. © Thinkstock

As late as the 1930s, psychologists believed that children who were raised in institutions, such as orphanages, and who received good physical care and proper nourishment, would develop normally, even if they had little interaction with their caretakers. Studies by the developmental psychologist John Bowlby (1953) and others, however, showed that these children did not develop

normally. They were usually sickly, emotionally slow, and generally unmotivated. These observations helped make it clear that normal infant development requires successful attachment with a caretaker.

Harlow's Research: In one classic study showing the importance of attachment, Wisconsin University psychologists Harry and Margaret Harlow investigated the responses of young monkeys. The infants were separated from their biological mothers, and two surrogate mothers were introduced to their cages. One, the wire mother, consisted of a round wooden head, a mesh of cold metal wires, and a bottle of milk from which the baby monkey could drink. The second mother was a foam-rubber form wrapped in a heated terry-cloth blanket. The infant monkeys went to the wire mother for food, but they overwhelmingly preferred and spent significantly more time with the warm terry-cloth mother. The warm terry-cloth mother provided no food, but did provide comfort (Harlow, 1958). *The infant's need for physical closeness and touching is referred to as* **contact comfort**. Contact comfort is believed to be the foundation for attachment.

The Harlows' studies confirmed that babies have social, as well as, physical needs. Both monkeys and human babies need a secure base that allows them to feel safe. From this base, they can gain the confidence they need to venture out and explore their worlds. Erikson was in agreement on the importance of a secure base, arguing that the most important goal of infancy was the development of a basic sense of trust in one's caregivers.

The Strange Situation Technique: Developmental psychologist Mary Ainsworth, a student of John Bowlby, was interested in studying the development of attachment in infants. Ainsworth created a laboratory test that measured an infant's attachment to his or her parent. The test is called the **strange situation** because it is *conducted in a context that is unfamiliar to the child and therefore likely to heighten the child's need for his or her parent* (Ainsworth, Blehar, Waters, & Wall, 1978). During the procedure that lasts about 20 minutes, the parent and the infant are first left alone, while the infant explores the room full of toys. Then a strange adult enters the room and talks for a minute to the parent, after which the parent leaves the room. The stranger stays with the infant for a few minutes, and then the parent again enters and the stranger leaves the room. During the entire session, a video camera records the child's behaviors, which are later coded by trained coders.

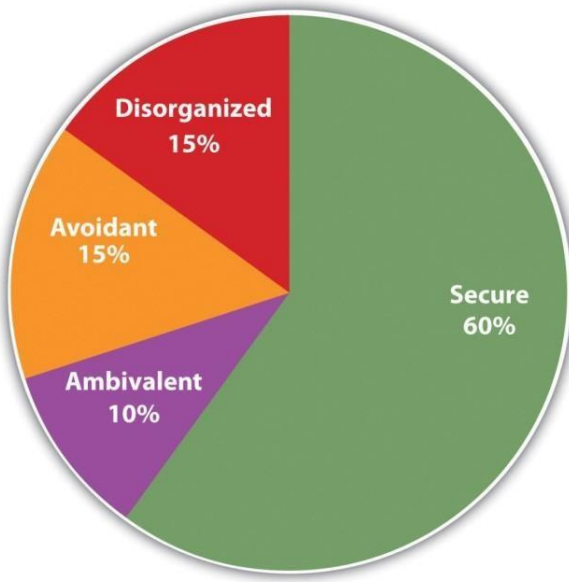
On the basis of their behaviors, the children are categorized into one of four groups, where each group reflects a different kind of attachment relationship with the caregiver.

- A child with a **secure attachment style** *usually explores freely while the mother is present and engages with the stranger. The child may be upset when the mother departs, but is also happy to see the mother return.*
- A child with an **ambivalent attachment style** (sometimes called *insecure-resistant*) *is wary about the situation in general, particularly the stranger, and stays close or even clings to the mother rather than exploring the toys. When the mother leaves, the child is extremely distressed and is ambivalent when she returns. The child may rush to the mother but then fail to cling to her when she picks up the child.*

- A child with an **avoidant attachment style** (sometimes called *insecure-avoidant*) *will avoid or ignore the mother, showing little emotion when the mother departs or returns. The child may run away from the mother when she approaches. The child will not explore very much, regardless of who is there, and the stranger will not be treated much differently from the mother.*
- A child with a **disorganized attachment style** *seems to have no consistent way of coping with the stress of the strange situation. The child may cry during the separation, but avoid the mother when she returns, or the child may approach the mother, but then freeze or fall to the floor.*

Although some cultural differences in attachment styles have been found (Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000), research has also found that overall the proportion of children who fall into each of the attachment categories is relatively constant across cultures. Figure 7.17 identifies the percentage of children with different attachment styles.

Figure 7.17



Source

Factors Determining Attachment: You might wonder whether differences in attachment style are determined more by the child (nature) or more by the parents (nurture). Most developmental psychologists believe that socialization is primary, arguing that a child becomes securely attached when the parent is available and able to meet the needs of the child in a responsive and appropriate manner, but that the insecure styles occur when the parent is insensitive and responds inconsistently to the child's needs. In a direct test of this idea, Dutch researcher van den Boom (1994) randomly assigned some babies' mothers to a training session in which they learned to better respond to their children's needs. The research found that these mothers' babies were more likely to show a secure attachment style in comparison to the mothers in a control group that did not receive training.

Severe deprivation of parental attachment can lead to serious problems. According to studies of children who have not been given warm, nurturing care may show developmental delays, failure to thrive, and attachment disorders (Bowlby, 1982). **Failure to thrive** is the *diagnosis for an infant who does not grow, develop, or gain weight on schedule*. In addition, postpartum depression can cause even a well-intentioned mother to neglect her infant and negatively impact the attachment relationship.

The attachment behavior of the child is also likely influenced, at least in part, by **temperament**, *the innate personality characteristics of the infant*. Some children are warm, friendly, and responsive, whereas others tend to be more irritable, less manageable, and difficult to console. These differences may also play a role in attachment (Gillath, Shaver, Baek, & Chun, 2008; Seifer,

Schiller, Sameroff, Resnick, & Riordan, 1996). It seems safe to say that attachment, like most other developmental processes, is affected by an interplay of genetic and socialization influences.

Research Focus: Using a Longitudinal Research Design to Assess the Stability of Attachment

You might wonder whether the attachment style displayed by infants has much influence later in life. In fact, research has found that the attachment styles of children predict their emotions and their behaviors many years later (Cassidy & Shaver, 1999).

Two approaches to examining the effect of age on development include cross-sectional and longitudinal. In a **cross-sectional research design**, *age comparisons are made between samples of different people at different ages at one time*. Cross-sectional studies have a major advantage in that the scientist does not have to wait for years to pass to get results. However, the interpretations drawn from cross-sectional studies may be confounded by cohort effects. **Cohort effects** refer to *the possibility that differences in cognition or behavior may be caused by differences that are unrelated to the changes in age. The differences might instead be due to environmental factors that affect an entire age group.*

Psychologists have studied the persistence of attachment styles over time using **longitudinal research designs** *in which individuals in the sample are followed and contacted over an extended period of time, often over multiple developmental stages*. In one such study, Waters, Merrick, Treboux, Crowell, and Albersheim (2000) examined the extent of stability and change in attachment patterns from infancy to early adulthood. In their research, 60 middle-class infants who had been tested in the strange situation at 1 year of age were contacted 20 years later and interviewed using a measure of adult attachment. Waters and colleagues found that 72% of the infants received the same secure versus insecure attachment classification in early adulthood as they had received as infants. The adults who changed categorization, usually from secure to insecure, were primarily those who had experienced traumatic events, such as the death or divorce of parents, severe illnesses contracted by the parents or the children themselves, or physical or sexual abuse by a family member.

In addition to finding that people generally display the same attachment style over time, longitudinal studies have also found that the attachment classification received in infancy, as assessed using the strange situation or other measures, predicts many childhood and adult behaviors. Securely attached infants have closer, more harmonious relationship with peers, are less anxious and aggressive, and are better able to understand others' emotions than are those who were categorized as insecure as infants (Lucas-Thompson & Clarke-Stewart, (2007). Securely attached adolescents also have more positive peer and romantic relationships than their less securely attached counterparts (Carlson, Sroufe, & Egeland, 2004).

Conducting longitudinal research is a very difficult task, but one that has substantial rewards. When the sample is large enough and the time frame long enough, the potential findings of such a study can provide rich and important information about how people change over time and the causes of those changes. The drawbacks of longitudinal studies include the cost and the difficulty of finding a large sample that can be tracked accurately over the many years it takes to get the

data. In addition, because the results are delayed over an extended period, the research questions posed at the beginning of the study may become less relevant as the research continues.

Social Development in Adolescence: Identity

According to Erikson, the main social task of the adolescent is the search for a unique identity and the ability to answer the question, "Who am I?" In the search for identity, the adolescent may experience role confusion in which he or she is balancing or choosing among identities. Teens may also take on negative or undesirable identities, or, if things are not going well, give up looking for an identity altogether.

One approach to assessing identity development was proposed by James Marcia (1980). In his approach, adolescents are asked questions regarding their exploration of and commitment to issues related to occupation, politics, religion, and sexual behavior. The responses to the questions allow the researchers to classify the adolescent into one of four identity statuses (see Figure 7.18).

Figure 7.18 James Marcia's Statuses of Identity Development

		Exploration: Yes	Exploration: No
Commitment	Yes	**Identity-achievement status** The individual has attained a coherent and committed identity based on personal decisions.	**Identity-foreclosure status** The individual has not engaged in any identity experimentation, but has established an identity based on the choices or values of others.
	No	**Identity-moratorium status** The individual is exploring various choices, but has not yet made a clear commitment to any of them.	**Identity-diffusion status** The individual does not have firm commitments regarding the issues in question, and is not making progress toward them.

Studies assessing how adolescents pass through Marcia's statuses show that, although most adolescents eventually succeed in developing a stable identity, the path to it is not always easy and there are many routes that can be taken. Some adolescents may not search for an identity (identity-diffusion status), while others may simply adopt the beliefs of their parents or the first role that is offered to them, perhaps at the expense of searching for other, more promising possibilities (identity-foreclosure status).

Other teens may spend years trying on different possible identities (identity-moratorium status) before finally choosing one. To help them work through the process of developing an identity, adolescents may try out different identities in different social situations. They may maintain one

identity at home and a different type of persona when they are with their peers. Eventually, most teenagers do integrate the different possibilities into a single self-concept and a comfortable sense of identity (identity-achievement status).

Social Development in Adulthood: Generativity

It is in adulthood when most of us make our most substantial contributions to society, by meeting two of Erik Erikson's life crises: *We learn to give and receive love in close, long-term relationships referred to as* **intimacy**. *We also develop an interest in guiding the development of the next generation, often by becoming parents or mentors. This is Erikson's concept of* **generativity.**

What Makes a Good Parent: One thing that you might think about if you decide to have children are the skills involved in parenting. Some parents are strict, others are lax; some parents spend a lot of time with their kids, while others do not; some parents are warm and affectionate, while others are more emotionally distant. Do these behaviors matter?

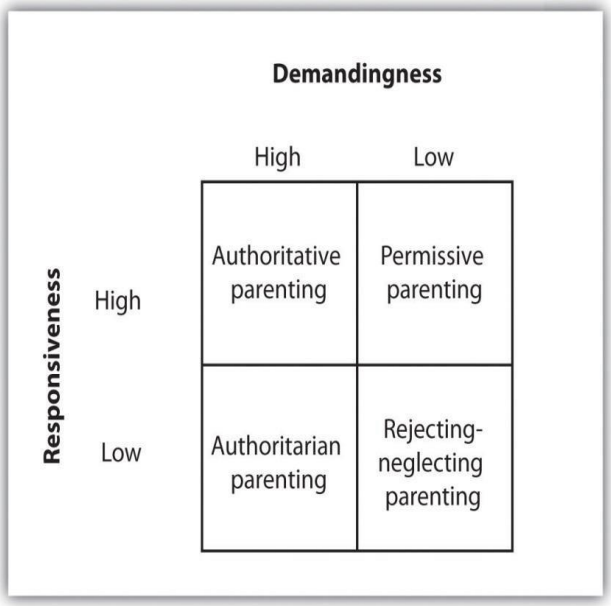
We have already considered two answers to this question, in the form of what all children require: (1) babies need a conscientious mother who does not smoke, drink, or use drugs during her pregnancy, and (2) infants need caretakers who are consistently available, loving, and supportive to help them form a secure base. One case in which these basic goals are less likely to be met is when the mother is an adolescent. Adolescent mothers are more likely to use drugs and alcohol during their pregnancies, to have poor parenting skills in general, and to provide insufficient support for the child (Ekéus, Christensson, & Hjern, 2004). As a result, the babies of adolescent mothers have higher rates of academic failure, delinquency, and incarceration in comparison to children of older mothers (Moore & Brooks-Gunn, 2002).

Normally, it is the mother who provides early attachment, but fathers are not irrelevant. Studies have found that children whose fathers are more involved tend to be more cognitively and socially competent, more empathic, and psychologically better adjusted, compared with children whose fathers are less involved (Rohner & Veneziano, 2001). Amato (1994) found that, in some cases, the role of the father can be as or even more important than that of the mother in the child's overall psychological health and well-being. Amato concluded, "Regardless of the quality of the mother-child relationship, the closer adult offspring were to their fathers, the happier, more satisfied, and less distressed they reported being" (p. 1039).

According to Baumrind (1996), as the child grows, parents take on one of four types of **parenting styles**, *which are parental behaviors that determine the nature of parent-child interactions.* These styles depend on whether the parent is more or less **demanding** *or having high expectations for behavior and control* and more or less **responsive** to the child, *as determined by the degree of warmth and attention provided* (see Figure 7.19). **Authoritarian parents** are *demanding but not responsive*. They impose rules and expect obedience, tending to give orders ("Eat your food!") and enforcing their commands with rewards and punishment, without providing any explanation of where the rules came from, except "Because I said so!" **Permissive parents,** on the other hand, tend to *make few demands, give little punishment, and generally allow their children to make their own rules, but they are warm and affectionate.*

Authoritative parents are *demanding* ("You must be home by curfew"), *but they are also responsive to the needs and opinions of the child* ("Let's discuss what an appropriate curfew might be"). They set rules and enforce them, but they also explain and discuss the reasons behind the rules. Finally, **rejecting-neglecting parents** are *undemanding and unresponsive* overall.

Figure 7.19 Parenting Styles



Parenting styles can be divided into four types, based on the combination of demandingness and responsiveness. The authoritative style, characterized by both responsiveness and also demandingness, is the most effective.

Many studies of children and their parents, using different methods, measures, and samples, have reached the same conclusion, namely that authoritative parenting, in comparison to the other three styles, is associated with a wide range of psychological and social advantages for children. Parents who use the authoritative style, with its combination of demands on the children, as well as responsiveness to the children's needs, have kids who have better psychological adjustment, school performance, and psychosocial maturity, compared with parents who use the other styles (Baumrind, 1996; Grolnick & Ryan, 1989). On the other hand, there are at least some cultural differences in the effectiveness of different parenting styles. Although the reasons for the differences are not completely understood, strict authoritarian parenting styles seem to work better in African American families than in European American families (Tamis-LeMonda, Briggs, McClowry, & Snow, 2008), and better in Chinese families than in American families (Chang, Lansford, Schwartz, & Farver, 2004).

Despite the fact that different parenting styles are differentially effective overall, every child is different and parents must be adaptable. Some children have particularly difficult temperaments, and these children require more parenting. Because these difficult children demand more parenting, the behaviors of the parents matter more for the children's development than they do for other, less demanding children who require less parenting overall (Pluess & Belsky, 2010). These findings remind us how the behavior of the child can influence the behavior of the people in his or her environment.

Although the focus is on the child, the parents must never forget about each other. Parenting is time consuming and emotionally taxing, and the parents must work together to create a relationship in which both mother and father contribute to the household tasks and support each other. It is also important for the parents to invest time in their own intimacy, as happy parents are more likely to stay together, and divorce can have a negative impact on children, particularly during and immediately after the divorce (Burt, Barnes, McGue, & Iacono, 2008; Ge, Natsuaki, & Conger, 2006).

Empty nest: The **empty nest**, *or post-parental period* (Dennerstein, Dudley & Guthrie, 2002), *refers to the time period when children are grown up and have left home.* For most parents this occurs during midlife. This time is recognized as a "normative event" as parents are aware that their children will become adults and eventually leave home (Mitchell & Lovegreen, 2009). The empty nest creates complex emotions, both positive and negative, for many parents. Some theorists suggest this is a time of role loss for parents, others suggest it is one of role strain relief (Bouchard, 2013).

A consistent finding throughout the research literature is that raising children has a negative impact on the quality of martial relationships (Ahlborg, Misvaer, & Möller, 2009; Bouchard, 2013). Several studies have reported that martial satisfaction often increases during the launching phase of the empty nest period, and that this satisfaction endures long after the last child has left home (Gorchoff, John, & Helson, 2008).

Social Development in Late Adulthood: Retirement

Because of increased life expectancy in the 21st century, those in late adulthood can expect to spend approximately a quarter of their lives in retirement. Leaving one's career is a major life change and can be a time when people experience anxiety, depression, and other negative changes in the self-concept and in self-identity. On the other hand, retirement may also serve as an opportunity for a positive transition from work and career roles to stronger family and community member roles, and the latter may have a variety of positive outcomes for the individual. Retirement may be a relief for people who have worked in boring or physically demanding jobs, particularly if they have other outlets for stimulation and expressing self-identity.

Figure 7.20

Source: http://commons.wikimedia.org/wiki/File:Seniors.jpg

Psychologist Mo Wang (2007) observed the well-being of 2,060 people between the ages of 51 and 61 over an 8-year period, and made the following recommendations to make the retirement phase a positive one:

1. Continue to work part time past retirement, in order to ease into retirement status slowly.
2. Plan for retirement: This is a good idea financially, but also making plans to incorporate other kinds of work or hobbies into postemployment life makes sense.
3. Retire with someone: If the retiree is still married, it is a good idea to retire at the same time as a spouse, so that people can continue to work part time and follow a retirement plan together.
4. If married, have a happy marriage: People with marital problems tend to find retirement more stressful because they do not have a positive home life to return to and can no longer seek refuge in long working hours. Couples that work on their marriages can make their retirements a lot easier.
5. Take care of physical and financial health: A sound financial plan and good physical health can ensure a healthy, peaceful retirement.

6. Retire early from a stressful job: People who stay in stressful jobs for fear that they will lose their pensions or will not be able to find work somewhere else feel trapped. Toxic environments can take a severe emotional toll on an employee. Leaving early from an unsatisfying job may make retirement a relief.
7. Retire "on time": Retiring too early or too late can cause people to feel "out of sync" or to feel they have not achieved their goals.

Whereas these seven tips are helpful for a smooth transition to retirement, Wang also notes that people tend to be adaptable, and that no matter how they do it, retirees will eventually adjust to their new lifestyles.

Many older adults remain active and happy. In some cultural groups, seniors may prefer to move in with adult children, helping out with the family, and being cared for as they age. This is not a universal or even a preferred practice in many Western cultures. Older adults may prefer to live in retirement communities where they can be among peers in a location that facilitates interaction and activity. Others want to "age in place", maintaining ties with family, friends, and service networks that they have developed over their lifetime. Some want to continue working at jobs they value or need, while others prefer to travel or retire to a life of gardening. Cultural and individual variations help determine how this stage of life will can be most rewarding.

Researchers are beginning to better understand the factors that allow some people to age better than others. For one, research has found that the people who are best able to adjust well to changing situations early in life are also able to better adjust later in life (Rubin, 2007; Sroufe, Collins, Egeland, & Carlson, 2009). Perceptions also matter. People who believe that the elderly are sick, vulnerable, and grumpy often act according to such beliefs when they become elderly (Nemmers, 2005). Levy, Slade, Kunkel, and Kasl (2002) found that the elderly who had more positive perceptions about aging also lived longer.

Death, Dying, and Bereavement

Living includes dealing with our own and our loved ones' mortality. In her book, *On Death and Dying* (1997), Elizabeth Kübler-Ross describes five phases of grief through which people pass in grappling with the knowledge that they or someone close to them is dying:

1. Denial: "This can't be happening to me."
2. Anger: "Why me? It's not fair!"
3. Bargaining: "I'd do anything for a few more years."
4. Depression: "I'm so sad, why bother with anything?"
5. Acceptance: "I know my time has come."

Despite Kübler-Ross's popularity, there are critics of her theory who argue the five-phase sequence is too constraining. Not everyone passes through the stages in this sequence. Other reactions, such as, guilt or anxiety, may be prominent in some people but absent in her theory. In addition, attitudes toward death and dying have been found to vary greatly across cultures and religions, and these variations make the process of dying different (Bonanno, 2009). As an example, Japanese Americans restrain their grief (Corr, Nabe, & Corr, 2009) so not to burden others with their pain. By contrast, followers of Judaism observe a 7-day, publicly announced mourning period.

In some cultures, older adults are more likely to be living and coping alone, or perhaps only with their spouse. In other cultures, such as the Hispanic culture, older adults are more likely to be living with their sons and daughters and other relatives. This social support may create a better quality of life for them (Diaz-Cabello, 2004). Social support is also important because losing a loved one is a major source of stress for anyone.

Stroebe, Hansson, Schut, and Stroebe (2008) found that although most people adjusted to the loss of a loved one without seeking professional treatment, many had an increased risk of mortality, particularly within the early weeks and months after the loss. These researchers also found that people going through the grieving process suffered more physical and psychological symptoms and illnesses and used more medical services.

The health of survivors during the end of life is influenced by factors such as circumstances surrounding the loved one's death, individual personalities, and ways of coping. People serving as caretakers to partners or other family members who are ill frequently experience a great deal of stress themselves, making the dying process even more stressful. Despite the trauma of the loss of a loved one, people do recover and are able to continue with effective lives. Grief intervention programs can go a long way in helping people cope during the bereavement period (Neimeyer, Holland, Currier, & Mehta, 2008).

Key Takeaways

- Erikson's theory of psychosocial development describes eight social-emotional crises that we face across the lifespan.
- Social development requires a secure base from which children feel free to explore.
- Attachment styles refer to the type of relationship that children develop with those who are important to them.
- Maternal deprivation can cause developmental problems, including a failure in attachment.
- Longitudinal and cross-sectional studies are each used to test hypotheses about development.
- A defining aspect of adolescence is the development of a consistent and committed self-identity. The process of developing an identity can take time, but most adolescents succeed in developing a stable identity.
- An important way in which adults fulfill the psychosocial task of generativity is by raising children. Parents differ in their degree of warmth and control, and these parenting styles have consequences for children's development.
- Empty nest research indicates that parents' relationships often improve when children leave home.
- Two significant social stages in late adulthood are retirement and dealing with grief and bereavement. Studies show that a well-planned retirement can result in a more pleasant retirement experience.
- A significant number of people going through the grieving process are at increased risk of mortality and physical and mental illness. Grief counseling and supportive families can help these people cope with their loss.

Exercises and Critical Thinking

1. Compare your behavior, values, and attitudes regarding marriage and work to the attitudes of your parents and grandparents. In what way are your values similar? In what ways are they different?
2. Think about your experiences in high school. What sort of cliques or crowds were there? How did people express their identities in these groups? How did you use your groups to define yourself and develop your own identity?
3. Watch the final section of this video and consider your view on the decisions that are made at the end of life. http://www.pbs.org/wgbh/pages/frontline/livingold/view/
4. How do the people in your culture view aging? What stereotypes are there about the elderly? Are there other ways that people in your society might learn to think about aging that would be more beneficial?

Videos

1. This free-online program, *Death, A Personal Understanding*, includes 10 thirty-minute videos on a variety of topics related to death and dying. http://www.learner.org/resources/series108.html

Chapter Summary

Development begins at conception when a sperm fertilizes an egg creating a new life. The resulting zygote grows into an embryo and then a fetus. Teratogens can cause abnormalities during the period of prenatal development. Mothers who drink alcohol during their pregnancy can give birth to infants with a fetal alcohol spectrum disorder.

Babies are born prepared with reflexes and cognitive skills that contribute to their survival and growth. These become deliberate, coordinated actions in the form of gross and fine motor skills.

Adolescence involves rapid physical changes, including puberty, as well as continued cognitive changes.

Emerging adults are at the peak of physical development, while muscle strength, reaction time, cardiac output, and sensory abilities begin to slowly decline in early and middle adulthood. Fertility, particularly for women, also decreases during adulthood, and women eventually experience menopause.

A portion of the elderly suffers from age-related brain diseases, such as a neurocognitive disorder or Alzheimer's disease.

Piaget's stage theory of cognitive development proposes that children learn through assimilation and accommodation, and that cognitive development follows specific sequential stages:

Sensorimotor, preoperational, concrete operational and formal operational.

Moral development develops through the lifespan. Kohlberg proposed 3 levels of moral reasoning: Preconventional, conventional, and postconventional.

Erikson's psychosocial theory describes 8 developmental crises (stages). His developmental challenges include trust v. mistrust (infant), autonomy v. shame, doubt (toddler), initiative v. guilt (early childhood), industry v. inferiority (middle childhood), identity v. role confusion (adolescent), intimacy v. isolation (early adulthood), generativity v. stagnation (middle adulthood), and ego integrity v. despair (late adulthood).

An important part of development is attachment between the infant and caregiver. The Harlows' research on contact comfort provided the basis for understanding attachment. Mary Ainsworth researched patterns of attachment. Caregiver deprivation may result in failure to thrive, developmental delays, and an attachment disorder.

In adolescence the major challenge is to establish a sense of identity. James Marcia expanded Erikson's work and identified four identity statuses based on exploration and commitment: Diffusion, foreclosure, moratorium, and achievement.

Erikson said that middle adulthood is centered on generativity, or an interest in guiding the next generation. Parenting is one way to express generativity. Parenting styles include authoritarian, authoritative, permissive, and rejecting-neglecting, and these styles influence the development of children and adolescents. Empty nest research indicates that parental relationships often improve once the children leave the home.

Reactions to retirement vary; it can be a source of anxiety for some, or as an opportunity to take on new roles for others. Most people eventually adapt to this life change.

Eventually we all have to deal with our own and our loved ones' mortality. Social support is important during the grieving process.

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Chapter 8 Personality

Learning Objective

1. Define personality.

One of the most fundamental tendencies of human beings is to size up other people. We say that Bill is fun, that Marian is adventurous, or that Frank is dishonest. When we make these statements, we mean that we believe that these people have stable individual characteristics or personalities. **Personality** is defined as *an individual's consistent patterns of feeling, thinking, and behaving* (John, Robins, & Pervin, 2008). Personality does not include physical or behavioral characteristics, skills or abilities, or changes in mood.

The tendency to perceive personality is a fundamental part of human nature, and a most adaptive one. If we can draw accurate generalizations about what other people are normally like, we can predict how they will behave in the future, and this can help us determine how they are likely to respond in different situations. Understanding personality can also help us better understand psychological disorders and the negative behavioral outcomes they may produce. In short, personality matters because it guides behavior.

Psychology's first attempts at explaining personality were based on the theories of Sigmund Freud and his followers. However, Freud's theories on personality development have not been well supported by empirical research (Crews, 1998; Fisher & Greenberg, 1996; Kihlstrom, 1997; McCrae, 2011; Newman, Duff, & Baumeister, 1997; Vazire, 2014). As you recall from chapter one, psychology is a science, and consequently, we will consider the contemporary theories of personality that have research support. We will also review the extent to which personality is caused by nature and nurture and how psychologists measure personality.

Personality as Traits

Learning Objectives

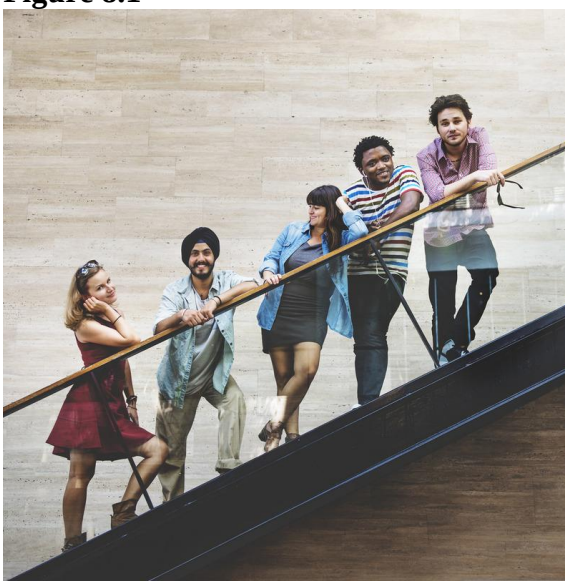
1. Define the term trait.
2. Describe the Big Five Model of personality traits and distinguish among openness, conscientiousness, extraversion, agreeableness, and neuroticism.
3. Explore how the Big Five traits change over the lifespan.
4. Describe how the Big Five traits predict behavior.

As we previously indicated, Freudian theories of personality are outdated and have little to do with contemporary personality psychology. Instead, one of the areas that personality psychologists currently investigate are traits (McCrae, 2011). **Traits** are *relatively enduring characteristics that influence our behavior across many situations*. Personality traits, such as introversion, friendliness, conscientiousness, honesty, and helpfulness are important because they help explain consistencies in behavior. The most popular way of measuring traits is by administering personality tests on which people self-report about their own characteristics.

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

The trait approach to personality was pioneered by early psychologists, including Gordon Allport (1897–1967), Raymond Cattell (1905–1998), and Hans Eysenck (1916–1997). Each of these psychologists believed in the idea of the trait as the stable unit of personality, and each attempted to provide a list or taxonomy of the most important trait dimensions. Their approach was to provide people with a self-report measure and then to use statistical analyses to look for the underlying "factors" or "clusters" of traits, according to the frequency and the co-occurrence of traits in the respondents. A misconception is that personality traits represent a type of person, such as, an extrovert versus an introvert. Rather, people can have many levels of a personality trait in that they can score very high, average, or very low on that trait. Overall, it is not whether or not you have that trait, it is the degree to which that trait distinguishes you from others (Vazire, 2014).

Figure 8.1



What traits do you think these individuals possess? Source

The Five Factor Model of Personality

The fundamental work on trait dimensions conducted by Allport, Cattell, Eysenck, and many others has led to contemporary trait models, the most important and well-validated of which is the **Five-Factor Model of Personality.** According to this model, *there are five fundamental underlying trait dimensions that are stable across time, cross-culturally shared, and explain a substantial proportion of behavior* (Costa & McCrae, 1992; Goldberg, 1982; McCrae, 2011). As you can see in Table 8.1, the five dimensions, known as the "Big Five", are openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. You can remember them using the watery acronyms OCEAN or CANOE.

A large body of research evidence has supported the five-factor model. The Big Five dimensions seem to be cross-cultural, because the same five factors have been identified in participants in China, Japan, Italy, Hungary, Turkey, and many other countries (Triandis & Suh, 2002). The Big Five factors are also increasingly being used in helping researchers understand the dimensions of psychological disorders, such as anxiety and depression (Oldham, 2010; Saulsman & Page, 2004).

The Big Five dimensions also accurately predict behavior. For instance, a pattern of high conscientiousness, low neuroticism, and high agreeableness predicts successful job performance (Tett, Jackson, & Rothstein, 1991). Scores on the Big Five dimensions also predict the performance of U.S. presidents; ratings of openness to experience are correlated positively with ratings of presidential success, whereas ratings of agreeableness are correlated negatively with success (Rubenzer, Faschingbauer, & Ones, 2000). Conscientiousness was found to be as important as intelligence in the prediction of both secondary and college academic achievement (Dumfart & Neubauer, 2016; Poropat, 2009).

Table 8.1 The Five-Factor Model of Personality

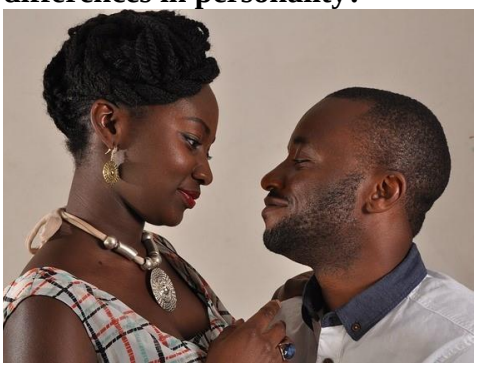
Dimension	Sample items	Description	Examples of behaviors predicted by the trait
Openness to experience	"I have a vivid imagination"; "I have a rich vocabulary"; "I have excellent ideas."	A general appreciation for art, emotion, adventure, unusual ideas, imagination, curiosity, and variety of experience	Individuals who are highly open to experience tend to have distinctive and unconventional decorations in their home. They are also likely to have books on a wide variety of topics, a diverse music collection, and works of art on display.
Conscientiousness	"I am always prepared"; "I am exacting in my work"; "I follow a schedule."	A tendency to show self-discipline, act dutifully, and aim for achievement	Individuals who are conscientious have a preference for planned rather than spontaneous behavior.
Extraversion	"I am the life of the party"; "I feel comfortable around people"; "I talk to a lot of different people at parties."	A tendency to experience positive emotions and to seek out stimulation and the company of others	Extroverts enjoy being with people. In groups they like to talk, assert themselves, and draw attention to themselves.
Agreeableness	"I am interested in people"; "I feel others' emotions"; "I make people feel at ease."	A tendency to be compassionate and cooperative rather than suspicious and antagonistic toward others	Agreeable individuals value getting along with others. They are generally considerate, friendly, generous, helpful, and willing to compromise their interests with those of others.
Neuroticism	"I am not usually relaxed"; "I get upset easily"; "I am easily disturbed."	A tendency to experience negative emotions, such as anger, anxiety, or depression; sometimes called "emotional instability"	Those who score high in neuroticism are more likely to interpret ordinary situations as threatening and minor frustrations as hopelessly difficult. They may have trouble thinking clearly, making decisions, and coping effectively with stress.

Additional predictions based on each of the Big Five factors are provided by Mehl, Gosling, and Pennebaker (2006), Ozer and Benet-Martinez (2006), and Roberts, Kuncel, Shiner, Caspi, and Goldberg (2007):

- **Openness** predicts more traveling, studying abroad, liberal political views, and choosing a career in the arts
- **Conscientiousness** predicts work place and academic success, less drug-use, and a less likelihood of divorcing
- **Extraversion** predicts being more talkative, happier, a higher social status, and greater volunteerism
- **Agreeableness** predicts less swearing, criminal behavior, and divorce, but higher volunteerism
- **Neuroticism** predicts depression, higher rates of divorce, and more conflict in relationships

Overall, personality is relatively stable, however, life experiences do affect personality. For example, when people enter their first serious relationship, they become more agreeable and less neurotic. Also, when we start our first job, we become more conscientious and agreeable (Vazire, 2014). Personality stability remains strong in middle adulthood (Lucas & Donnellan, 2011), however, there are slight changes in personality as one ages. According to the research, conscientiousness and agreeableness show small increases with age, while neuroticism, extraversion, and openness show slight declines with age (Lachman & Bertrand, 2001; Lucas & Donnellan, 2011; Allemand, Zimprich, & Martin, 2008).

Figure 8.2 Are there gender differences in personality?



Source

While pop psychology books with titles such as "*Men are from Mars and Women are from Venus*" (Gray, 1992) would suggest that men and women differ in personality, the reality is that *gender differences, when present, are small, and tend to get even smaller with age. This is a phenomenon called* **gender convergence**. When differences are found, women tend to score slightly higher than men on conscientiousness, agreeableness, and neuroticism, and some studies show women may be slightly higher on extraversion, but only on the aspects of extraversion that involve gregariousness, warmth, and positive emotions, while men score higher on the assertiveness and excitement seeking aspects of extraversion (Costa, Terracciano, & McCrae, 2001; Weisberg, DeYoung, & Hirsh, 2011).

An advantage of the five-factor approach is that it is parsimonious. Rather than studying hundreds of traits, researchers can focus on only five underlying dimensions. The Big Five may also capture other dimensions that have been of interest to psychologists. For instance, the trait dimension of need for achievement relates to the Big Five variable of conscientiousness, and self-esteem relates to low neuroticism. On the other hand, the Big Five factors do not seem to capture all the important dimensions of personality. For instance, the Big Five does not capture moral behavior (Ashton & Lee, 2008), although this variable is important in many theories of personality. There is also evidence that the Big Five factors are not the same across all cultures (Cheung & Leung, 1998).

Another critique is that people may behave differently in different situations. Personality will only predict behavior when the behaviors are aggregated or averaged across different situations. We might not be able to use the personality trait of friendliness to determine how friendly Malik will be on Friday night, but we can use it to predict how friendly he will be the next year in a variety of situations. When many measurements of behavior are combined, there is much clearer evidence for the stability of traits and for the effects of traits on behavior (Roberts & DelVecchio, 2000; Srivastava, John, Gosling, & Potter, 2003).

Studying the Nature of Personality

Learning Objectives

1. Outline the theory and methodology of behavioral genetics.
2. Describe evidence for the effects of genetics, the environment, and interactions of the two on personality.
3. Define epigenesis.
4. Explain whether our genetics is our destiny.

Box 8.1 Identical Twins Reunited after 35 Years

Paula Bernstein and Elyse Schein were identical twins who were adopted into separate families immediately after their births in 1968. It was only at the age of 35 that the twins were reunited and discovered how similar they were to each other.

Paula Bernstein grew up in a happy home in suburban New York. She loved her adopted parents and older brother and even wrote an article titled "Why I Don't Want to Find My Birth Mother." Elyse's childhood, also a happy one, was followed by college and then film school abroad.

In 2003, 35 years after she was adopted, Elyse, acting on a whim, inquired about her biological family at the adoption agency. The response came back: "You were born on October 9, 1968, at 12:51 p.m., the younger of twin girls. You've got a twin sister Paula and she's looking for you." Elyse dialed Paula's phone number: "It's almost like I'm hearing my own voice in a recorder back at me," she said. "It's funny because I feel like in a way I was talking to an old, close friend I never knew I had…we had an immediate intimacy, and yet, we didn't know each other at all," Paula said.

The two women met for the first time at a café for lunch and talked until the late evening. "We had 35 years to catch up on," said Paula. "How do you start asking somebody, 'What have you been up to since we shared a womb together?' Where do you start?"

With each new detail revealed, the twins learned about their remarkable similarities. They'd both gone to graduate school in film. They both loved to write, and they had both edited their high school yearbooks. They have similar taste in music.

"I think, you know, when we met it was undeniable that we were twins. Looking at this person, you are able to gaze into your own eyes and see yourself from the outside. This identical individual has the exact same DNA and is essentially your clone. We don't have to imagine," Paula said. Now they finally feel like sisters. "But it's perhaps even closer than sisters," Elyse said, "Because we're also twins."

The twins, who both now live in Brooklyn, combined their writing skills to write a book called *Identical Strangers* about their childhoods and their experience of discovering an identical twin in their mid-30s (Spilius, 2007; Kuntzman, 2007).

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

Figure 8.3 Instincts

Source

The genes of different members of the same species are almost identical. The DNA in your genes, for instance, is about 99.9% the same as the DNA of every other human being. These common genetic structures lead members of the same species to be born with a variety of behaviors that come naturally to them and that define the characteristics of the species. These abilities and characteristics are known as **instincts**, *or complex inborn patterns of behaviors that help ensure survival and reproduction* (Tinbergen, 1951). Different animals have different instincts. Birds naturally build nests, dogs are naturally loyal to their pack, and humans instinctively learn to walk, speak, and understand language. The strength of different traits and behaviors also varies within species. These differences are determined by the small amount (in humans, the 0.1%) of the differences in genes among the members of the species.

Personality is not determined by any single gene, but rather by the actions of many genes working together. There is no "IQ gene" that determines intelligence and there is no "good marriage partner gene" that makes a person a particularly good marriage bet. Furthermore, even working together, genes are not so powerful that they can control or create our personality. Some genes tend to increase a given characteristic and others work to decrease that same characteristic. The complex relationship among the various genes, as well as a variety of random factors, produces our personality. Furthermore, genetic factors always work with environmental factors to create personality.

Having a given pattern of genes does not necessarily mean that a particular trait will develop, because some traits might occur only in some environments. For example, a person may have a genetic variant that is known to increase his or her risk for developing alcoholism, but if that person

never drinks because they live in a country where alcohol is not available, then the person will not become alcoholic. In addition to the effects of inheritance (nature) and environment (nurture), interactions between these two also influence personality. A high stress environment affects a genetically anxious person differently than a low stress environment.

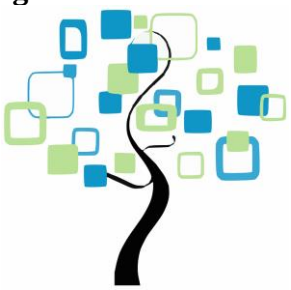
Perhaps the most direct way to study the role of genetics in personality is to selectively breed animals for the trait of interest. In this approach the scientist chooses the animals that most strongly express the personality characteristics of interest and breeds these animals with each other. If the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

Behavioral Genetics

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

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

Figure 8.4



Source

Although family studies can reveal whether a trait runs in a family, it cannot explain why. In a **twin study**, *the data from many pairs of twins are collected and the rates of similarity for identical and fraternal pairs are compared*. A correlation coefficient is calculated that assesses the extent to which the trait for one twin is associated with the trait in the other twin. Studies on twins rely on the fact that identical (or monozygotic) twins have essentially the same set of genes, while fraternal (or dizygotic) twins have, on average, a half-identical set. The idea is that if the twins are raised in the same household, then the twins will be influenced by their environments to an equal degree, and this influence will be pretty much equal for identical and fraternal twins. In other words, if environmental factors are the same, then the only factor that can make identical twins more similar than fraternal twins is their greater genetic similarity.

Box 8.2 Monozygotic and Dizygotic Twins

Many students are interested in twins. **Monozygotic** *or identical twins occur when a fertilized egg splits apart in the first two weeks of development.* The result is the creation of two separate, but genetically identical offspring. That is, they possess the same genotype and often the same phenotype. About one-third of twins are monozygotic twins. Sometimes, however, *two eggs or ova are released and fertilized by two separate sperm. The result is* **dizygotic** *or fraternal twins*. These two individuals share the same amount of genetic material as would any two children from the same mother and father. In other words, they possess a different genotype and phenotype. Older mothers are more likely to have dizygotic twins than are younger mothers, and couples who use fertility drugs are also more likely to give birth to dizygotic twins. Consequently, there has been an increase in the number of fraternal twins recently (Bortolus et al., 1999).

Source: Monozygotic Twins

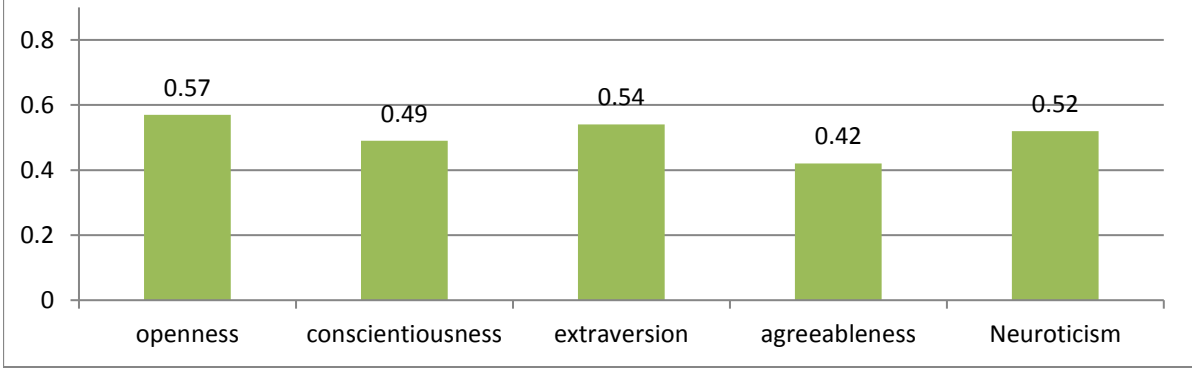
Source Dizygotic Twins

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

Although twin and adoption studies differ in their methodologies, both studies conclude that genetics is important in determining personality, as well as other cognitive (intelligence levels) and behavioral (psychopathologies) characterisitcs (Kim & Kim, 2011; Plominm, Defries, Knopik, & Neiderhiser, 2013). Results indicate that identical twins are much more similar than fraternal twins, and therefore these results strongly suggest genetic influences. Similarly, adoption studies demonstrate stronger family resemblances, even when family members are separated due to adoption. However, adoption studies do not demonstrate the level of heritability that the twin studies do (Kim & Kim, 2011).

When looking specifically at personality and the Five Factor Model, Bouchard and McGue (2002) found that personality is partly genetic with approximately half of the variation on the five personality traits due to genetic variation between people (see Figure 8.5).

Figure 8.5 Heritability of the Big Five Traits



Source: Bouchard & McGue (2002)

Molecular Genetics

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

Figure 8.6 Mice in Knockout Studies

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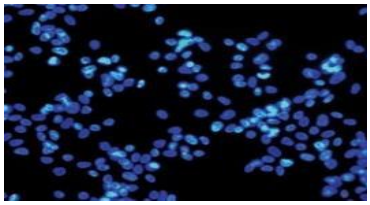
One approach that can be used in animals, usually in laboratory mice, is the **knockout study**. *In this approach the researchers use specialized techniques to remove or modify the influence of a gene in a line of mice* (Crusio, Goldowitz, Holmes, & Wolfer, 2009). The researchers harvest embryonic stem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

Changes in gene expression may also be due to known or unknown epigenetic influences, which is known as epigenesis (Plomin et al., 2013). **Epigenesis** *refers to environmental factors that turn genes on or off at a molecular level*. Substances in the environment, such as drugs or toxins, can cause epigenesis. Less obvious epigenetic influences, such as diet, may also be part of the interaction between genes and environment. Having a trait or disorder may require inheriting a gene, and then being exposed to the epigenetic influence which turns the gene "on" or "off."

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

Figure 8.7



Researchers use dyes, such as these in a sample of stem cells, to determine the action of genes from DNA samples.

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

Is Our Genetics Our Destiny?

Over the past two decades, scientists have made substantial progress in understanding the important role of genetics in behavior. Molecular genetics studies have begun to pinpoint the particular genes that are causing these differences. The results of these studies might lead you to believe that your destiny is determined by your genes, but this would be a mistaken assumption.

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

Furthermore, it is important to reiterate that although genetics is important, and although we are learning more every day about its role in many personality variables, genetics does not determine everything. In fact, the major influence on personality is the **nonshared environment**, *which include all the things that occur to us that make us unique individuals. These differences include*

variability in brain structure, nutrition, education, upbringing, and even interactions among the genes themselves (Plomin et al., 2013; Kim & Kim, 2011).

The genetic differences that exist at birth may be either amplified or diminished over time through environmental factors and interactions between the genes and environment. The brains and bodies of identical twins are not exactly the same, and they become even more different as they grow up. As a result, even genetically identical twins have distinct personalities, resulting in a large part from environmental effects. The effect of our genes on our behavior is entirely dependent upon the context of our life as it unfolds day to day. Based on your genes, no one can say what kind of human being you will turn out to be or what you will do in life.

Key Takeaways

- Genes are the basic biological units that transmit characteristics from one generation to the next.
- Personality is not determined by any single gene, but rather by the actions of many genes working together.
- Behavioral genetics refers to a variety of research techniques that scientists use to learn about the genetic and environmental influences on human behavior.
- Behavioral genetics is based on the results of family studies, twin studies, and adoptive studies.
- Molecular genetics is the study of which genes are associated with which personality traits.
- Epigeneis refers to environmental factors that turn genes on and off.
- The largely unknown environmental influences, known as the nonshared environment, may have the largest impact on personality. These differences are nonsystematic and largely random, and thus we do not inherit our personality in any fixed sense.

Exercises and Critical Thinking

1. Think about the twins you know. Do they seem to be very similar to each other, or does it seem that their differences outweigh their similarities?
2. Describe the implications of the effects of genetics on personality, overall. What does it mean to say that genetics "determines" or "does not determine" our personality?
3. Watch this video on epigenesis and evaluate the complexity of researching these influences. http://video.pbs.org/video/1525107473

Videos

Try finding your own DNA by using the procedure recommended by NOVA:
http://www.pbs.org/wgbh/nova/body/extract-your-dna.html

Studying the Nurture of Personality

Learning Objectives

1. Describe the views of humanism on personality.
2. Distinguish between self-concept and self-esteem.
3. Describe Abraham Maslow's hierarchy of needs and define self-actualization.
4. Explain Carl Roger's unconditional positive regard as it relates to personality development.
5. Describe Bandura's social cognitive theory and the concept of reciprocal determinism.
6. Explain self-efficacy.
7. Differentiate between internal and external locus of control.

Humanism and Self-Actualization

As you recall from chapter one, **humanism** embraces the notions of the self and free will. Arguing that people are free to choose their own lives and make their own decisions, humanistic psychologists focus on the underlying motivations that they believe drive personality, that is, focusing on the nature of the **self-concept**, *the set of beliefs about who we are*, and **self-esteem**, *our positive feelings about the self*.

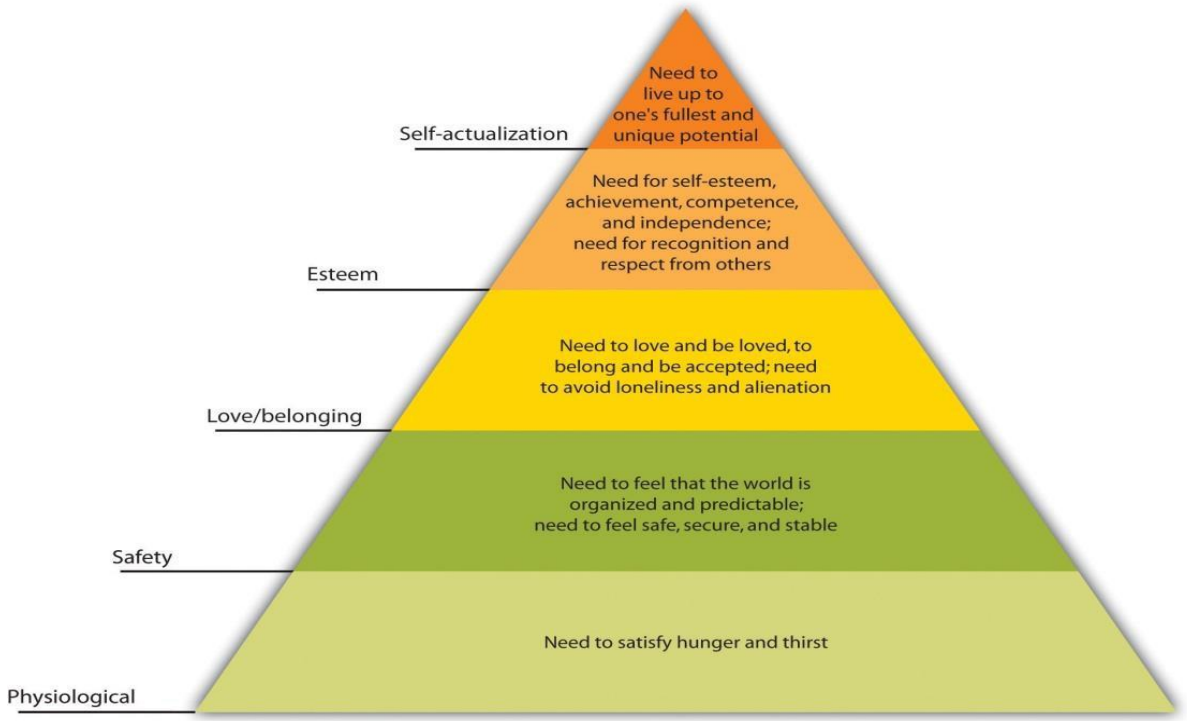
One of the most important humanists, Abraham Maslow (1908–1970), conceptualized personality in terms of a pyramid-shaped **Hierarchy of Needs** (Vazire, 2014) (see Figure 8.8). At the base of the pyramid are the lowest-level motivations, including hunger and thirst, safety, and belongingness. Maslow argued that only when people meet the lower-level needs are they able to move on to achieve the higher-level needs of self-esteem, and eventually **self-actualization**, which is *the motivation to develop our innate potential to the fullest possible extent*.

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

One criticism of Maslow's hierarchy of needs is that individuals are not static. They are motivated by different needs at different times. For instance, sometimes competing motives may exist at the same time. Additionally, growth in one area does not stop growth in another area (Haggerty, 1999). The stepwise progression of a pyramid also suggests a one directional journey which may not reflect the full complexity of human motivation. Needs for recognition, for example, may take precedence over needs for personal safety. Maslow also focused on a small number of historically productive individuals that he subjectively identified as self-actualized (Smith, 1978), and thus drew overly optimistic conclusions about the capacity of people to achieve their full potential.

Finally, cross-cultural criticism suggests that the theory is biased by the Western emphasis on individualism (Vazire, 2014). Other cultures may regard "self-actualization" as "self-indulgent". These cultures believe reaching one's full potential means supporting group needs and sacrificing one's own potential for the benefit of others.

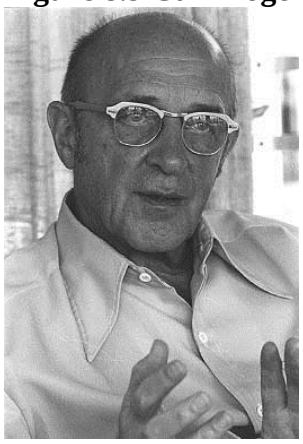
Figure 8.8 Maslow's Hierarchy of Needs



Abraham Maslow conceptualized personality in terms of a hierarchy of needs. The highest of these motivations is self-actualization.

Perhaps the best-known humanistic theorist is Carl Rogers (1902–1987). Rogers was positive about human nature, viewing people as primarily moral and helpful to others, and he believed that we can achieve our full potential for emotional fulfillment if the self-concept has experienced **unconditional positive regard**, *a set of behaviors including being treated in an empathic, genuine, and open manner by others.* In contrast, when people are subjected to **conditional positive regard** *in that others only showed them warmth or consideration when they behaved as expected*, they fail to reach their full potential.

Figure 8.9 Carl Rogers



Source

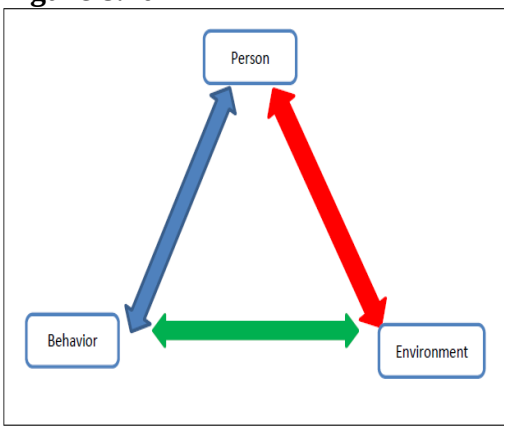
According to Rogers (Engler, 2014), experiencing unconditional positive regard allows us to view ourselves favorably and accept ourselves for who we are. When we treat ourselves or others with unconditional positive regard, we express understanding and support, even while we may acknowledge failings. The principle of unconditional positive regard has become a foundation of psychological therapy; therapists who use it in their practice are more effective than those who do not (Prochaska & Norcross, 2007; Yalom, 1995).

Overall, the ideas of humanism are so powerful and optimistic that they have continued to influence the development of psychological theories. Today **positive psychology**, *which is the study of positive human experiences, including compassion, self-actualization, happiness, leadership, and gratitude* (Vazire, 2014) argues for many of the ideas of humanism. Research has documented the extent to which thinking positively and openly has important beneficial consequences for our relationships, our life satisfaction, and our psychological and physical health (Seligman & Csikszentmihalyi, 2000).

Interactions with the Environment

Albert Bandura's (1986) **Social cognitive theory** *explains personality development as learning that occurs through interactions with other people.* The term interaction is important. It means that each person in the interaction influences each other. A child with ADHD does not act the same as a child who is shy. A parent does not speak in the same way to an active child and a quiet child. The shy child and the active child do not respond in the same way to what the parent says. If an easily frustrated parent is paired with an active child, conflict can escalate and both personalities can be affected. Each influence the other. When relationships are more complex, for example in a large family, each individual plays a role in shaping all the other family members.

Figure 8.10

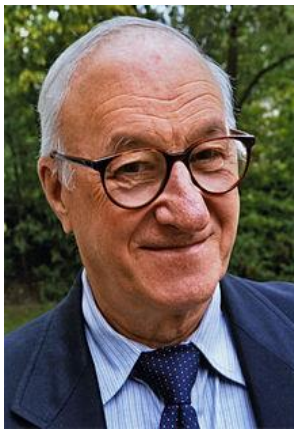


Bandura's concept of reciprocal determinism emphasizes the interaction between the person, the person's behavior, and the environment.

Environments, as well as the individuals themselves, influence their personality. Bandura (1977) selected the term **reciprocal determinism** to explain the *interactions between environmental factors (parents, culture, school, work place), personal factors (genetics, feelings, cognition, appearance) and the individual's behavior.* Bandura stated, "people are neither powerless objects controlled by environmental forces nor free agents who can become whatever they choose. Both people and their environments are reciprocal determinants of each other," (p. vii).

The prior example can then be expanded to include environmental factors. A parent under stress at work yells at the active child. The child throws a tantrum, causing the parent to be late to work. The tardy parent snaps at a customer and loses a sale. The parent returns home and blames the child. The child smashes the parent's cell phone, and the parent misses a call from the office. Both parent and child become more aggressive.

Figure 8.11
Albert Bandura



Source

Bandura (1986) also studied the concept of self-efficacy. **Self-efficacy** *refers to people's belief that they can be successful in achieving their goals.* Self-efficacy is not the same as self-esteem. Self-esteem refers to our judgments of self-worth, whereas, self-efficacy refers to our judgments of personal ability. Both are affected by our past experiences and successes. We usually do not try things that we do not believe we can do. Both self-efficacy and self-esteem are important features of the "person" factor.

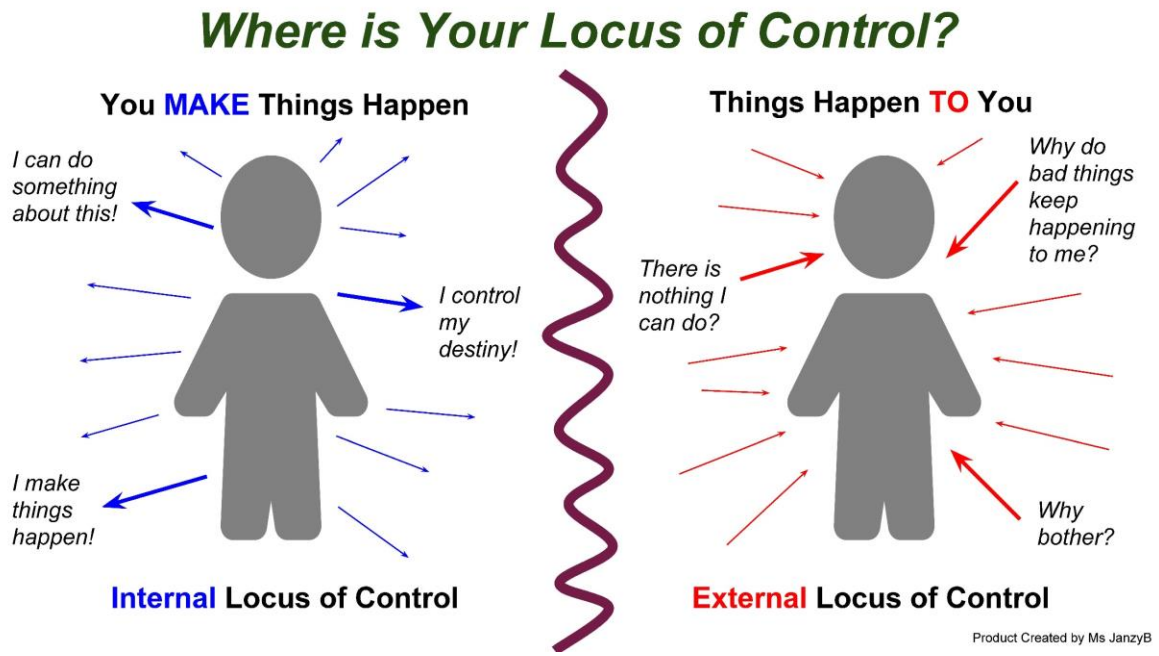
Taken together, these findings make a very important point about personality, which is that it not only comes from inside us, but is also shaped by the situations to which we have been exposed. Personality is partially derived from our interactions with and observations of others, from our interpretations of those interactions and observations, and from our choices of which social situations we prefer to enter or avoid (Bandura, 1986).

Locus of Control

The social-cognitive theorist, Julian Rotter examined our belief in personal control (Schultz & Schultz, 1994). **Locus of control** *refers to the belief that consequences are either the result of our own actions, or due to outside forces beyond our control*. Rotter noted that individuals who have an **internal locus of control** *assume that their behavior is responsible for the consequences they experience.* Whereas, individuals with an **external locus of control** *believe that they are at the whim of luck, chance, or the actions of other people.*

Several studies have shown that there are benefits to being more internal than external. Internals tend to achieve more and have better problem-solving abilities (Agarwal & Misra, 1986) are less likely to be persuaded by others or blindly follow authority (Lefcourt, 1976). In contrast, externals tend to be more vulnerable to stress and may develop strategies that invite failure (Drwal & Wiechnik, 1984; Lester, 1992).

Figure 8.12



The humanistic and social-cognitive theories contribute to our understanding of the complexities of human personality. Psychologists may choose explanations based on traits, early childhood experiences, feelings about the self, and even complex interactions between the person and the environment.

Key Takeaways

- Humanism emphasizes the concepts of self-esteem, self-actualization, and free will.
- Self-actualization is the highest level of motivation in Maslow's hierarchy of needs.
- Rogers focused on the need for unconditional positive regard to fulfill our potential.
- The social cognitive theory explains personality development as learning that occurs through complex interactions among the person, his or her actions, and the environment, referred to as reciprocal determinism.
- Two important features of the person are self-efficacy and locus of control.

Exercises and Critical Thinking

1. Based on your understanding of humanistic theories, how would you try to change your behavior to better meet the underlying motivations of physiology, security, acceptance, self-esteem, and self-actualization?
2. Consider your own self-efficacy and locus of control. How do these influence your personality?

Personality Assessment

Learning Objectives

1. Diffferentiate between objective and projective measures of personality assessment.
2. Identify two types of objective measures of personality assessment.
3. What problems are associated with the Myers-Briggs as a personality test?
4. Describe the Rorschach and TAT as measures of personality assessment and identify their drawbacks.
5. Distinguish between individualistic and collectivistic cultures.
6. Describe how mental health disorders are related to personality.
7. Describe the use of the MMPI.

Researchers have adopted a wide range of approaches to measure important personality characteristics. The most widely used strategies will be summarized in the following sections, and both their strengths and limitations will be described.

Objective Tests

Objective personality tests *use questions with a limited number of answers*, for example true-false items. An **Inventory** *is a questionnaire that may be used in objective psychological testing to determine personality traits*. Research has shown that specific patterns of answers are associated with certain traits. This enables a psychologist to determine a person's traits or diagnosis based on their answers.

Self-report Measures: Objective personality tests can be further subdivided into two basic types. The first type, the **self-report measure**, *is the most widely used in modern personality research and asks people to describe themselves.* This approach offers two key advantages. First, self-raters have access to an unparalleled wealth of information: After all, who knows more about you than you yourself? Self-raters have direct access to their own thoughts, feelings, and motives, which may not be readily available to others (Oh, Wang, & Mount, 2011; Watson, Hubbard, & Weise, 2000). Second, asking people to describe themselves is the simplest, easiest, and most cost-effective approach to assessing personality. Countless studies, for instance, have involved administering self-report measures to college students, who are provided some relatively simple incentive (e.g., extra course credit) to participate.

The items included in self-report measures may consist of single words (e.g., assertive), short phrases (e.g., am full of energy), or complete sentences (e.g., I like to spend time with others). Figure 8.13 illustrates examples from a self-report measure assessing the general traits from the five-factor model of personality: Extraversion, openness, agreeableness, neuroticism, and conscientiousness (John & Srivastava, 1999; McCrae, Costa, & Martin, 2005).

Figure 8.13 Sample self-report measure assessing the general traits comprising the influential five-factor model (FFM) of personality:

Please read each statement carefully and then mark the appropriate response below. Use the following scale to record your responses:

1	2	3	4	5
strongly disagree	slightly disagree	neutral or cannot decide	slightly agree	strongly agree

_____ 1. I get upset easily.
_____ 2. I enjoy being part of a group.
_____ 3. I like to solve complex problems.
_____ 4. I believe that others have good intentions.
_____ 5. I am always prepared.
_____ 6. I have a low opinion of myself.
_____ 7. I have a natural talent for influencing people.
_____ 8. I enjoy the beauty of nature.
_____ 9. I try to anticipate the needs of others.
_____ 10. I can be trusted to keep my promises.
_____ 11. I get irritated easily.
_____ 12. I have a lot of fun.
_____ 13. I like to visit new places.
_____ 14. I love to help others.
_____ 15. I set high standards for myself and others.

Sum up the following items to see how you score on five general personality traits. The numbers below indicate which questions correspond to each trait. A high score indicates a stronger level of that trait:

1	6	11	Neuroticism
2	7	12	Extraversion
3	8	13	Openness/Intellect
4	9	14	Agreeableness
5	10	15	Conscientiousness

Source: NOBA Personality Traits http://nobaproject.com/modules/personality-traits

Self-report personality tests show impressive validity in relation to a wide range of important outcomes. For example, self-ratings of conscientiousness are significant predictors of both overall academic performance (e.g., cumulative grade point average; Poropat, 2009) and job performance (Oh et al., 2011). Roberts, Kuncel, Shiner, Caspi, and Goldberg (2007) reported that self-rated personality predicted occupational attainment, divorce, and mortality. Similarly, Friedman, Kern, and Reynolds (2010) showed that personality ratings collected early in life were related to

happiness/well-being, physical health, and mortality risk assessed several decades later. Finally, self-reported personality has important and pervasive links to psychopathology. Most notably, self-ratings of neuroticism are associated with a wide array of clinical syndromes, including anxiety disorders, depressive disorders, substance use disorders, somatoform disorders, eating disorders, personality, conduct disorders, and schizophrenia/schizotypy (Kotov, Gamez, Schmidt, & Watson, 2010; Mineka, Watson, & Clark, 1998).

At the same time, however, this method is limited in a number of ways. First, raters may be motivated to present themselves in an overly favorable, socially desirable way (Paunonen & LeBel, 2012). This is a particular concern in "high-stakes testing", that is, situations in which test scores are used to make important decisions about individuals (e.g., when applying for a job). Second, personality ratings reflect a self-enhancement bias (Vazire & Carlson, 2011); in other words, people are motivated to ignore (or at least downplay) some of their less desirable characteristics and to focus instead on their more positive attributes. Third, self-ratings are subject to the reference group effect (Heine, Buchtel, & Norenzayan, 2008); that is, we base our self-perceptions, in part, on how we compare to others in our sociocultural reference group. For instance, if you tend to work harder than most of your friends, you will see yourself as someone who is relatively conscientious, even if you are not particularly conscientious in any absolute sense.

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

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

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

> *You frequently stand up for your own opinions even if it means that others may judge you negatively. You have a tendency to find the positives in your own behavior. You work to the fullest extent of your capabilities. You have few personality weaknesses, but some may show up under stress. You sometimes confide in others that you are concerned or worried, but inside you maintain discipline and self-control. You generally believe that you have made the right decision and done the right thing.*

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

Informant-rating Measures: *Another approach to personality assessment is to ask someone who knows a person well to describe his or her personality characteristics,* which is known as an **informant-rating measure**. In the case of children or adolescents, the informant is most likely to be a parent or teacher. In studies of older participants, informants may be friends, roommates, dating partners, spouses, children, or bosses (Oh et al., 2011; Vazire & Carlson, 2011; Watson et al., 2000). Generally speaking, informant ratings are similar in format to self-ratings. As was the case with self-report, items may consist of single words, short phrases, or complete sentences. Indeed, many popular instruments include parallel self- and informant-rating versions, and it often is relatively easy to convert a self-report measure so that it can be used to obtain informant ratings.

Informant ratings are particularly valuable when self-ratings are impossible to collect, such as when studying young children or cognitively impaired adults, or when their validity is suspect, such as when people may not be entirely honest in high-stakes testing situations. They also may be combined with self-ratings of the same characteristics to produce more reliable and valid measures of these attributes (McCrae, 1994).

Informant ratings offer several advantages in comparison to other approaches to assessing personality. A well-acquainted informant presumably has had the opportunity to observe large samples of behavior in the person he or she is rating. Moreover, these judgments presumably are not subject to the types of defensiveness that potentially can distort self-ratings (Vazire & Carlson, 2011). Indeed, informants typically have strong incentives for being accurate in their judgments.

Nevertheless, informant ratings also are subject to certain problems and limitations. One general issue is the level of relevant information that is available to the rater (Funder, 2012). For instance, even under the best of circumstances, informants lack full access to the thoughts, feelings, and motives of the person they are rating. This problem is magnified when the informant does not know the person particularly well and/or only sees him or her in a limited range of situations (Funder, 2012; Beer & Watson, 2010).

Informant ratings also are subject to some of the same response biases noted earlier for self-ratings. For instance, they are not immune to the reference group effect. Indeed, it is well-established that parent ratings often are subject to a sibling contrast effect, such that parents exaggerate the true magnitude of differences between their children (Pinto, Rijsdijk, Frazier-Wood, Asherson, & Kuntsi, 2012). Furthermore, in many studies, individuals are allowed to nominate (or even recruit) the informants who will rate them. Because of this, it most often is the case that informants (who, as noted earlier, may be friends, relatives, or romantic partners) like the people they are rating. This, in turn, means that informants may produce overly favorable personality ratings. Indeed, their

ratings can be more favorable than the corresponding self-ratings (Watson & Humrichouse, 2006). *This tendency for informants to produce unrealistically positive ratings has been termed the* **letter of recommendation effect** (Leising, Erbs, & Fritz, 2010) and the **honeymoon effect** *when applied to newlyweds* (Watson & Humrichouse, 2006).

As with intelligence tests, the utility of self-report measures of personality depends on their reliability and validity. Some popular measures of personality are not useful because they are unreliable or invalid. Perhaps you have heard of a personality test known as the Myers-Briggs Type Indicator (MBTI). If so, you are not alone, because the MBTI is the most widely administered personality test in the world, given millions of times a year to employees in thousands of companies. The MBTI categorizes people into one of four categories on each of four dimensions: introversion versus extraversion, sensing versus intuiting, thinking versus feeling, and judging versus perceiving.

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

Projective Techniques

Figure 8.14 Rorschach Inkblot Test

Whereas self-report measures ask people to consciously report on their inner experiences, **projective measures** are *measures of personality in which unstructured stimuli, such as inkblots, drawings of social situations, or incomplete sentences, are shown to participants, who are asked to freely list what comes to mind as they think about the stimuli*. Experts then score the responses for clues to personality. The proposed advantage of these tests is that they are more indirect as they allow the respondent to freely express whatever comes to mind.

One commonly used projective test is the Rorschach Inkblot Test, developed by the Swiss psychiatrist Hermann Rorschach (1884–1922). The **Rorschach Inkblot Test** is *a projective measure of personality in which the respondent indicates his or her thoughts about a series of 10 symmetrical inkblots* (Figure 8.14). The Rorschach is administered millions of time every year. The participants are asked to respond to the inkblots, and their responses are systematically scored in terms of what, where, and why they saw what they saw. For example, people who focus on the details of the inkblots may have obsessive-compulsive tendencies, whereas those who talk about sex or aggression may have sexual or aggressive problems.

Figure 8.15 Sample Card from the TAT

This is one of the cards from the TAT. Note that the sex of the figure in the foreground is ambiguous as is the emotional expression of the woman in the background

Another frequently administered projective test is the Thematic Apperception Test (TAT), developed by the psychologist Henry Murray (1893–1988). The **Thematic Apperception Test (TAT)** is *a projective measure of personality in which the respondent is asked to create stories about sketches of ambiguous situations, most of them people, either alone or with others* (Figure 8.15). The sketches are shown to individuals, who are asked to tell a story about what is happening in the picture. The TAT assumes that people may be unwilling or unable to admit their true feelings when asked directly, but these feelings will show up in the stories about the pictures. Trained coders use the stories to develop a personality profile of the respondent.

The idea is that when people view ambiguous stimuli, they will describe them according to the aspects of personality that are most important to them, and therefore bypass some of the limitations of more conscious responding. Despite their widespread use, however, the empirical evidence supporting the use of projective tests is mixed (Karon, 2000; Wood, Nezworski, Lilienfeld, & Garb, 2003). The reliability of the measures is low because people often produce very different responses on different occasions. The construct validity of the measures is also suspect because there are very few consistent associations between Rorschach scores or TAT scores and most personality traits. The projective tests often fail to distinguish between people with psychological disorders and those without or to correlate with other measures of personality or with behavior.

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

Box 8.3 Psychology in Everyday Life: Leaders and Leadership

One trait that has been studied in thousands of studies is **leadership**, *the ability to direct or inspire others to achieve goals*. *Trait theories of leadership* are theories based on the idea that some people are simply "natural leaders" because they possess personality characteristics that make them effective (Zaccaro, 2007). Consider Bill Gates, the founder of the Microsoft Corporation, shown in Figure 8.16. What characteristics do you think he possessed that allowed him to create such a strong company, even though many similar companies failed?

Figure 8.16 Varieties of Leaders

Which personality traits do you think characterize these leaders?

Former President Barack Obama photo courtesy Source
Microsoft Chairman Bill Gates photo courtesy Source
Illinois Senator Tammy Duckworth photo courtesy Source

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

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

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

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

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

Personality and Culture

Culture greatly affects how individuals perceive themselves, and one important distinction is where a culture falls on the continuum between individualism and collectivism (Vazire, 2014). **Individualistic cultures**, *such as the mainstream culture in the United States, focus on the self more than relationships. Independence and personal rights are valued over obligations to others.* In contrast, **collectivistic cultures**, *such as those in eastern Asia, value obligation to one's group over personal rights and desires.* Cultural traditions and hierarchies are stronger in collectivistic cultures. Additionally, personality differences typically assessed, such as the Big Five, appear less noticeable in collectivistic cultures. However, within any culture there will be some members who exhibit more individualism than collectivism and vice versa. Consequently, individualism-collectivism may be a personality trait itself.

Personality and Mental Health

Although they may appear unrelated, personality traits and mental health disorders are often on a continuum (Twenge & Campbell, 2017). The line between what is considered normal and abnormal is due to the quantity of a trait. When in very high amounts, traits (such as narcissism) can result in a mental health diagnosis.

An important objective measure used to diagnose mental health disorders, is the **Minnesota Multiphasic Personality Inventory (MMPI),** *a test used around the world to identify personality and psychological disorders* (Tellegen et al., 2003). The MMPI (see Table 8.2) was developed by creating a list of more than 1,000 true-false questions and choosing those that best differentiated patients with different psychological disorders from other people. The current version (the MMPI-2) has more than 500 questions, and the items can be combined into a large number of different subscales. The MMPI also has questions that are designed to detect the tendency of the respondents to answer in ways that make them appear in a more positive light (social desirability), lie, fake, or simply not answer the questions.

Table 8.2 Some of the Major Subscales of the MMPI

Abbreviation	Description	What is measured	No. of items
Hs	Hypochondriasis	Concern with bodily symptoms	32
D	Depression	Depressive symptoms	57
Hy	Hysteria	Awareness of problems and vulnerabilities	60
Pd	Psychopathic deviate	Conflict, struggle, anger, respect for society's rules	50
MF	Masculinity/femininity	Stereotypical masculine or feminine interests/behaviors	56
Pa	Paranoia	Level of trust, suspiciousness, sensitivity	40
Pt	Psychasthenia	Worry, anxiety, tension, doubts, obsessiveness	48
Sc	Schizophrenia	Odd thinking and social alienation	78
Ma	Hypomania	Level of excitability	46
Si	Social introversion	People orientation	69

To interpret the results, the clinician looks at the pattern of responses across the different subscales and makes a diagnosis about the potential psychological problems facing the patient. Although clinicians prefer to interpret the patterns themselves, a variety of research has demonstrated that computers can often interpret the results as well as clinicians (Garb, 1998; Karon, 2000). Extensive research has found that the MMPI-2 can accurately predict which of the many different psychological disorders a person suffers from (Graham, 2006). This measure contrasts with the projective measures, Rorschach and TAT, previously discussed. With those projective measures, there is questionable reliability and validity.

Key Takeaways

- Personality can be assessed using objective measures, including self-report and informant-rating measures.
- There is often only a low correlation between the specific traits that a person expresses in one situation and those that is expressed in other situations. Personality predicts behavior better when the behaviors are aggregated or averaged across different situations.
- Projective measures of personality show participants unstructured stimuli, such as inkblots, drawings of social situations, or incomplete sentences, and ask them to freely list what comes to mind as they think about the stimuli. Despite their widespread use, however, the empirical evidence supporting the use of projective tests is mixed.
- Both cultural and mental health issues have been researched with personality.
- The Minnesota Multiphasic Personality Inventory (MMPI) is a measure of personality and psychological disorders.

Exercises and Critical Thinking

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

Activities

You can complete a self-report measure of personality using a short form of the Five-Factor Personality Test here. There are 50 questions and it should take you about 3-8 minutes to complete. You will receive feedback about your personality after you have finished the test.

http://personality-testing.info/tests/IPIP-BFFM/

Chapter Summary

Personality is defined as an individual's consistent patterns of feeling, thinking, and behaving.

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

The trait approach to personality was pioneered by early psychologists, including Allport, Cattell, and Eysenck, and their research helped produce the Five-Factor (Big Five) Model of Personality.

The Big Five dimensions are openness, conscientiousness, extraversion, agreeableness, and neuroticism.

The Big Five are cross-culturally valid and accurately predict some behavior, including work place and academic success, relationships, and psychological disorders.

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

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

The role of nature and nurture in personality is studied by means of behavioral genetics, including family studies, twin studies, and adoption studies. These studies partition personality variability into the interactions among genetics (known as heritability), shared environment, and nonshared environment. Although these studies find that many personality traits are highly heritable, genetics does not determine everything. The major influence on personality is nonshared environmental influences.

In addition to the use of behavioral genetics, our understanding of the role of biology in personality recently has been increased through the use of molecular genetics, the study of which genes are associated with which personality traits in animals and humans. Epigenetic influences are also important in that genes can be expressed through environmental factors.

Humanistic theories of personality focus on the underlying motivations that they believed drive personality. Humanists focus on the nature of the self-concept and the development of self-esteem. Abraham Maslow focused on self-actualization as the most advanced motive in his hierarchy of needs, while Carl Rogers focused on how unconditional positive regard helps us reach our full potential.

Albert Bandura uses the term reciprocal determinism to explain the complex interactions between individuals, their behavior, and the environment. Bandura also studied self-efficacy, or the belief that you can be successful.

Objective measures of personality include self-report and informant-rating measures. The utility of these measures depends on their reliability and validity. Additionally, concerns regarding the barnum effect, honeymoon effect, and letter of recommendation effect, are noted.

While measures of the Big Five have shown reliability and validity, the Myers-Briggs does not, and therefore, is not a useful measure of personality.

Another approach to measuring personality is the use of projective measures, such as the Rorschach Inkblot Test and the Thematic Apperception Test (TAT). However, both lack reliability and validity.

Personality is reflected through culture, especially the distinction between individualism and collectivism.

Personality and mental health disorders are on a continuum, and an important test used to assess psychological disorders is the Minnesota Multiphasic Personality Inventory (MMPI).

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Chapter 9 Social Psychology

Learning Objective

1. Define social psychology.

This chapter focuses on **social psychology**, which is defined as *the scientific study of how we feel, think, and behave toward the other people around us, and how those people influence our feelings, thoughts, and behavior.* The subject matter of social psychology is our everyday interactions with people, including the social groups to which we belong. Questions these psychologists ask include why we are often helpful to other people, but at other times are unfriendly or aggressive; why we sometimes conform to the behaviors of others, but at other times are able to assert our independence; and what factors help groups work together in effective and productive, rather than in ineffective and unproductive, ways. A fundamental principle of social psychology is that, although we may not always be aware of it, our cognitions, emotions, and behaviors are substantially influenced by the social situation.

In this chapter we will introduce the principles of social cognition, and consider the ways that our judgments about other people guide our behaviors toward them. We will explore how we form impressions of other people, including stereotypes, prejudice and discrimination. We will also discuss attribution theory and attitudes. Next, we will discuss social influence, including social norms and roles, persuasion, conformity, obedience, and group behavior. Lastly, we will consider social relationships, including attraction, altruism, and aggression.

Social Cognition

Learning Objectives

1. Define social cognition.
2. Describe the importance of appearance in our perceptions of others.
3. Describe the fundamentals of how we form judgments about other people, including stereotypes, prejudice, and discrimination.
4. Define attribution and distinguish between internal and external attributions.
5. Describe the two common attributional biases of self-serving and fundamental attribution.
6. Define the concept of attitude and describe when attitudes predict behavior and when behavior influences attitudes.
7. Desribe the study on cognitive dissonance.

Hopefully you remember from our discussion in chapter five, that psychologists refer to cognition as the mental activity of processing information and using that information in judgments. **Social cognition** *is cognition that relates to social activities and that helps us understand and predict the behavior of ourselves and others* (Jhangiani & Tarry, 2014). Making these judgments quickly and accurately helps us guide our behavior to interact appropriately with both the people we know, and

do not know. If we can figure out why our roommate is angry at us, we can react to resolve the problem; if we can determine how to motivate the people in our group to work harder on a project, then the project might be better.

The Importance of Appearance

Our initial judgments of others are based, in large part, on what we see. The physical features of other people, particularly their sex, race, age, and physical attractiveness, are very salient, and we often focus our attention on these dimensions (Schneider, 2004; Zebrowitz & Montepare, 2006).

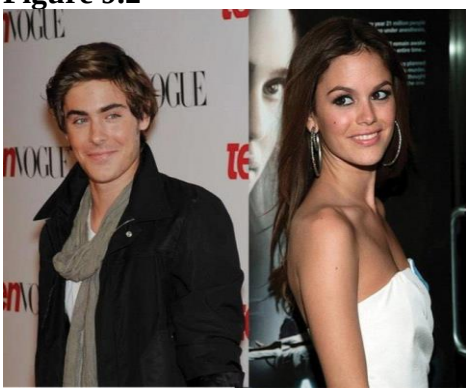
Figure 9.1

Can you read a book by its cover? Which of these people do you think is more fun and friendly? Who is smarter or more competent? Do you think your judgments are accurate? © Thinkstock

Although it may seem inappropriate or shallow to admit it, we are strongly influenced by the physical attractiveness of others, and in many cases physical attractiveness is the most important determinant of our initial liking for other people (Walster, Aronson, Abrahams, & Rottmann, 1966). Infants who are only a year old prefer to look at faces that adults consider to be attractive than at unattractive faces (Langlois, Ritter, Roggman, & Vaughn, 1991; Hoss & Langlois, 2003). Evolutionary psychologists have argued that our belief that "what is beautiful is also good" may be because we use attractiveness as a cue for health; people whom we find more attractive may also, evolutionarily, have been healthier (Zebrowitz, Fellous, Mignault, & Andreoletti, 2003).

One indicator of health is youth. Zebrowitz and colleagues (Zebrowitz, 1996; Zebrowitz, Luevano, Bronstad, & Aharon, 2009) have extensively studied the tendency for both men and women to prefer people whose faces have characteristics similar to those of babies. These features include large, round, and widely spaced eyes, a small nose and chin, prominent cheekbones, and a large forehead. People who have baby faces (both men and women) are seen as more attractive than people who are not baby-faced.

Figure 9.2



People with baby faces are perceived as attractive.
Source and Source

Another indicator of health is symmetry. People are more attracted to faces that are more symmetrical than they are to those less symmetrical, and this may be due in part to the perception that symmetrical faces are perceived as healthier (Rhodes et al., 2001). Although you might think that we would prefer faces that are unusual or unique, in fact the opposite is true. Langlois and Roggman (1990) showed college students the faces of men and women. The faces were composites made up of the average of 2, 4, 8, 16, or 32 faces. The researchers found that the more faces that were averaged into the stimulus, the more attractive it was judged. Again, our liking for average faces may be because they appear healthier.

Although preferences for youthful, symmetrical, and average faces have been observed cross-culturally, and thus appear to be common human preferences, different cultures may also have unique beliefs about what is attractive. In modern Western cultures, "thin is in," and people prefer those who have little excess fat (Crandall, Merman, & Hebl, 2009). The need to be thin to be attractive is particularly strong for women in contemporary society, and the desire to maintain a low body weight can lead to low self-esteem, eating disorders, and other unhealthy behaviors. However, the norm of thinness has not always been in place; the preference for women with slender, masculine, and athletic looks has become stronger over the past 50 years. In contrast to the relatively universal preferences for youth, symmetry, and averageness, other cultures do not show such a strong propensity for thinness (Sugiyama, 2005).

Stereotyping, Prejudice, and Discrimination

Social psychologists refer to us as **cognitive misers**, *meaning we often do not think carefully before making decisions.* We are stingy with our cognitive energy. Humans quickly evaluate others on characteristics of attractiveness, aggression, trustworthiness, competence, and likeability even after viewing a photo of a person for a mere tenth of second. Willis and Todorov (2006) found that those shown a photo briefly and those who were given more time to evaluate the photograph had very similar impressions. So not only do we arrive at our conclusions quickly, but it is also likely that once we do, we may be unlikely to change our impressions.

We frequently use people's appearances to form our judgments about them and to determine our responses to them. The *tendency to attribute personality characteristics to people on the basis of their external appearance or their social group memberships* is known as **stereotyping**. Our stereotypes about physically attractive people lead us to see them as more dominant, warm, mentally healthy, intelligent, and socially skilled than we perceive physically unattractive people (Langlois et al., 2000). Moreover, our stereotypes lead us to treat people differently, the physically attractive are given better grades on essay exams, are more successful on job interviews, and receive lighter sentences in court judgments than their less attractive counterparts (Hosoda, Stone-Romero, & Coats, 2003; Zebrowitz & McDonald, 1991).

In addition to stereotypes about physical attractiveness, we also regularly stereotype people on the basis of their sex, race, age, religion, and many other characteristics, and these stereotypes are frequently negative (Schneider, 2004). Stereotyping is unfair to the people we judge because stereotypes are based on our preconceptions and emotions about the members of the group. Stereotyping is closely related to **prejudice**, *negative feelings we have about people because of their appearance or group memberships*, and **discrimination**, *behaviors toward others based on prejudice.* Generally, these behaviors are negative. Stereotyping, prejudice, and discrimination work together. We may not vote for candidates for public office because of our negative stereotypes about their ethnicity, and we may avoid people from other religions or those with mental illness because of our prejudices.

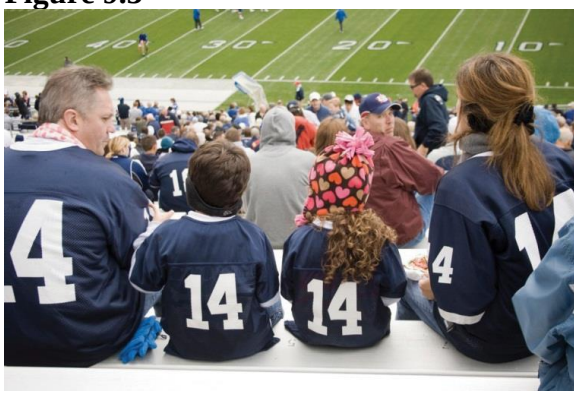
Some stereotypes may be accurate in part. Research has found, for instance, that attractive people are actually more sociable, more popular, and less lonely than less attractive individuals (Langlois et al., 2000). Consistent with the stereotype that women are "emotional," women are, on average, more empathic and attuned to the emotions of others than are men (Hall & Schmid Mast, 2008). Group differences in personality traits may occur, in part, because people act toward others on the

basis of their stereotypes, creating a self-fulfilling prophecy. A **self-fulfilling prophecy** occurs *when our expectations about the personality characteristics of others lead us to behave toward them in ways that make those beliefs come true*. If we have a stereotype that attractive people are friendly, then we may act in a friendly way toward those who are attractive. This friendly behavior may be reciprocated by the attractive person, and if many people also engage in the same positive behaviors, he or she may actually become friendlier.

Even if attractive people are, on average friendlier than unattractive people, not all attractive people are friendlier than all unattractive people. Also, even if women are, on average, more emotional than men, not all men are less emotional than all women. Social psychologists believe that it is better to treat people as individuals rather than rely on our stereotypes and prejudices, because stereotyping and prejudice are always unfair and often inaccurate (Fiske, 1989; Stangor, 1995). Furthermore, many of our stereotypes and prejudices occur outside of our awareness, such that we do not even know that we are using them.

We use our stereotypes and prejudices in part because they are easy; if we can quickly size up people based on their physical appearance, that can save us a lot of time and effort. We may be evolutionarily disposed to stereotyping. Our primitive ancestors needed to accurately separate members of their own group from others, thus categorizing people into the **ingroup**, *those that are similar to us on physical and social categories,* and **outgroup**, *those that are different from us* (Neuberg, Kenrick, & Schaller, 2010). Separating those we meet into ingroups and outgroups is something we continue to do. The creation of our ingroup strengthens our **social identity**, *which is our sense of self based on the emotions that we experience as a result of our group membership* (Hogg, 2003). We may gain social identity as members of our college, our sports teams, our religious and racial groups, and many other groups.

Figure 9.3



Social identity is the positive emotions that we experience as a member of an important social group. Source:

The fact that we may use stereotypes does not mean we should use them. Stereotypes, prejudice, and discrimination, whether consciously or unconsciously applied, make it difficult for some people to effectively contribute to society and may create both mental and physical health problems for them (Swim & Stangor, 1998). Getting beyond our prejudices is required by law, as detailed in the U.S. Civil Rights Act of 1964, the Equal Opportunity Employment Act of 1972, and the Americans with Disabilities Act of 1990 (Bartol & Bartol, 2015) and the Fair Housing Act of 1968 (U.S. Department of Housing and Urban Development, 1968). Important research done by psychologists has contributed to the creation of these laws. As mentioned in chapter one, Mamie Phipps Clark and her husband, Kenneth Clark, demonstrated that when shown white and black dolls, Black children preferred the white dolls believing they were better (American Psychological Association, 2018). The Clarks convinced the Supreme Court that the Black children saw themselves as inferior, which adversely affected their academic and personal achievement.

Social psychologists believe that we should work to get past our prejudices. The tendency to hold stereotypes and prejudices and to act on them can be reduced, for instance, through positive interactions and friendships with members of other groups, through practice in avoiding using them, and through education (Hewstone, 1996).

Attribution: Forming Judgments by Observing Behavior

When we observe people's behavior we may attempt to determine if the behavior really reflects their underlying personality. If Frank hits Joe, we might wonder if Frank is naturally aggressive or if perhaps Joe had provoked him. If Leslie leaves a big tip for the waitress, we might wonder if she is a generous person or if the service was particularly excellent. *The process of trying to determine the causes of people's behavior, with the goal of learning about their personalities,* is known as **attribution** (Jones et al., 1987).

Figure 9.4

Was the accident caused by John's bad driving (internal) or the road conditions (external)?
Source

Making causal attributions is a bit like conducting an experiment. We observe the people we are interested in and note how they behave in different social situations. After we have made our observations, we draw our conclusions. Sometimes *we may decide that the behavior was caused primarily by something about the person, their personality, abilities, motives*; this is called making a **dispositional (or internal) attribution.** At other times, *we may determine that the behavior was caused primarily by the situation, or chance*; this is called making a **situational (or external) attribution**. At other times we may decide that the behavior was caused by both the person and the situation.

It is easier to make dispositional attributions when behavior is more unusual or unexpected. Imagine that you go to a party and you are introduced to Tess. Tess shakes your hand and says, "Nice to meet you!" Can you readily conclude, on the basis of this behavior, that Tess is a friendly person? Probably not. The social situation demands that people act in a friendly way. In this circumstance it is difficult to know whether Tess acted friendly because of the situation or because she is really friendly. Imagine, however, that instead of shaking your hand, Tess sticks out her tongue at you and walks away. I think you would agree that it is easier in this case to infer that Tess is unfriendly because her behavior is so contrary to what one would expect (Jones, Davis, & Gergen, 1961).

Attribution Biases

Self-serving Bias: Although people are reasonably accurate in their attributions (Fiske, 2003), they are far from perfect. One error that we frequently make when making judgments about ourselves is to make **self-serving attributions** by *judging the causes of our own behaviors in overly positive ways*. If you did well on a test, you will probably attribute that success to person causes ("I'm smart," "I studied really hard"), but if you do poorly on the test you are more likely to make

situation attributions ("The test was hard," "I had bad luck"). Although making causal attributions is expected to be logical and scientific, our emotions are not irrelevant.

Fundamental Attribution Error: Another way that our attributions are often inaccurate is that we are, by and large, too quick to attribute the behavior of others to something personal about them rather than to something about their situation. We are more likely to say, "Leslie left a big tip, so she must be generous" than "Leslie left a big tip, but perhaps that was because the service was really excellent." *The common tendency to overestimate the role of person factors and overlook the impact of situations in judging others* is known as the **fundamental attribution error**.

Figure 9.5

The tendency to make dispositional attributions (such as poor people are lazy) for the behaviors of others, even where situational factors such as poor education and growing up in poverty might be better explanations, is caused by the fundamental attribution error.

The fundamental attribution error occurs in part because other people are so noticeable in our social environments. When you look at others, the person is your focus, and you are likely to make personal attributions about them. If the situation is reversed, such that you see situations from the perspectives of others, the fundamental attribution error is reduced (Storms, 1973). When we judge people, we often see them in only one situation. It's easy for you to think that your math professor is "picky and detail-oriented" because that describes her behavior in class, but you do not know how she acts with her friends and family, which might be completely different. We also tend to make person attributions because they are easy. We are more likely to commit the fundamental attribution error when we are tired, distracted, or busy doing other things (Trope & Alfieri, 1997).

An important moral about perceiving others applies here: We should not be too quick to judge other people. It is easy to think that poor people are lazy, that people who say something harsh are rude or unfriendly, and that all terrorists are insane madmen. These attributions may frequently overemphasize the role of the person, however, resulting in an inappropriate and inaccurate tendency to blame the victim (Lerner, 1980; Tennen & Affleck, 1990). Sometimes people are lazy and rude, and some terrorists are probably insane, but these people may also be influenced by the situation in which they find themselves. Poor people may find it more difficult to get work and education because of the environment they grow up in, people may say rude things because they are feeling threatened or are in pain, and terrorists may have learned in their family and school that committing violence in the service of their beliefs is justified. When you find yourself making strong dispositional attributions for the behaviors of others, stop and think more carefully and refrain from making the fundamental attribution error.

How Attitudes Influence Behavior

Attitude refers to *our relatively enduring evaluations of people and things* (Albarracín, Johnson, & Zanna, 2005). We hold many thousands of attitudes, including those about family and friends, political parties and political figures, abortion rights, preferences for music, and much more. Attitudes are important because they frequently, but not always, predict behavior. Attitudes predict behavior better for some people than for others. People who are high in **self-monitoring**, *act like social chameleons in that they change their behavior in response to social situations, and thus do not always act on their attitudes* (Gangestad & Snyder, 2000). High self-monitors agree with statements such as, "In different situations and with different people, I often act like very different people." Attitudes are more likely to predict behavior for low self-monitors, who are more likely to act on their own attitudes, even when the social situation suggests that they should behave otherwise. Low self-monitors are more likely to agree with statements such as, "I can only argue for ideas that I already believe."

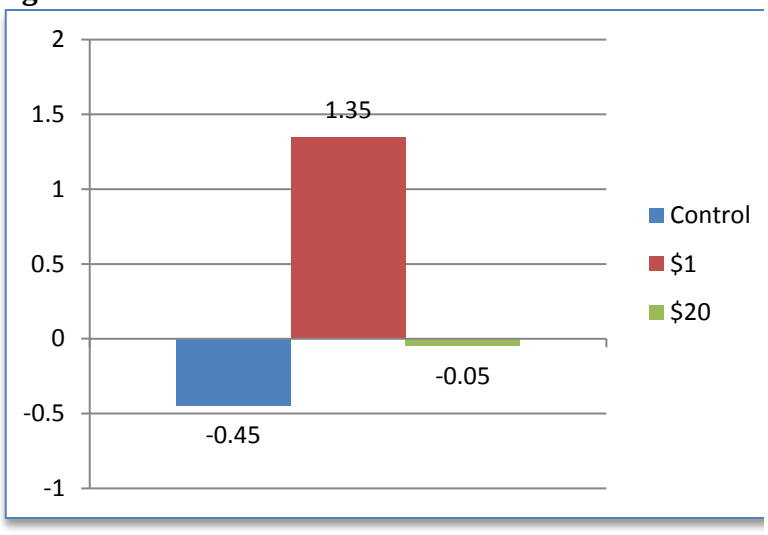
How Behaviors Influence Attitude

Although it might not have surprised you to hear that our attitudes predict our behaviors, you might be more surprised to learn that our behaviors also have an influence on our attitudes. It makes sense that if you like the newest cell phone advertised, you will buy it, because your positive attitude toward the product influences your behavior. However, your attitudes toward that cell phone may become even more positive if you decide to buy it. Behaviors influence attitudes through the process of self-perception. **Self-perception** occurs *when we use our own behavior as a guide to help us determine our own thoughts and feelings* (Bem, 1972; Olson & Stone, 2005).

Behavior also influences our attitudes through a more emotional process known as cognitive dissonance. **Cognitive dissonance** refers to *the discomfort we experience when we choose to behave in ways that we see as inconsistent to our attitudes* (Festinger, 1957; Harmon-Jones & Mills, 1999). If we feel that we have wasted our time or acted against our own moral principles, we experience negative emotions (dissonance) and may change our attitudes about the behavior to reduce the negative feelings.

Imagine that you are a participant in a psychology study. You have just spent the last 60 minutes turning pegs on a large peg board a quarter of a turn. The experimenter tells you that the study concerned the effects of expectation on task performance and as you were in the control group you had not been told anything prior to completing the task. The experimenter is concerned because their research assistant is running late and the next subject has already arrived. This person is in the experimental group and the experimenter wonders if you could tell the next participant that the experiment was really interesting and enjoyable. The researcher explains that their budget is rather small, but for your effort they can give you a dollar. You agree to this and inform the next person about how interesting and enjoyable the study was. Before you finally leave you are asked to complete a questionnaire about the study and how much you enjoyed the study. Festinger and Carlsmith (1959) compared the ratings given by people who had been given only $1 to lie to those who were offered $20, or who were not asked to lie to the next person.

Figure 9.6



Subjects' ratings of the favorability of study varied based on whether they could justify their behavior. Festinger & Carlsmith (1959).

As you can see from Figure 9.6, those who were not asked to lie (control group) had no reason to alter their perceptions of the study. Those who were given $20 to lie also had sufficient justification. A small lie for $20 seemed a reasonable explanation to lie. Thus, there was no cognitive dissonance between what they really felt about the study and their willingness to lie to the next person. But those who lied for only $1 had insufficient justification. To save face they altered their assessment of the study and gave the highest rating.

When we put in effort for something, an initiation, a big purchase price, or even some of our precious time, we will likely end up liking the activity more than we would have if the effort had been less; not doing so would lead us to experience the unpleasant feelings of dissonance. After we buy a product, we convince ourselves that we made the right choice because the product is excellent. If we fail to lose the weight we wanted to, we decide that we look good anyway. If we hurt someone else's feelings, we may even decide that he or she is a bad person who deserves our negative behavior. To escape from feeling poorly about themselves, people will engage in quite extraordinary rationalizing. No wonder that most of us believe that "If I had it all to do over again, I would not change anything important."

Key Takeaways

- Social psychology studies how we influence, and are influenced, by others.
- Social cognition involves forming impressions of ourselves and other people.
- Our initial judgments of others are based primarily on what we see. The physical features of other people, particularly their sex, race, age, and physical attractiveness, are very noticeable, and we often focus our attention on these dimensions.
- We are attracted to people who appear to be healthy. Indicators of health include youth, symmetry, and averageness.
- We frequently use people's appearances to form our judgments about them, and to determine our responses to them. These responses include stereotyping, prejudice, and discrimination.
- Causal attribution is the process of trying to determine the causes of people's behavior with the goal of learning about their personalities. People often succumb to biases when making attributions, such as the self-serving bias and the fundamental attribution error.
- Attitudes refer to our relatively enduring evaluations of people and things. Although attitudes predict behaviors, behaviors also predict attitudes. This occurs through the processes of self-perception and cognitive dissonance.

Exercises and Critical Thinking

1. What stereotypes and prejudices do you hold? Are you able to get past them and judge people as individuals? Do you think that your stereotypes influence your behavior without your being aware of them?
2. Watch this video and evaluate the use of this technique to increase the awareness of prejudice and discrimination. http://www.pbs.org/wgbh/pages/frontline/shows/divided/etc/view.html
3. Consider a time when your behavior influenced your attitudes. Did this occur as a result of self-perception or cognitive dissonance?

Videos

1. Cognitive neuroscientist Rebecca discusses how we form judgments about other people. http://www.ted.com/talks/lang/eng/rebecca_saxe_how_brains_make_moral_judgments.html
2. You might want to test your own stereotypes and prejudices by completing the Implicit Association Test, a measure of unconscious stereotyping. https://implicit.harvard.edu/implicit/demo

Social Influences

Learning Objectives

1. Define social roles and social norms and explain how they influence behavior.
2. Describe the findings and controversies of Zimbardo's Prison Experiment.
3. Define persuasion and describe the two routes to persuasion.
4. Describe the persuasion techniques of foot-in-the-door, door-in-the-face, low-ball, and that's-not-all.
5. Define conformity and distinguish between normative and informational conformity.
6. Explain the situations under which people conform to others and their motivations for doing so.
7. Describe Milgram's experiment on obedience and explain when obedience was reduced.
8. Describe how the presence of others affects one's performance.
9. Describe the problems that can occur when working in groups.
10. Review the factors that can improve the effectiveness of groups.

Social Roles: One major social determinant of human behavior is our social roles. A **social role** *is a pattern of behavior that is expected of a person in a given setting or group* (Hare, 2003). Each one of us has several social roles. You may be, at the same time, a student, a parent, an aspiring teacher, a son or daughter, or a friend. How do these social roles influence your behavior? Social roles are defined by culturally shared knowledge. That is, nearly everyone in a given culture knows what behavior is expected of a person in a given role. For example, what is the social role for a student? If you look around a college classroom you will likely see students engaging in studious behavior, taking notes, listening to the professor, reading the textbook, and sitting quietly at their desks (Figure 9.7). Of course, you may see students deviating from the expected studious behavior such as texting on their phones or using Facebook on their laptops, but in all cases, the students that you observe are attending class, a part of the social role of students.

Figure 9.7

Being a student is just one of the many social roles you have. (credit: "University of Michigan MSIS"/Flickr)

Social roles, and our related behavior, can vary across different settings. How do you behave when you are engaging in the role of son or daughter and attending a family function? Now imagine how you behave when you are engaged in the role of employee at your workplace. It is very likely that your behavior will be different. Perhaps you are more relaxed and outgoing with your family, making jokes and doing silly things. At your workplace you might speak more professionally, and although you may be friendly, you are also serious and focused on getting the work completed. These are examples of how our social roles influence and often dictate our behavior to the extent that identity and personality can vary with context, that is, in different social groups, (Malloy, Albright, Kenny, Agatstein & Winquist, 1997).

Social Norms: As discussed previously, social roles are defined by a culture's shared knowledge of what is expected behavior of an individual in a specific role. This shared knowledge comes from social norms. A **social norm** *is a group's expectation of what is appropriate and acceptable behavior for its members; that is, how they are supposed to behave and think* (Deutsch & Gerard, 1955; Berkowitz, 2004). How are we expected to act? What are we expected to talk about? What are we expected to wear? In our discussion of social roles, we noted that colleges have social norms for students' behavior in the role of student and workplaces have social norms for employees' behaviors in the role of employee. Social norms are everywhere including in families, gangs, and on social media outlets.

Zimbardo's Stanford Prison Experiment: The famous Stanford University prison experiment, conducted by Zimbardo and colleagues, investigated the power of social roles and social norms. In the summer of 1971, an advertisement was placed in a California newspaper asking for male volunteers to participate in a study about the psychological effects of prison life. More than 70 men volunteered, and these volunteers then underwent psychological testing to eliminate candidates who had underlying psychiatric issues, medical issues, or a history of crime or drug abuse. The pool of volunteers was whittled down to 24 healthy male college students. Each student was paid $15 per day and was randomly assigned to play the role of either a prisoner or a guard in the study.

A mock prison was constructed in the basement of the psychology building at Stanford. Participants assigned to play the role of prisoners were "arrested" at their homes by Palo Alto police officers, booked at a police station, and subsequently taken to the mock prison. The experiment was scheduled to run for several weeks. To the surprise of the researchers, both the "prisoners" and "guards" assumed their roles with zeal. In fact, on day 2, some of the prisoners revolted, and the guards quelled the rebellion by threatening the prisoners with night sticks. In a relatively short time, the guards came to harass the prisoners in an increasingly sadistic manner, through a complete lack of privacy, lack of basic comforts, such as mattresses to sleep on, and through degrading chores and late-night counts.

The prisoners, in turn, began to show signs of severe anxiety and hopelessness, and they began tolerating the guards' abuse. Even the Stanford professor who designed the study and was the head researcher, Philip Zimbardo, found himself acting as if the prison was real and his role, as prison supervisor, was real as well. After only six days, the experiment had to be ended due to the participants' deteriorating behavior.

The Stanford prison experiment sought to demonstrate the power of social roles and norms in affecting human behavior. The guards and prisoners enacted their social roles by engaging in behaviors appropriate to the roles: The guards gave orders and the prisoners followed orders. Social norms require guards to be authoritarian and prisoners to be submissive. When prisoners rebelled, they violated these social norms, which led to upheaval. Some prisoners became so immersed in their roles that they exhibited symptoms of mental breakdown; however, according to Zimbardo, none of the participants suffered long term harm (Alexander, 2001).

Recently, both the methodology and results of the Stanford Prison Experiment have been criticized (Toppo, 2018). New interviews with the participants indicated that they deliberately acted in ways that supported the hypothesis, rather than actually taking on a social role. For example, one "prisoner" indicated he faked having a mental breakdown so that he could go home and study for the Graduate Record Examination. Similarly, a "guard" stated he deliberately behaved in an outrageous way to see how far he could go before someone intervened. Consequently, like all research, both the methodology and findings need to be critically analyzed and the results replicated before the results can be taken as proof.

Figure 9.8

Iraqi prisoners of war were abused by their American captors in Abu Ghraib prison, during the second Iraq war. (credit: United States Department of Defense)

The Stanford Prison Experiment has some parallels with the abuse of prisoners of war by U.S. Army troops and CIA personnel at the Abu Ghraib prison in 2003 and 2004. The offenses at Abu Ghraib were documented by photographs of the abuse, some taken by the abusers themselves (Figure 9.8). Zimbardo testified on behalf of one of the U. S. guards and stated, "It's imperative for our society to acknowledge how situational forces can corrupt even good people into becoming perpetrators of evil. It is essential that all of us learn to recognize the situational and systemic determinants of antisocial behaviors" (Zimbardo, 2015, p. 25). However, not all military personnel were abusive, and in fact, it was an

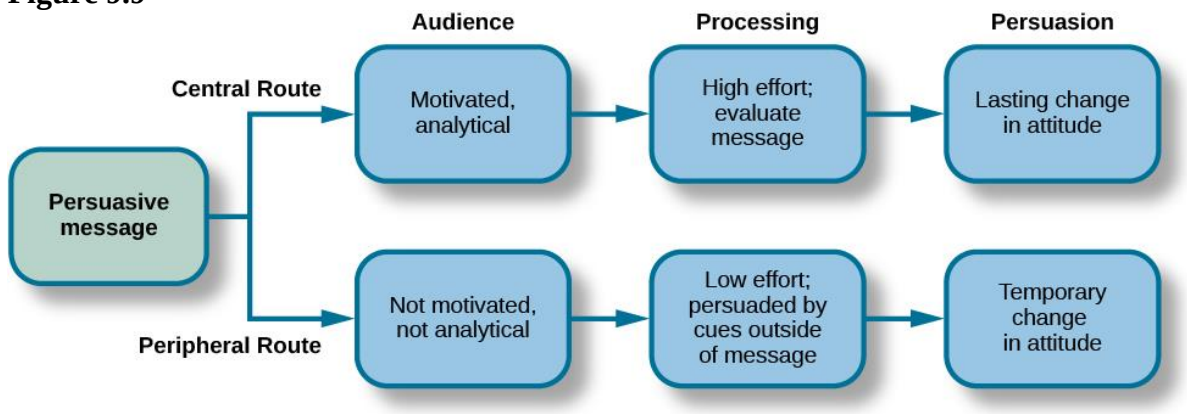
army reservist who blew the whistle on what occurred in the Abu Ghraib prison. It may be that both personality characteristics and the situation result in abusive behavior (Toppo, 2018).

Persuasion

In the previous section we discussed that the motivation to reduce cognitive dissonance leads us to change our attitudes, behaviors, and/or cognitions to make them consistent. **Persuasion** *is the process by which a message results in a change in our attitudes or behavior*. How do people convince others to change their attitudes, beliefs, and behaviors? What communications do you receive that attempt to persuade you to change your attitudes, beliefs, and behaviors?

Elaboration Likelihood Model: A model that describes the dynamics of persuasion is the **elaboration likelihood model** *that considers the variables of the attitude change including features of the source, the message, and characteristics of the audience, to determine when attitude change will occur* (Petty & Cacioppo, 1986). According to this model, there are two main routes that play a role in delivering a persuasive message: Central and peripheral (Figure 9.9).

Figure 9.9



Persuasion can take one of two paths, and the durability of the end result depends on the path.

The **central route** *is logic driven and uses data and facts to convince people of an argument's worthiness.* For example, a car company seeking to persuade you to purchase their model will emphasize the car's safety features and fuel economy. This is a direct route to persuasion that focuses on the quality of the information. In order for the central route of persuasion to be effective in changing attitudes, thoughts, and behaviors, the argument must be strong and, if successful, will result in lasting attitude change.

The central route to persuasion works best when the target of persuasion, or the audience, is analytical and willing to engage in processing of the information. From an advertiser's perspective, what products would be best sold using the central route to persuasion? What audience would most likely be influenced to buy the product? One example is buying a computer. It is likely, for example, that small business owners might be especially influenced by the focus on the computer's quality and features such as processing speed and memory capacity.

The **peripheral route** *is an indirect route that uses peripheral cues to associate positivity with the message* (Petty & Cacioppo, 1986). Instead of focusing on the facts and a product's quality, the peripheral route relies on association with positive characteristics, such as, positive emotions and celebrity endorsement. This route to attitude change does not require much effort or information processing. This method of persuasion may promote positivity toward the message or product, but it typically results in less permanent attitude or behavior change. The audience does not need to be analytical or motivated to process the message. In fact, a peripheral route to persuasion may not even be noticed by people, for example, in the strategy of product placement in films and stores.

Common Persuasion Techniques

Foot-in-the-door Technique: One effective strategy is the **foot-in-the-door technique**, *the persuader gets a person to agree to bestow a small favor or to buy a small item, only to later request a larger favor or purchase of a bigger item* (Cialdini, 2001; Pliner, Hart, Kohl, & Saari, 1974). The foot-in-the-door technique was demonstrated in a study by Freedman and Fraser (1966) in which participants who initially agreed to post small signs in their windows stating, "Be a safe driver" were more likely to agree to put a large, ugly sign in their yard stating, "Drive carefully" than people who had not been approached initially to put up the small sign. More than 100 studies have shown that when people initially commit themselves to a behavior they feel of their own doing, they are more likely to commit to a larger request later (Myers & Twenge, 2017).

Figure 9.10

(a) (b)

With the foot-in-the-door technique, a small request such as (a) wearing a campaign button can turn into a large request, such as (b) putting campaigns signs in your yard. (credit a: modification of work by Joe Crawford; credit b: modification of work by "shutterblog"/Flickr)

Research on this technique also illustrates the principle of consistency (Cialdini, 2001): Our past behavior often directs our future behavior, and we have a desire to maintain consistency once we have a committed to a behavior. Guéguen and Jacob (2002) found that students in a computer discussion group were more likely to volunteer to complete a 40-question survey on their food habits (which required 15 to 20 minutes) if they had already, a few minutes earlier, agreed to help the same requestor with a simple computer-related question (how to convert a file type) than if they had not first been given the smaller opportunity to help. The idea is that when asked the second time, the people looked at their past behavior, having agreed to the small request, and inferred that they are helpful people and they desire to remain consistent.

Door-in-the-face Technique: In the **door-in-the-face technique** *a large, unreasonable request is made, which is it turned down; this is followed by a smaller more reasonable request.* People are more likely to agree to the second request when it is placed in the context of the more unreasonable request, than if they had been asked to the smaller request at the outset. The success of this

technique may be related to the **reciprocity social norm**, *the rule that we should payback in kind what we receive from others* (Cialdini, 2008). The person asking for our support or assistance, appears to have made a concession by forgoing their initial request, for a much smaller one. As a result, we feel compelled to reciprocate and agree to the smaller request (Cialdini, 1993). A common application of foot-in-the-door is when teens ask their parents for a large request (attending an out-of-town concert) and then when the permission is denied, asking them for something smaller (attending a local concert). Having denied the larger request, increases the likelihood that parents will acquiesce with the later, smaller request.

Figure 9.11

Source

Low-ball Technique: In the **low-ball technique**, *compliance is gained by getting people to agree to an attractive, less costly request, and then reneging on it*. Cialdini (1993) noted that this is a technique sometimes used by sales people. An attractive price is quoted for a car or appliance that the buyer has verbally agreed upon, only for the salesperson to come back and say they misquoted the price, or it was for a different model with fewer of the features that the buyer desired. A higher price is now quoted for the desired product. Research shows that people are more likely to comply and buy the product at the higher price than if they had been quoted this price at the outset. Cialdini argues that many of us feel obligated to act consistent with our initial decision.

That's-not-all Technique: The **that's-not-all technique** *gains compliance by sweetening the deal before the person can respond to the initial request.* Berger (1986) demonstrated the power of this technique in two experiments. In the first experiment cupcakes were sold with two cookies for 75 cents (the control condition) or the cupcakes were sold for 75 cents with two cookies thrown in for free (experimental condition). More people purchased the cupcakes in the experimental condition (73%) than in the control condition (40%). In the second experiment, cupcakes were sold for 75 cents (control condition) or were initially quoted as a dollar, but were then discounted to 75 cents before the buyer could respond to the initial price (experimental condition). Compliance was higher in the experimental condition (73%) versus (44%) in the control condition. Burger suggested that the success of the technique is reciprocity. The seller looks like they are making a concession by adding more products or by reducing the price, so the buyer feels more pressure to reciprocate. Table 9.1 presents additional techniques that can be used to persuade others (Cialdini, 2001).

Figure 9.12

Source

Table 9.1 Techniques That Can Be Effective in Persuading Others

Technique	Examples
Choose effective communicators	Communicators who are attractive, expert, trustworthy, and similar to the listener are most persuasive.
Consider the goals of the listener	If the listener wants to be entertained, then it is better to use a humorous ad; if the listener is processing the ad more carefully, use a more thoughtful one.
Use humor	People are more easily persuaded when they are in a good mood.
Use classical conditioning	Try to associate your product with positive stimuli, such as funny jokes or attractive models.
Make use of the listener's emotions	Humorous and fear-arousing ads can be effective because they arouse the listener's emotions.

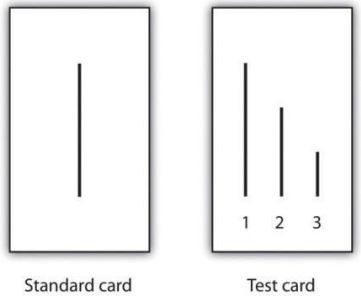
Conformity

When we decide on what courses to enroll in by asking for advice from our friends, change our beliefs or behaviors as a result of the ideas that we hear from others, or binge drink because our friends are doing it, we are engaging in **conformity**, *a change in beliefs or behavior that occurs as the result of the presence of the other people around us.* We conform because of:

- **Informational Conformity:** *We believe that other people have accurate information and we want to have knowledge.*
- **Normative Conformity:** *We want to be liked by others.*

At times conformity occurs in a relatively spontaneous and unconscious way, without any obvious intent of one person to change the other, or an awareness that the conformity is occurring. Cialdini, Reno, and Kallgren (1990) found that college students were more likely to throw litter on the ground themselves when they had just seen another person throw some paper on the ground, and Cheng and Chartrand (2003) found that people unconsciously mimicked the behaviors of others, such as by rubbing their face or shaking their foot, and that that mimicry was greater when the other person was of high versus low social status.

Figure 9.13



Example of the stimuli used in Asch's study.

Asch's Line Experiment: Not all conformity is passive observation. In Asch's (1955) study, male college students were told that they were to participate in a test of visual abilities. The men were seated in front of a board that displayed the visual stimuli that they were going to judge. The men were told that there would be 18 trials during the experiment, and on each trial, they would see two cards. The standard card had a single line that was to be judged, and the test card had three lines that varied in length between about 2 and 10 inches (see Figure 9.13 for an example).

On each trial, each person in the group answered out loud, beginning with one end of the group and moving toward the other end. Although the real research participant did not know it, the other group members were experimental confederates who gave predetermined answers on each trial. Because the real participant was seated next to last in the row, he always made his judgment following most of the other group members. Although on the first two trials the confederates each gave the correct answer, on the third trial, and on 11 of the subsequent trials, they all had been instructed to give the same wrong choice. For instance, even though the correct answer was Line 1, they would all say it was Line 2. Thus, when it became the participant's turn to answer, he could either give the clearly correct answer or conform to the incorrect responses of the confederates.

Remarkably, in this study about 76% of the 123 men who were tested gave at least one incorrect response when it was their turn, and 37% of the responses, overall, were conforming. This is evidence for the power of conformity because the participants were making clearly incorrect responses in public, and the influences of others on these responses was apparent. However, conformity was not absolute; in addition to the 24% of the men who never conformed, only 5% of the men conformed on all 12 of the critical trials.

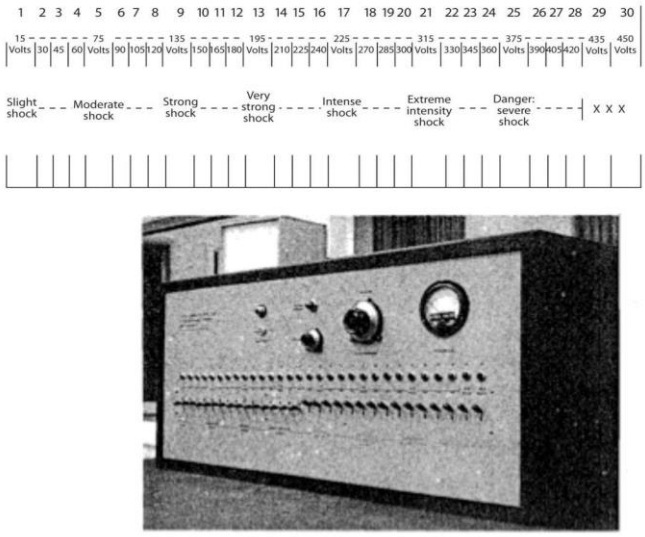
Obedience

The tendency to conform to those in authority, known as **obedience**, was demonstrated in a remarkable set of studies performed by Stanley Milgram (1974). Milgram designed a study in which he could observe the extent to which people would obey someone in authority, even to the extent of causing harm to others. Milgram's interest stemmed in part from his desire to understand the Holocaust during World War II. Specifically, how did everyday German citizens commit such atrocities against other citizens in their own country. Did obedience to authority play a role in the actions of the German people?

Milgram's Study: Milgram used newspaper ads to recruit men, and in one study, women, from a wide variety of backgrounds to participate in his research. When the research participant arrived at the lab, he or she was introduced to another research participant, but he was a confederate working for the experimenter as part of the experimental team. The experimenter explained that the goal of the research was to study the effects of punishment on learning. The researcher explained that one of them would be the "teacher", and the other the "learner". The real research subject was always assigned to the role of "teacher".

The experimenter explained that the participants job would be to sit in the control room and read a list of word pairs to the "learner". After the particiapant read the list once, it would be the "learner's" job to remember which words went together. The experimenter sat behind the particiapant and explained that each time the "learner" made a mistake, the participant was to press one of the switches to administer the shock. Moreover, the switch that was to be pressed increased by one level with each mistake, so that each mistake required a stronger shock (see Figure 9.14).

Figure 9.14 Materials Used in Milgram's Experiments on Obedience



Source: Adapted from Milgram (1974).

Once the "learner" was alone in the shock room, he brought out a tape recorder that played a prerecorded series of responses that the particpant could hear through the wall of the room. The particiapant heard the "learner" say "ugh!" after the first few shocks. After the next few mistakes, when the shock level reached 150 volts, the "learner" was heard to exclaim, "Let me out of here. I have heart trouble!" As the shock reached about 270 volts, the protests of the "learner" became more vehement, and after 300 volts the "learner" proclaimed that he was not going to answer any more questions. From 330 volts and up, the "learner" was silent. At this point the experimenter responded to participants' questions, if any, with a scripted response indicating that they should continue reading the questions and applying increasing shock when the "learner" did not respond.

The results of Milgram's research were themselves quite shocking. Although all the participants gave the initial mild levels of shock, responses varied after that. Some refused to continue after about 150 volts, despite the insistence of the experimenter to continue to increase the shock level. Still others, however, continued to present the questions and to administer the shocks, under the pressure of the experimenter, who demanded that they continue. In the end, 65% of the participants continued giving the shock to the "learner" all the way up to the 450 volts maximum, even though that shock was marked as "danger: severe shock" and no response had been heard from the participant for several trials.

In case you are thinking that such high levels of obedience would not be observed in today's modern culture, there is in fact evidence that they would. Milgram's findings were almost exactly replicated, using men and women from a wide variety of ethnic groups, in a study conducted at Santa Clara University (Burger, 2009). In this replication of the Milgram experiment, 67% of the men and 73% of the women agreed to administer increasingly painful electric shocks when an authority figure ordered them to. The participants in this study were not, however, allowed to go beyond the 150 volts shock switch.

Although it might be tempting to conclude that Burger's and Milgram's experiments demonstrate that people are innately bad creatures who are ready to shock others to death, this is not in fact the case. Rather, it is the social situation, and not the people themselves, that is responsible for the behavior. When Milgram created variations on his original procedure, he found that changes in the situation dramatically influenced the amount of obedience.

Obedience was significantly reduced when:

- People were allowed to choose their own shock level rather than being ordered to use the level required by the experimenter.
- The experimenter communicated by phone rather than from within the experimental room.
- Research participants were partnered with someone who refused to give the shock.
- When there were two experimenters who disagreed with each other about whether the study should continue.
- When the "learner" was sitting right next to the participant.

These findings are consistent with a basic principle of social psychology: The situation in which people find themselves has a major influence on their behavior.

Do We Always Conform and Obey?

The research that we have discussed to this point suggests that most people conform to the opinions and desires of others, but it is not always the case that we blindly conform. For one, there are individual differences in conformity. People with lower self-esteem are more likely to conform than are those with higher self-esteem, and people who are dependent on and who have a strong need for approval from others are also more conforming (Bornstein, 1993). People who highly identify with or who have a high degree of commitment to a group are also more likely to conform to group norms than those who care less about the group (Jetten, Spears, & Manstead, 1997). Despite these individual differences among people in terms of their tendency to conform, however, research has generally found that the impact of individual difference variables on conformity is smaller than the influence of situational variables, such as the number and unanimity of the majority.

Figure 9.15

Source

Minority Influence: We have seen that conformity usually occurs such that the opinions and behaviors of individuals become more similar to the opinions and behaviors of the majority of the people in the group. However, and although it is much more unusual, there are cases *in which a smaller number of individuals is able to influence the opinions or behaviors of the larger group*, a phenomenon known as **minority influence**. Minorities who are consistent and confident in their opinions may in some cases be persuasive (Moscovici, Mugny, & Van Avermaet, 1985).

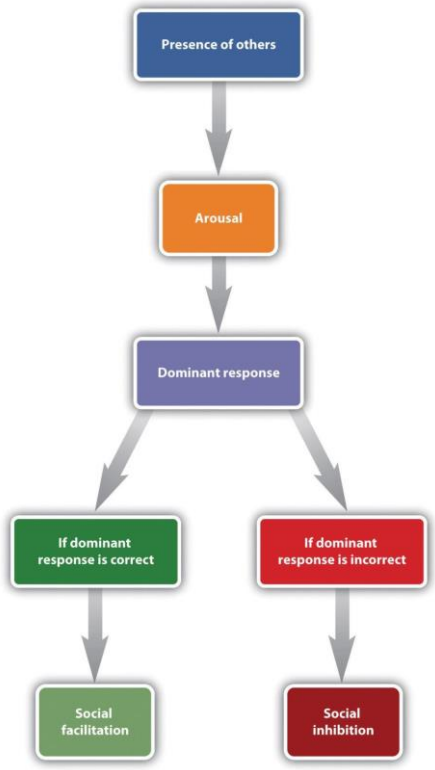
Persuasion that comes from minorities has another, and potentially even more important, effect on the opinions of majority group members: It can lead majorities to engage in fuller, as well as more divergent, innovative, and creative thinking about the topics being discussed (Martin, Hewstone, Martin, & Gardikiotis, 2008). Nemeth and Kwan (1987) found that participants working together in groups solved problems more creatively when only one person gave a different and unusual

response than the other members did (minority influence) in comparison to when three people gave the same unusual response. It is a good thing that alternative views can be influential. When we look back on history, we find that it is the unusual, divergent, innovative individuals, who although frequently ridiculed at the time for their unusual ideas, end up being respected for producing positive changes.

Psychological Reactance: When people feel that their freedom is being threatened by influence attempts, they have the ability to resist that persuasion. They may develop *a strong emotional reaction that leads people to resist pressures to conform* known as **psychological reactance** (Miron & Brehm, 2006). Reactance is aroused when our ability to choose which behaviors to engage in is removed or threatened with possible elimination. The outcome of the experience of reactance is that people may not conform at all, in fact moving their opinions or behaviors away from the desires of the influencer. Consider an experiment conducted by Pennebaker and Sanders (1976), who attempted to get people to stop writing graffiti on the walls of campus restrooms. In the first group of restrooms they put a sign that read "Do not write on these walls under any circumstances!" whereas in the second group they placed a sign that simply said, "Please don't write on these walls." Two weeks later, the researchers returned to the restrooms to see if the signs had made a difference. They found that there was significantly less graffiti in the second group of restrooms than in the first one. It seems as if people who were given strong pressures to not engage in the behavior were more likely to react against those directives than were people given a weaker message.

Social Facilitation and Social Inhibition

Figure 9.16 Drive-Arousal Model



In an early study, Triplett (1898) found that bicycle racers who were competing with other cyclists on the same track rode significantly faster than cyclists who were racing alone. This led Triplett to hypothesize that people perform tasks better when other people are present than when one is alone. Subsequent findings validated Triplett's results, and experiments have shown that the presence of others can increase performance on many types of tasks, including jogging, shooting pool, lifting weights, and solving problems (Bond & Titus, 1983). *The tendency to perform tasks better or faster in the presence of others* is known as **social facilitation**.

However, although people sometimes perform better when they are in groups than they do alone, the situation is not that simple. Perhaps you remember an experience when you performed a task (playing the piano, shooting basketball free throws, giving a public presentation) very well alone, but poorly with, or in front of, others. Thus, it seems that the conclusion that being with others increases performance cannot be entirely true. *The tendency to perform tasks more poorly or more slowly in the presence of others* is known as **social inhibition**.

Zajonc (1965) explained the observed influence of others on task performance using the concept of physiological arousal. According to Zajonc, when we are with others we experience more arousal than we do when we are alone, and this arousal increases the likelihood that we will perform the action that we are most likely to emit in any given situation (Figure 9.16). For relatively easy tasks, the arousal caused by others results in increased performance (social facilitation). In contrast, for difficult tasks, the arousal created by others hinders performance (social inhibition).

A great deal of experimental research has now confirmed these predictions. A meta-analysis by Bond and Titus (1983), which looked at the results of over 200 studies using over 20,000 research participants, found that the presence of others significantly increased the rate of performing on simple tasks, and also decreased both rate and quality of performance on complex tasks.

Working Together in Groups

The ability of a group to perform well is determined by the characteristics of the group members (e.g., are they knowledgeable and skilled?) as well as by the group process; that is, the events that occur while the group is working on the task. When the outcome of group performance is better than we would expect given the individuals who form the group, we call the outcome a group process gain, and when the group outcome is worse than we would have expected given the individuals who form the group, we call the outcome a group process loss. Examples of group process loss include group polarization, social loafing, groupthink, and deindividuation.

Group Polarization: Groups can reach more extreme decisions, either extremely cautious or extremely risky, even when compared to an individual's decision. This is called **Group polarization,** which refers to *the strengthening of a group's prevailing position on a topic following discussion on the topic*. When like-minded people discuss a topic, group members' opinions are strengthened because they are not hearing opposing views. This may lead some groups to endorse a more extreme argument. Group polarization has been observered in real-world contexts, including financial decision making in corporate boardrooms (Cheng & Chiou, 2008; Zhu, 2010), extreme positions of terrorist groups (Drummond, 2002; McCauley, 1989), and the recent polarization in political attitudes between "red" states and "blue" states in the United States (Jhangiani & Tarry, 2014).

Figure 9.17

Are they working as hard as if they were alone?
Source

Social Loafing: One group process loss that may occur in groups is that the group members may engage in **social loafing**, *a group process loss that occurs when people do not work as hard in a group as they do when they are working alone*. In one of the earliest social psychology experiments, Ringelmann (1913; reported in Kravitz & Martin, 1986) had individual men, as well as groups of various numbers of men pull as hard as they could on ropes while he measured the maximum amount that they were able to pull. Although larger groups pulled harder than any one individual, Ringelmann also found a substantial process loss. In fact,

the loss was so large that groups of three men pulled at only 85% of their expected capability, whereas groups of eight pulled at only 37% of their expected capability. This type of process loss, in which group productivity decreases as the size of the group increases, has been found to occur on a wide variety of tasks.

Groupthink: Group process losses can also occur when group members conform to each other rather than expressing their own divergent ideas. **Groupthink** is *a phenomenon that occurs when a group, made up of competent members capable of making excellent decisions, actually make poor decisions because of flawed group processes and strong conformity pressures* (Baron, 2005; Janis, 2007).

Groupthink is more likely to occur in groups whose members feel a strong group identity, when there is a strong and directive leader, and when the group needs to make an important decision quickly. The problem is that groups suffering from groupthink become unwilling to seek out or discuss discrepant or unsettling information, and the group members do not express contradictory opinions. Because group members are afraid to express opinions that contradict the leader, or bring in outside information, the group is prevented from making fully informed decisions. Figure 9.18 summarizes the basic causes of groupthink.

Figure 9.18 Causes of Groupthink

It has been suggested that groupthink was involved in many well-known and important, but very poor decisions, made by government and business groups, including invasion of Iraq made by President Bush and his advisors in 2002, two Space Shuttle mission crashes in 1986 and 2003, and the decision of President Kennedy and his advisors to invade Cuba and overthrow Fidel Castro in 1962. Analyses of the decision-making processes in these cases have documented the role of groupthink. Due to the high levels of conformity, the group begins to see itself as extremely important, highly capable of making quality decisions, and invulnerable to making mistakes. The group members begin to feel that they were superior and did not seek outside information. Such a situation is conducive to terrible decision-making and resulting fiascoes.

Deindividuation: Whether we are waiting for a bus with a group of strangers, sports fans leaving an arena, or are with colleagues, family, or friends, we can lose our own personal sense of identity and responsibility when we are part of a group. When the "group mind" becomes one of "mob behavior" deindividuation may be to blame. **Deindividuation** refers to *the loss of a person's sense of individuality and a reduction in the usual social constraints on our behavior*. When a part of a larger group we are more anonymous and the actions of the group are diffused across all members of the group.

Using Groups Effectively

Taken together, working in groups has both positive and negative outcomes. On the positive side, it makes sense to use groups to make decisions because people can create outcomes working together that any one individual could not hope to accomplish alone. In addition, once a group makes a decision, the group will normally find it easier to get other people to implement it, because many people feel that decisions made by groups are fairer than are those made by individuals.

Figure 9.19

Working groups are used to perform tasks and make decisions, but are they effective? © Thinkstock

Yet, groups frequently succumb to process losses, leading them to be less effective than they should be. Furthermore, group members often do not realize that the process losses are occurring around them. For instance, people who participate in brainstorming groups report that they have been more productive than those who work alone, even if the group has actually not done that well (Nijstad, Stroebe, Lodewijkx, 2006; Stroebe, Diehl, & Abakoumkin, 1992). *The tendency for group members to overvalue the productivity of the groups they work in* is known as **the illusion of group productivity**, and it seems to occur for several reasons. For one, the productivity of the group as a whole is highly accessible, and this productivity generally seems quite good, at least in comparison to the contributions of single individuals. The group members hear many ideas expressed by themselves and the other group members, and this gives the impression that the group is doing very well, even if objectively it is not. On the affective side, group members receive a lot of positive social identity from their group memberships. These positive feelings naturally lead them to believe that the group is strong and performing well.

What we need to do, then, is to recognize both the strengths and limitations of group performance and use whatever techniques we can to increase process gains and reduce process losses. Table 9.2 presents some techniques that are known to help groups achieve their goals.

Table 9.2 Techniques That Can Be Used to Improve Group Performance

Techniques	Examples
Provide rewards for performance	Rewarding employees and team members with bonuses will increase their effort toward the group goal. People will also work harder in groups when they feel that they are contributing to the group goal than when they feel that their contributions are not important (Fareed, Abidan, Shahzad, Umm-e-Amen, & Lodhi, 2013).
Keep group member contributions identifiable	Group members will work harder if they feel that their contributions to the group are known and potentially seen positively by the other group members than they will if their contributions are summed into the group total and thus unknown (Szymanski & Harkins, 1987).
Maintain distributive justice (equity)	Workers who feel that their rewards are proportional to their efforts in the group will be happier and work harder than will workers who feel that they are underpaid or not recognized (Geurts, Buunk, & Schaufeli, 1994).
Keep groups small	Larger groups are more likely to suffer from coordination problems and social loafing. The most effective working groups are of relatively small size—about four or five members (Wheelan, 2009).
Create positive group norms	Group performance is increased when the group members care about the ability of the group to do a good job (e.g., a cohesive sports or military team). On the other hand, some groups develop norms that prohibit members from working to their full potential and thus encourage loafing (Høigaard, Säfvenbom, & Tønnessen, 2006).
Improve information sharing	Leaders must work to be sure that each member of the group is encouraged to present the information that he or she has in group discussions. One approach to increasing full discussion of the issues is to have the group break up into smaller subgroups for discussion. (Mesmer-Magnus & DeChurch, 2009).
Allow plenty of time	Groups take longer to reach consensus, and allowing plenty of time will help keep the group from coming to premature consensus and making an unwise choice. Time to consider the issues fully also allows the group to gain new knowledge by seeking information and analysis from outside experts (Kelly & Loving, 2004).
Set specific and attainable goals	Groups that set specific, difficult, yet attainable goals (e.g., "improve sales by 10% over the next 6 months") are more effective than groups that are given goals that are not very clear (e.g., "let's sell as much as we can!") (Locke & Latham, 2006).

Key Takeaways

- Social roles and social norms influence us because they set expectations regarding how we are to behave in given situtations. Zimbardo's prison study attempted to demonstrate the power of social roles.
- Persuasion is the process by which a message results in a change in our attitudes or behavior. According to the elaboration likelihood model, persuasion can be obtained through either a central or peripheral route. Several persuasive techniques use either a desire for consistency or the reprocity norm.
- Conformity, the change in beliefs or behavior that occurs as the result of the presence of the other people around us, can occur in both active and passive ways. The typical outcome of conformity is that our beliefs and behaviors become more similar to those of others around us.
- The important research on conformity and obedience was demonstrated by Asch and Milgram.
- Conformity can be affected by minority influence and psychological reactance.
- The tendency to perform tasks better or faster in the presence of others is known as social facilitation. The tendency to perform tasks more poorly or more slowly in the presence of others is known as social inhibition.
- The performance of working groups is almost never as good as we would expect, given the number of individuals in the group, and in some cases may even be inferior to the performance of one or more members of the group working alone.
- Group process losses may occur in groups when the group members engage in group polarization, social loafing, groupthink, and deindividuation.
- It is important to recognize both the strengths and limitations of group performance and use whatever techniques we can to increase process gains and reduce process losses.

Exercise and Critical Thinking

1. Consider a time when you worked together with others in a group. Do you think the group experienced group process gains or group process losses? If the latter, what might you do now in a group to encourage effective group performance?

Videos

1. Watch this video to see a demonstration of Asch's line studies. Video Clip Of Asch's Line Matching Studies http://www.youtube.com/v/iRh5qy09nNw

Social Relationships

Learning Objectives

1. Describe how similarity, self-disclosure, and proximity influence the development of close relationships.
2. Define altruism and summarize the genetic and environmental factors that contribute to altruism.
3. Explain the bystander effect.
4. Provide an overview of the causes of human aggression.

In this section, we examine how we relate to each other, what attracts us to each other, the behaviors of aggression and altruism, and the factors that lead to these social behaviors.

Close Relationships

One of the most important tasks faced by humans is to develop successful relationships with others. These relationships include acquaintanceships and friendships, but also close relationships, which are the long-term intimate relationships that we develop with another person (Hendrick & Hendrick, 2000). It is useful to know what psychologists have learned about the principles of liking and loving.

Similarity: A major interest of social psychologists is the study of interpersonal attraction, or what makes people like, and even love, each other. One important factor isperceived **similarity** *or resemblance in values and beliefs between the partners* (Davis & Rusbult, 2001). Similarity is important for relationships because it is more convenient. It is easier if both partners like to ski or go to the movies than if only one does. In addition, because similarity supports our values, we can feel better about ourselves and choice of activities if we see that others also enjoy doing the same things. *Having others like and believe in the same things we do makes us feel validated in our beliefs.* This is referred to as **consensual validation,** and it is an important aspect of why we are attracted to others.

Figure 9.20

Birds of a feather flock together.
Source:

Self-Disclosure: Liking is also enhanced by **self-disclosure**, *the tendency to communicate frequently, without fear of reprisal, and in an accepting and empathetic manner*. Friends are our friends because we can talk to them openly about our needs and goals and because they listen to and respond to our needs (Reis & Aron, 2008). However, self-disclosure must be balanced. If we open up to our friends about the concerns that are important to us, we expect them to do the same in return. If the self-disclosure is not reciprocal, the relationship may not last.

Proximity: Another important determinant of liking is **proximity,** or *the extent to which people are physically near us.* Research has found that we are more likely to develop friendships with people who are nearby, for instance, those who live in the same dorm that we do, and even with people who just happen to sit nearer to us in our classes (Back, Schmukle, & Egloff, 2008).

Proximity has its effect on liking through the principle of **mere exposure**, which is *the tendency to prefer stimuli (including but not limited to people) that we have seen more frequently*. The effect of mere exposure is powerful and occurs in a wide variety of situations. Infants tend to smile at a photograph of someone they have seen before more than they smile at a photograph of someone they are seeing for the first time (Brooks-Gunn & Lewis, 1981), and people prefer side-to-side reversed images of their own faces over their normal (nonreversed) face, whereas their friends prefer their normal face over the reversed one (Mita, Dermer, & Knight, 1977). This is expected on the basis of mere exposure, since people see their own faces primarily in mirrors, and thus are exposed to the reversed face more often.

Mere exposure may well have an evolutionary basis. We have an initial fear of the unknown, but as things become more familiar they seem more similar and safe, and thus produce more positive affect and seem less threatening and dangerous (Harmon-Jones & Allen, 2001; Freitas, Azizian, Travers, & Berry, 2005). When the stimuli are people, there may well be an added effect. Familiar people become more likely to be seen as part of the ingroup rather than the outgroup, and this may lead us to like them more. Zebrowitz and colleagues found that we like people of our own race in part because they are perceived as similar to us (Zebrowitz, Bornstad, & Lee, 2007)

Helping Others: Altruism

Altruism refers to *any behavior that is designed to increase another person's welfare, and particularly those actions that do not seem to provide a direct reward to the person who performs them* (Dovidio, Piliavin, Schroeder, & Penner, 2006). Altruism occurs when we stop to help a stranger who has been stranded on the highway, when we volunteer at a homeless shelter, or when we donate to a charity. Twenty-five percent of Americans (63 million) contributed almost $193 billion in value by volunteering in 2016. In addition, in that same year Americans donated $360 billion to charities, an increase of 2.7 percent over 2015 (Independentsector.org, 2018).

Figure 9.21

We help in part to make ourselves feel good, but also because we care about the welfare of others.

Why Are We Altruistic?

Because altruism is costly, you might wonder why we engage in it at all. There are a variety of explanations for the occurrence of altruism, and Table 9.3 summarizes some of the variables that are known to increase helping.

Table 9.3 Variables Known to Increase Helping

Variables	Research Results
Positive Moods	We help more when we are in a good mood (Guéguen & De Gail, 2003).
Time	We are more likely to help when we have plenty of time than when we are in a hurry (Darley & Batson 1973).
Similarity	We help people whom we see as similar to us, for instance, those who mimic our behaviors (van Baaren, Holland, Kawakami, & van Knippenberg, 2004).
Guilt	If we are experiencing guilt, we may help in order to relieve those negative feelings (Malti et al., 2016).
Empathy	We help more when we feel empathy for the other person (Batson, O'Quin, Fultz, Varnderplas, & Isen, 1983).
Benefits	We are more likely to help if we can feel good about ourselves by doing so (Snyder, Omoto, & Lindsay, 2004). When we act altruistically, we gain a reputation as a person with high status who is able and willing to help others, and this status makes us more desirable in the eyes of others (Hardy & Van Vugt, 2006).
Personal Responsibility	We are more likely to help if it is clear that others are not helping (Rogers, Miller, Mayer, & Duval,1982).
Self-presentation	We may help in order to show others that we are good people (Hardy & Van Vugt, 2006).

The tendency to help others in need is, in part, a functional evolutionary adaptation. Although helping others can be costly to us as individuals, helping people who are related to us can perpetuate our own genes (Madsen et al., 2007; McAndrew, 2002). Burnstein, Crandall, and Kitayama (1994) found that students indicated they would be more likely to help a person who was closely related to them (e.g., a sibling, parent, or child) than they would be to help a person who was more distantly related (e.g., a niece, nephew, uncle, or grandmother). People are more likely to donate kidneys to relatives than to strangers (Borgida, Conner, & Manteufel, 1992), and even children indicate that they are more likely to help their siblings than they are to help a friend (Tisak & Tisak, 1996).

Although it makes evolutionary sense that we would help people who we are related to, why would we help people to whom we not related? One explanation for such behavior is based on the principle of reciprocal altruism (Krebs & Davies, 1987; Trivers, 1971). **Reciprocal altruism** is *the principle that, if we help other people now, those others will return the favor should we need their help in the future*. By helping others, we both increase our chances of survival and reproductive success and help others increase their survival too. Over the course of evolution, those who engage in reciprocal altruism should be able to reproduce more often than those who do not, thus enabling this kind of altruism to continue.

We also learn to help by modeling the helpful behavior of others. Although people frequently worry about the negative impact of the violence that is seen on TV, there is also a great deal of

helping behavior shown on television. Smith et al. (2006) found that 73% of TV shows had some altruism, and that about three altruistic behaviors were shown every hour. Furthermore, the prevalence of altruism was particularly high in children's shows. However, just as viewing altruism can increase helping, modeling of behavior that is not altruistic can decrease altruism. For instance, Anderson and Bushman (2001) found that playing violent video games led to a decrease in helping. We are also more likely to help when we receive rewards for doing so and less likely to help when helping is costly. Another potential reward is the status we gain as a result of helping.

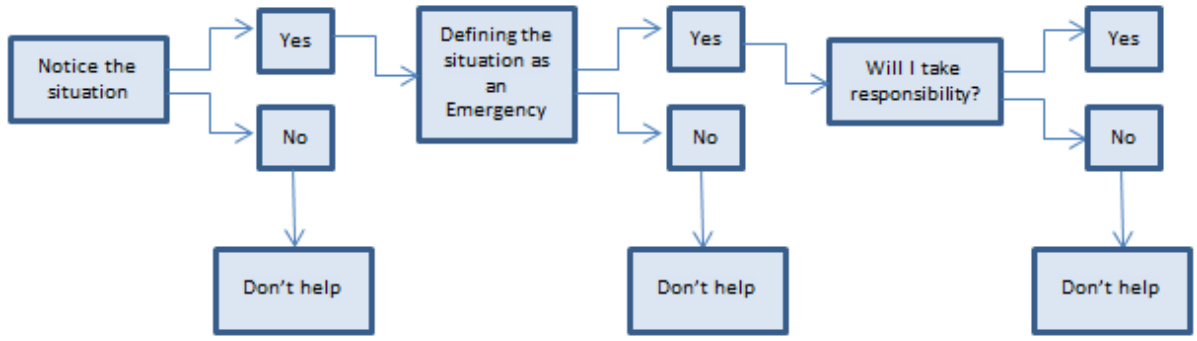
We might hope that our children internalize another relevant social norm that seems more altruistic: the **social responsibility norm** *which tells us that we should try to help others who need assistance, even without any expectation of future paybacks*. The teachings of many cultures are based on the social responsibility norm; that we should, as good human beings, reach out and help other people whenever we can.

How the Presence of Others Can Reduce Helping

One reason that might limit our decision to help is the presence of others. The **bystander effect** *refers to the reduced likelihood of people offering assistance as the number of bystanders increases.* In other words, there is not always safety in numbers. One of the most widely touted examples of the bystander effect is the case of Kitty Genovese. Late at night on March 13, 1964, 28-year-old Kitty Genovese was murdered within a few yards of her apartment building in New York City after a violent fight with her killer in which she struggled and screamed. When police interviewed her neighbors about the crime, they reported that while 38 of her neighbors heard the sounds of a fight, none had intervened, and only one had called the police. See Box 9.1 for more recent details on the accuracy of the reporting of this case. Two social psychologists, Latané and Darley (1968), set out to understand the factors that influence people's willingness, or unwillingness, to help. They developed a model (see Figure 9.22) that took into consideration the important role of the social situation in determining helping. The model has been extensively tested in many studies, and there is substantial support for it.

The first step in the model is noticing the event. You may not notice a swimmer struggling in the water at a crowded beach. It would be hard not to notice this person if you were alone on the beach. Even if we notice the situation, we might not interpret it as an emergency. There may be other explanations. Are they just goofing around in the water or are they really in need of assistance? When we are unsure we frequently look to others to see how they are responding. At the same time, they may be looking to us to help them understand the situation. As no one is reacting as if this is an emergency, the bystanders take each other's inaction to mean that this situation is not serious. This *tendency of the individuals to incorrectly assume that others in the group believe something, when this is not the case is called* **pluralistic ignorance**, and is considered one of the explanations for the bystander effect (Kitts, 2003).

Figure 9.22



The decision to help can be hindered by the presence of others. The more people present the less likely you are to notice the victim. The inaction of others at the scene may lead you to redefine the situation as not being an emergency. The presence of others diffuses any personal responsibility you may feel to step in and take action.

Even if we have noticed the emergency and have interpreted it as such, we still need to decide if it is our responsibility to do something. When others are present, it is easier for us to assume that others will help, and we do not need to do anything. **Diffusion of responsibility** *occurs when we assume that others will take on the responsibility and that we do not need to take action ourselves*.

The final step in helping is knowing how to help. Of course, for many of us, the best way to help someone in an emergency is not always clear; we are not professionals and we have little training in how to help in an emergency. People who do have such training are more likely to help, whereas the rest of us just do not know what to do, and may simply walk on by. On the other hand, today many people have cell phones, and can do a lot with a quick call.

Kitty Genovese

Source

Box 9.1 Did the Bystander Effect Really Occur in the Case of Kitty Genovese?

The case of Kitty Genovese has come under scrutiny. In a recent documentary, *The Witness,* Bill Genovese disputes the account of his sister's murder published in the New York Times in 1964 by Martin Gansberg. In the opening lines Gansberg states,

"For more than half-an-hour 38 respectable, law-abiding citizens in Queens watched a killer stalk and stab a woman in three separate attacks in Kew Gardens. Twice their chatter and the sudden glow of their bedroom lights interrupted him and frightened him off. Each time he returned, sought her out, and stabbed her again. Not one person telephoned the police during the assault; one witness called after the woman was dead." (Gansberg, New York Times, March 1964)

Gansberg also goes on to suggest that when the police were finally called they arrived within two minutes.

Kitty Genovese's murder became the face of social apathy for decades. Bill Genovese was 16 at the time of his sister's murder. Growing up hearing the stories, he felt there was more to it than had been reported. His investigation uncovered several mistakes in the original article about the events of that night. The documentary also suggests that the then editor of the newspaper, A.M. Rosenthal, guided the story to create the "myth of bystander apathy". Rosenthal later went on to write a best-selling book, "Thirty-Eight Witnesses: The Kitty Genovese Case", which Genovese claims further reinforced the idea that no one helped.

According to Brody (2015), Bill Genovese's investigation found that:

- Given the location of the apartments, it was late at night, and the advanced age of most of the witnesses, no one actually "watched," as the New York Times article stated. Many heard a commotion and were roused from their sleep. Across from the apartment complex was a tavern. Hearing shouting late at night was not uncommon, and many reported this is what they thought they heard. Few saw little of the attack.
- The police were called twice, but failed to respond because they thought it was just a domestic dispute. The issue of domestic violence was handled quite differently in 1964 than it is today. By the time they did respond it was too late.
- In the account by the New York Times it suggested that she died alone. However, this was not true as a friend came to her aid and helped her until police arrived.

Just after the recent death of her murderer, Winston Moseley, the New York Times wrote regarding the original 1964 article:

> While there was no question that the attack occurred, and that some neighbors ignored cries for help, the portrayal of 38 witnesses as fully aware and unresponsive was erroneous. The article grossly exaggerated the number of witnesses and what they had perceived. None saw the attack in its entirety. Only a few had glimpsed parts of it, or recognized the cries for help. Many thought they had heard lovers or drunks quarreling. There were two attacks, not three. And afterward, two people did call the police. A 70-year-old woman ventured out and cradled the dying victim in her arms until they arrived. (MacFadden, New York Times, April 2016)

The one good thing that came out of the death of Kitty Genovese was 911. Calling the police back in 1964 was not as simple as dialing 911. Dialing zero meant the call went to a general switchboard operator who had to locate the nearest police station to the caller. Tracking the caller's location was not as easy as it is today, and even knowing the location did not mean the call would get to the correct precinct. New York City officials realized that a more straightforward system would be needed. In 1964, after the death of Kitty Genovese, the city provided a centralized police number. In 1968, the 911 system was introduced (MacFadden, 2016).

Human Aggression

Aggression is *behavior that is intended to harm another individual.* Aggression may occur in the heat of the moment, for instance, when a jealous lover strikes out in rage or the sports fans at a university light fires and destroy cars after an important basketball game. Or it may occur in a more cognitive, deliberate, and planned way, such as the aggression of a bully who steals another child's toys, a terrorist who kills civilians to gain political exposure, or a hired assassin who kills for money.

Not all aggression is physical. Aggression also occurs in nonphysical ways, as when children exclude others from activities, call them names, or spread rumors about them. Paquette and Underwood (1999) found that both boys and girls rated nonphysical aggression, such as name-calling as making them feel more "sad and bad" than did physical aggression. Bullying can include physical, verbal, or even cyber-behaviors.

Aggression is Part of Human Nature

We may aggress against others in part because it allows us to gain access to valuable resources such as food, territory, and desirable mates, or to protect ourselves from direct attack by others. If aggression helps in the survival of our genes, then the process of natural selection may well have caused humans, as it would any other animal, to be aggressive (Buss & Duntley, 2006).

There is evidence for the genetics of aggression. Aggression is controlled in large part by the amygdala. One of the primary functions of the amygdala is to help us learn to associate stimuli with the rewards and the punishment that they may provide. The amygdala is particularly activated in our responses to stimuli that we see as threatening and fear-arousing. When the amygdala is stimulated, in either humans or in animals, the organism becomes more aggressive.

However, just because we can aggress does not mean that we will aggress. It is not necessarily evolutionarily adaptive to aggress in all situations. Neither people nor animals are always aggressive; they rely on aggression only when they feel that they absolutely need to (Berkowitz, 1993a). The prefrontal cortex serves as a control center on aggression; when it is more highly activated, we are more able to control our aggressive impulses. Research has found that the cerebral cortex is less active in murderers and death row inmates, suggesting that violent crime may be caused by a failure or reduced ability to regulate aggression (Davidson, Putnam, & Larson, 2000).

Hormones are also important in regulating aggression. Most important in this regard is the male sex hormone testosterone, which is associated with increased aggression in both males and females. Research conducted on a variety of animals has found a positive correlation between levels of testosterone and aggression. This relationship seems to be weaker among humans than among animals, yet it is still significant (Dabbs, Hargrove, & Heusel, 1996).

Consuming alcohol increases the likelihood that people will respond aggressively to provocations, and even people who are not normally aggressive may react with aggression when they are intoxicated (Graham, Osgood, Wells, & Stockwell, 2006). Alcohol reduces the ability of people who have consumed it to inhibit their aggression because when people are intoxicated, they become

more self-focused and less aware of the social constraints that normally prevent them from engaging aggressively (Bushman & Cooper, 1990; Steele & Southwick, 1985).

Negative Experiences Increase Aggression

When asked about the times that you have been aggressive, you would probably state that many of them occurred when you were angry, in a bad mood, tired, in pain, sick, or frustrated. You would be right because we are much more likely to aggress when we are experiencing negative emotions. The following are some causes of aggression:

- One important determinant of aggression is frustration. When we are frustrated we may lash out at others, even at people who did not cause the frustration. In some cases, the aggression is displaced aggression, which is aggression that is directed at an object or person other than the person who caused the frustration (Marcus-Maxwell, Pedersen, Carlson, & Miller, 2000).
- Aggression is greater on hot days than it is on cooler days and during hot years than during cooler years, and most violent riots occur during the hottest days of the year (Bushman, Wang, & Anderson, 2005).
- Pain also increases aggression (Berkowitz, 1993b).

If we are aware that we are feeling negative emotions, we might think that we could release those emotions in a relatively harmless way, such as by punching a pillow or kicking something, with the hopes that doing so will release our aggressive tendencies. This is incorrect! **Catharsis** or *the idea that observing or engaging in less harmful aggressive actions will reduce the tendency to aggress later in a more harmful way*, was considered by many as a way of decreasing violence. However, as far as social psychologists have been able to determine, catharsis simply does not work. Rather than decreasing aggression, engaging in aggressive behaviors of any type increases the likelihood of later aggression.

Figure 9.23

Source

Bushman, Baumeister, and Stack (1999) first angered their research participants by having another student insult them. Then half of the participants engaged in a cathartic behavior. They were given boxing gloves and were given a chance to hit a punching bag for 2 minutes. Then all the participants played a game with the person who had insulted them earlier and had a chance to get back at the other person with a painful blast of white noise. Contrary to the catharsis hypothesis, the students who had punched the punching bag set a higher noise level and delivered longer bursts of noise than the participants who did not get a chance to hit the punching bag. It seems that if we hit a punching bag, punch a pillow, or scream as loud as we can to release our frustration, the opposite may occur. Rather than decreasing aggression, these behaviors in fact increase it.

Viewing Violent Media Increases Aggression

The average American watches over 4 hours of television every day, and these programs contain a substantial amount of aggression. At the same time, children are also exposed to violence in movies and video games, as well as in popular music and music videos that include violent lyrics and imagery. Research evidence makes it very clear that, on average, people who watch violent behavior become more aggressive. The evidence supporting this relationship comes from many studies conducted over many years using both correlational designs, as well as experimental studies in which people have been randomly assigned to view either violent or nonviolent material (Anderson et al., 2003). Viewing violent behavior also increases aggression in part through observational learning. Children who witness violence are more likely to be aggressive.

Another outcome of viewing large amounts of violent material is **desensitization**, which is *the tendency over time to show weaker emotional responses to emotional stimuli*. When we first see violence, we are likely to be shocked, aroused, and even repulsed by it. However, over time, as we see more and more violence, we become habituated to it, such that the subsequent exposures produce fewer and fewer negative emotional responses. Continually viewing violence also makes us more distrustful and more likely to behave aggressively (Bartholow, Bushman, & Sestir, 2006; Nabi & Sullivan, 2001).

Of course, not everyone who views violent material becomes aggressive; individual differences also matter. People who experience a lot of negative affect and who feel that they are frequently rejected by others whom they care about are more aggressive (Downey, Irwin, Ramsay, & Ayduk, 2004). People with inflated or unstable self-esteem are more prone to anger and are highly aggressive when their high self-image is threatened (Baumeister, Smart, & Boden, 1996). For instance, classroom bullies are those children who always want to be the center of attention, who think a lot of themselves, and who cannot take criticism (Salmivalli & Nieminen, 2002). Bullies are highly motivated to protect their inflated self-concepts, and they react with anger and aggression when it is threatened.

There is a culturally universal tendency for men to be more physically violent than women (Archer & Coyne, 2005; Crick & Nelson, 2002). Worldwide, about 99% of rapes and about 90% of robberies, assaults, and murders are committed by men (Graham & Wells, 2001). These sex differences do not imply that women are never aggressive. Both men and women respond to insults and provocation with aggression; the differences between men and women are smaller after they have been frustrated, insulted, or threatened (Bettencourt & Miller, 1996).

Key Takeaways

- Close relationships are based on intimacy, which is determined by similarity, self-disclosure, and proximity.
- Altruism is behavior that is designed to increase another person's welfare, and particularly those actions that do not seem to provide a direct reward to the person who performs them. The tendency to help others in need is a functional evolutionary adaptation, and also determined by environmental factors.

- Although helping others can be costly to us as individuals, helping people who are related to us can perpetuate our own genes. Some helping is based on reciprocal altruism, the principle that if we help other people now, those others will return the favor should we need their help in the future.
- We also learn to help through modeling and reinforcement. The result of this learning is norms about helping, including the social responsibility norm.
- Research testing the Latané and Darley model of helping has shown the importance of the bystander effect when noticing, interpreting, and acting in emergency situations.
- Aggression is physical or nonphysical behavior intended to harm another individual. Aggression has both biological and environmental causes. The experience of negative emotions tends to increase aggression.
- Viewing violence tends to increase aggression.

Exercises and Critical Thinking

1. Consider a time when you were helpful. Was the behavior truly altruistic, or did you help for selfish reasons?
2. Consider a time when you or someone you know was aggressive. What do you think caused the aggression?
3. Should parents limit the amount of violent TV shows and video games that their children are exposed to? Why or why not?

Videos

1. Watch this video on the bystander effect. Video Clip: The Case of Kitty Genovese http://www.youtube.com/v/JozmWS6xYEw

2. This video shows Professor Albert Bandura describing his studies on the observational learning of aggression in children. Video Clip http://www.youtube.com/v/Pr0OTCVtHbU

Chapter Summary

Social psychology is the scientific study of how we feel about, think about, and behave toward the other people around us, and how those people influence our thoughts, feelings, and behavior. A fundamental principle of social psychology is that although we may not always be aware of it, our cognitions, emotions, and behaviors are substantially influenced by the people with whom we are interacting.

Our initial judgments of others are based in large part on what we see. The physical features of other people, particularly their sex, race, age, and physical attractiveness, are noticeable, and we often focus our attention on these dimensions.

Youth, symmetry, and averageness have been found to be cross-culturally consistent determinants of perceived attractiveness, although different cultures may also have unique beliefs about what is attractive.

We frequently use people's appearances to form our judgments about them, and these judgments may lead to stereotyping, prejudice, and discrimination. We use our stereotypes and prejudices in part because they are easy and we may be evolutionarily disposed to stereotyping. We can change and learn to avoid using them through positive interaction with members of other groups, practice, and education.

Causal attribution is the process of trying to determine the causes of people's behavior. Attributions may be made to the person, to the situation, or to a combination of both. Although people are reasonably accurate in their attributions, they may make self-serving attributions and fall victim to the fundamental attribution error.

Attitudes refer to our relatively enduring evaluations of people and things. Attitudes are important because they frequently (but not always) predict behavior. Attitudes can be changed through persuasive communications. Attitudes predict behavior better for some people than for others and in some situations more than others. Our behaviors also influence our attitudes through the cognitive processes of self-perception and the more emotional process of cognitive dissonance.

Social norms influence social roles which cultures use to socialize members. Zimbardo's prison experiment attempted to prove that social roles can have potentially negative consequences.

Persuasion can be obtained via a central route, that requires more carefully analysis of the information, or the peripheral route, that focuses more on our emotional reactions.

The foot-in-the-door technique gains compliance by getting people to agree to a small request followed by a later larger request. The door-in-the-face technique gains compliance by asking for an unreasonable request first, and then scaling it back to the smaller desired request. In low-ball compliance is gained by first getting people to agree to an attractive request, and then reneging on it. The that's-not-all technique gains compliance by adding more features, or dropping the price before people are asked to agree.

Both the foot-in-the-door and the low-ball techniques rely on people's desire to be consistent in their behavior or decision making. Both the door-in-the-face and the that's-not-all techniques rely on the reciprocity social norm.

We conform not only because we believe that other people have accurate information and we want to have knowledge (informational conformity) but also because we want to be liked by others (normative conformity). The typical outcome of conformity is that our beliefs and behaviors become more similar to those of others around us. Studies demonstrating the power of conformity include those by Asch, while Milgram researched obedience.

Although majorities are most persuasive, a minority influence may be more persuasive.

The tendency to perform tasks better or faster in the presence of others is known as social facilitation, whereas the tendency to perform tasks more poorly or more slowly in the presence of others is known as social inhibition. Zajonc explained the influence of others on task performance using the concept of physiological arousal.

Working in groups involves both costs and benefits. The costs of working in groups are observed in phenomena such as social loafing, group polarization, groupthink and deindividuation. These process losses can be reduced by better motivation and coordination among the group members, by keeping contributions identifiable, and by providing difficult but attainable goals.

Liking and loving in friendships and close relationships are determined by variables including similarity, disclosure, and proximity.

The tendency to help others in need is in part a functional evolutionary adaptation. We help others to benefit ourselves and to benefit the others. Reciprocal altruism leads us to help others now with the expectation those others will return the favor should we need their help in the future. The outcome of the reinforcement and modeling of altruism is the development of social norms about helping, including the reciprocity norm and the social responsibility norm. Latané and Darley's model of helping proposes that the presence of others can reduce noticing, interpreting, and responding to emergencies.

Aggression may be physical or nonphysical. Aggression is activated in large part by the amygdala and regulated by the prefrontal cortex. Testosterone is associated with increased aggression in both males and females. Aggression is also caused by negative experiences and emotions, including frustration, pain, and heat. As predicted by principles of observational learning, research evidence makes it very clear that, on average, people who watch violent behavior become more aggressive.

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Chapter 10 Defining Psychological Disorders

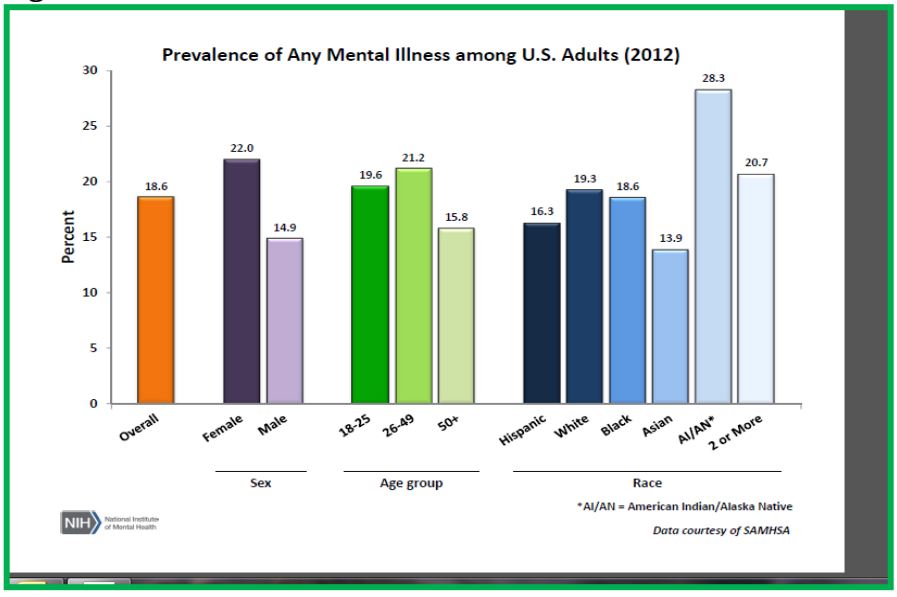
Learning Objectives

1. Define abnormal psychology.
2. List the criteria for a psychological disorder.
3. Describe the stigma of psychological disorders and their impact on those who are diagnosed with them.
4. Describe the structure and function of the Diagnostic and Statistical Manual of Mental Disorders and its criticisms.

The focus of the next two chapters is, to many people, the heart of psychology. This emphasis on **abnormal psychology**, which is *the application of psychological science to understanding and treating mental disorders*, is appropriate, as more psychologists are involved in the diagnosis and treatment of psychological disorder than in any other field (Lin, Stamm, & Christidis, 2018). Assessment and treatment of disorders are probably the most important tasks psychologists face. About 1 in every 5 American adults (or approximately 44.7 million) are affected by a psychological disorder during any one year (National Institute of Mental Health (NIMH), 2017), and at least a half billion people are affected worldwide. The impact of mental illness is particularly strong on people who are poorer, of lower socioeconomic class, and from disadvantaged ethnic groups.

People with psychological disorders are also stigmatized by the people around them, resulting in shame and embarrassment, as well as prejudice and discrimination against them. Thus, the understanding and treatment of psychological disorder has broad implications for the everyday life of many people. Figure 10.1 shows the 2012 **prevalence,** or *the frequency of occurrence of a given condition in a population at a given time*, of any mental illness in the United States based on gender, age, and ethnicity for adults.

Figure 10.1 Prevalence Rates for Adults



Children and adolescents also exhibit high levels of mental health disorders. Children 3-17 years of age were identified as having the following disorders based on information collected between the years 2005-2011 (Centers for Disease Control and Prevention (CDC), 2018).

- Attention-deficit/hyperactivity disorder (ADHD) (6.8%)
- Behavioral or conduct problems (3.5%)
- Anxiety (3.0%)
- Depression (2.1%)
- Autism spectrum disorder (1.1%)
- Tourette syndrome (0.2%) (among children aged 6–17 years)

Adolescents aged 12–17 years were identified as having a current diagnosis of

- Illicit drug use disorder in the past year (4.7%)
- Alcohol use disorder in the past year (4.2%)
- Cigarette dependence in the past month (2.8%)

It must be noted that psychological disorders frequently occur together. For instance, children and adults diagnosed with anxiety disorders also often have depressive disorders (Hunt, Slade, & Andrews, 2004). **Comorbidity** *occurs when people who suffer from one disorder also suffer at the same time from other disorders*. Because many psychological disorders are comorbid, most severe mental disorders are concentrated in a small group of people (about 6% of the population) who have more than three serious diagnoses (Kessler, Chiu, Demler, & Walters, 2005).

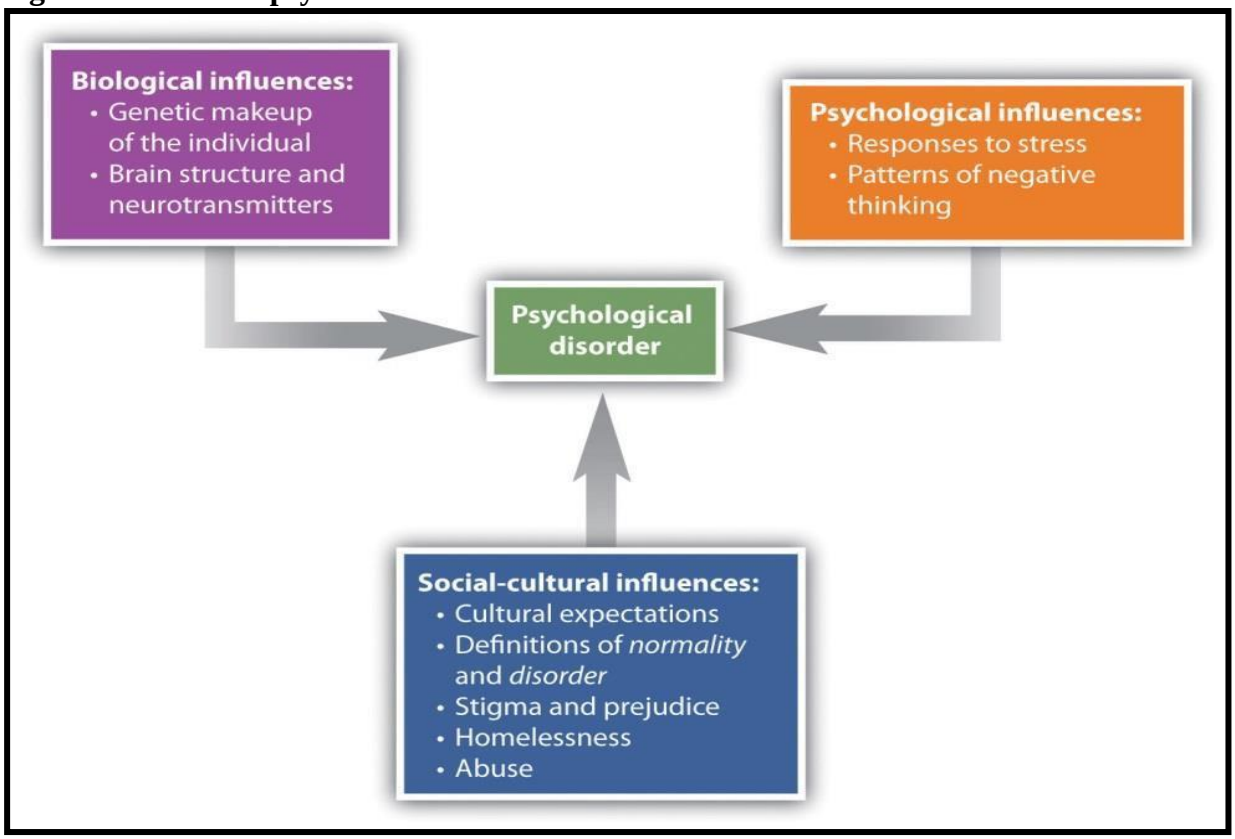
Defining a Disorder

According to the World Health Organization (2011), a **psychological disorder** is *a clinically recognizable set of symptoms or behaviours associated in most cases with distress and with interference with personal functions.* Disabilities include loss of the ability to function in an important area of functioning, such as home, social settings, work, or school.

Psychological disorders have much in common with other medical disorders. They are often out of the patient's control, they may in some cases be treated by drugs, and their treatment is often covered by medical insurance. Like medical problems, psychological disorders have both biological (nature) as well as environmental (nurture) influences. These causal influences are reflected in the biopsychosocial model of mental disorders (Engel, 1977).

The **biopsychosocial model** of mental disorders is *a way of understanding disorders that assumes the disorder is caused by biological, psychological, and social factors* (see Figure 10.2). The biological component refers to the influences that come from the functioning of the individual's body. Particularly important are genetic characteristics, that make some people more vulnerable to a disorder than others, and the influence of neurotransmitters. The psychological component refers to the influences that come from the individual, such as patterns of negative thinking and stress responses. The social component refers to social and cultural factors, such as socioeconomic status, homelessness, abuse, and discrimination.

Figure 10.2 The Biopsychosocial Model of Mental Disorders



The biopsychosocial model of disorders proposes that disorders are caused by biological, psychological, and social-cultural factors.

To consider one example, the psychological disorder of schizophrenia has a biological cause because it is known that there are patterns of genes that make a person vulnerable to the disorder (Gejman, Sanders, & Duan, 2010). Whether the person with a biological vulnerability develops the disorder depends, in large part, on psychological factors. These include how individuals respond to the stress experienced, whether the stressful environment occurs in adolescence, and whether they have support from people who care about them (Sawa & Snyder, 2002; Walker, Kestler, Bollini, & Hochman, 2004). Similarly, mood disorders are caused, in part, by genetic factors, such as hormones and neurotransmitters, the individual's thought patterns, and the ways that other people in the social environment treat the person with the disorder. The biopsychosocial model will be used as a framework for considering the causes and treatments of disorders.

Although they share many characteristics with medical conditions, psychological disorders are nevertheless different from them in important ways. For one, diagnosis of psychological disorders can be more difficult. Although a medical doctor can see cancer in the lungs using an MRI scan or see blocked arteries in the heart using cardiac catheterization, there is no corresponding test for a psychological disorder. Current research is beginning to provide more evidence about the role of brain structures in psychological disorder, but for now the brains of people with severe mental disturbances often look identical to those of people without such disturbances.

What Makes a Behavior "Abnormal"?

Deviance: Because there are no clear biological diagnoses for most mental disorders, psychological disorders are instead diagnosed on the basis of clinical observations of the individual's behaviors. These observations find that emotional states and behaviors operate on a continuum, ranging from more "normal" and "accepted" to more "abnormal," and "unaccepted." **Deviance** *refers to behaviors that are outside the realm of societal expectations.* The behaviors that are associated with a disorder are in many cases the same behaviors that we engage in our "normal" everyday life, but they are at an extreme level that is not consistent with normal functioning. For example, washing one's hands is a normal healthy activity, but it can be overdone by those with an obsessive-compulsive disorder (OCD).

Dysfunction: Whether a given behavior is considered a psychological disorder is determined not only by whether a behavior is deviant, but also by whether a behavior is dysfunctional or maladaptive**. Dysfunction** *refers to the extent to which the behavior causes impairment in one or more important areas of functioning.* An intense fear of spiders, for example, would not be considered a psychological disorder unless it has a significant negative impact on the individual's life, for instance by causing him or her to be unable to step outside the house.

Distress: Lastly, **distress** *refers to the behavior causing the individual physical or emotional harm.* Abusing substances, suicide attempts, and repeated bingeing and purging can cause distress. The additional focus on distress and dysfunction means that behaviors that are simply unusual are not classified as disorders. For example, less common cultural, religious or sexual practices are not considered disorders if they do not cause significant distress or dysfunction.

Figure 10.3 How Thin Is Too Thin?

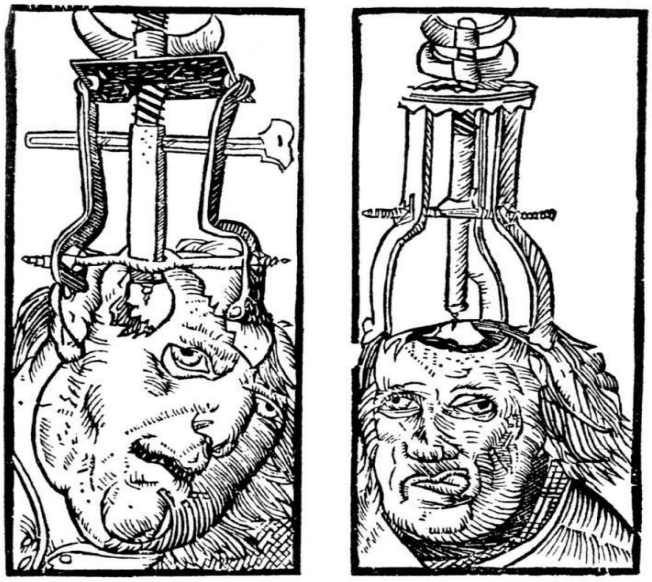
When does dieting turn into a disorder? Psychologists believe this happens when the behavior becomes distressing or dysfunctional to the person. © Thinkstock

Combating the Stigma of Abnormal Behavior

Every culture and society has its own views on what constitutes abnormal behavior and what causes it (Brothwell, 1981). Ancient tradition attributed psychological disorders to sorcery and witchcraft (Comer, 2015). During the Middle Ages, it was believed that mental illness occurred when the body was infected by evil spirits, particularly the devil. Remedies included whipping, bloodletting, purges, and trepanation, which involved cutting a hole in the skull to release the demons (see Figure 10.4).

Until the 18th century, the most common treatment for the mentally ill was to incarcerate them in asylums or "madhouses." During the 18th century, however, some reformers began to oppose this brutal treatment of the mentally ill, arguing that mental illness was a medical problem that had nothing to do with evil spirits or demons. In France, one of the key reformers was Philippe Pinel (1745–1826), who believed that mental illness was caused by a combination of physical and psychological stressors, exacerbated by inhumane conditions (Kring, Johnson, Davison, & Neale, 2016). Pinel advocated the introduction of exercise, fresh air, and daylight for the inmates, as well as treating them gently and talking with them. In America, the reformers Benjamin Rush (1745–1813) and Dorothea Dix (1802–1887) were instrumental in creating mental hospitals that treated patients humanely and attempted to cure them if possible (Comer, 2015; Kring et al., 2016). These reformers saw mental illness as an underlying psychological disorder, which was diagnosed according to its symptoms and which could be cured through treatment.

Figure 10.4 Trepanation



Trepanation (drilling holes in the skull) has been used since prehistoric times in attempts to cure epilepsy and mental disorders such as schizophrenia. Source: Courtesy of Peter Treveris

Despite the progress made since the 1800s in public attitudes about those who suffer from psychological disorders, people, including police, coworkers, and even friends and family members, still stigmatize people with psychological disorders. A **stigma** *refers to a disgrace or defect that indicates that person belongs to a culturally devalued social group.* In some cases, the stigma of mental illness is accompanied by disrespectful and dehumanizing labels, including names such as "crazy," "nuts," or "mental." The mass media, including movies, television shows, and advertisements, have a significant influence on society's negative attitudes toward mental illness (Francis, Pirkis, Dunt, & Blood, 2001; Kring et al., 2016; Tartakovsky, 2009).

The stigma of mental disorder affects people while they are ill, while they are healing, and even after they have healed (Schefer, 2003). On a community level, stigma can affect the kinds of services social service agencies give to people with mental disorders, and the treatment provided to them and their families by schools, workplaces, places of worship, and health-care providers. Stigma about mental illness also leads to employment discrimination, despite the fact that with appropriate support, even people with severe psychological disorders are able to hold a job (Boardman, Grove, Perkins, & Shepherd, 2003; Leff & Warner, 2006; Ozawa & Yaeda, 2007; Pulido, Diaz, & Ramirez, 2004).

The most significant problem of the stigmatization of those with psychological disorder is that it slows their recovery. People with mental disorders internalize societal attitudes about mental illness, often becoming so embarrassed or ashamed that they conceal their difficulties and fail to

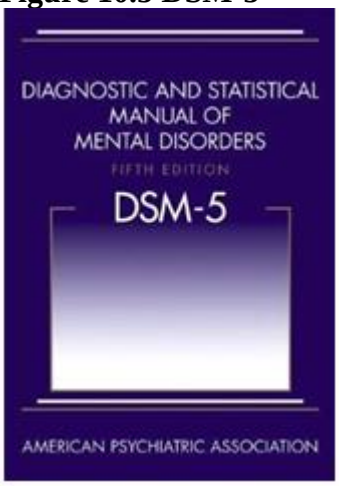
seek treatment. Stigma leads to lowered self-esteem, increased isolation, and hopelessness, and it may negatively influence the individual's family and professional life (Hayward & Bright, 1997).

Despite all of these challenges, however, many people overcome psychological disorders and go on to lead productive lives. It is up to all of us who are informed about the causes of psychological disorder and the impact of these conditions on people to understand, first, that mental illness is not a "fault" any more than is cancer. People do not choose to have a mental illness. Second, we must all work to help overcome the stigma associated with disorder. Organizations such as the National Alliance on Mental Illness (Greenstein, 2017), for example, work to reduce the negative impact of stigma through education, community action, individual support, and other techniques.

Diagnosing Disorders: The DSM

The American Psychiatric Association publishes the **Diagnostic and Statistical Manual of Mental Disorders (DSM)** to help therapists, researchers, drug companies, health insurance companies and policy makers in the United States determine whether behavior should be considered a psychological disorder. The DSM is a book that provides a common language and standard criteria for the classification of mental disorders (American Psychiatric Association (APA), 2013).

Figure 10.5 DSM-5



The Diagnostic and Statistical Manual of Mental Disorders (DSM) is used to classify psychological disorders in the United States.

The first edition of the DSM was published in 1952 on the basis of census data and psychiatric hospital statistics. Since then, the DSM has been revised six times. The fifth edition (DSM-5) was published in May 2013. The DSM-5 was designed in conjunction with the World Health Organization's 11th version of the International Classification of Diseases (ICD-11) (APA, 2013). The ICD-11 is used as a guide for mental disorders in Europe and other parts of the world. The DSM-5 made a number of significant changes from previous editions.

Each revision of the DSM takes into consideration new knowledge, as well as changes in cultural norms about disorders. For example, homosexuality was listed as a mental disorder in the DSM until 1973. It was removed in response to research that there was no more mental pathology among homosexuals than among heterosexuals (Hooker, 1957). The current DSM-5 lists more than 300 disorders.

The DSM-5 lists the symptoms that typically must be present to make a diagnosis, as well as, clinical features, demographic data, and statistical information. The DSM–5 identifies specific criteria that need to be met for diagnosis, and patients whose symptoms are similar to the description of the disorder are said to have that disorder. Within a diagnostic category, clinicians may also rate severity. Relevant psychosocial or environmental factors may also be noted.

DSM Criticisms: The DSM has been criticized regarding the nature of its categorization system, being based on weak research, lacking reliability and validity, and primarily focused on Western illnesses (Comer, 2015). Consequently, it is frequently revised to attempt to address these criticisms. Nevertheless, the DSM is a comprehensive, practical, and necessary tool that provides a common language to describe disorders. Most U.S. insurance companies will not pay for therapy unless the patient has a DSM diagnosis. The DSM approach allows a systematic assessment of the patient's medical condition, psychological and cultural factors, and the way the patient functions in everyday life. The manual is also a useful tool for researchers who need to know they are labeling disorders in the same way as other scientists.

Key Takeaways

- More psychologists are involved in the diagnosis and treatment of psychological disorder than in any other area, and those tasks are probably the most important psychologists face.
- The impact on people with a psychological disorder comes both from the disease itself and from the stigma associated with disorder.
- A psychological disorder is an ongoing pattern of thought, emotion, and behavior that causes significant distress or dysfunction and that is considered deviant in that person's culture or society.
- According to the biopsychosocial model, psychological disorders have biological, psychological, and social causes.
- It is difficult to diagnose psychological disorders, although the DSM provides guidelines that are based on a category system. The DSM is periodically revised, taking into consideration new knowledge, as well as changes in cultural norms about disorders.

Exercises and Critical Thinking

1. Do you or your friends hold stereotypes about the mentally ill? Can you think of or find clips from any films or other popular media that portray mental illness positively or negatively? Is it more or less acceptable to stereotype the mentally ill than to stereotype other social groups?

Anxiety, OCD, and PTSD

Learning Objectives

1. Outline and describe the different types of anxiety disorders, including generalized anxiety disorder, panic disorder, specific phobias, social phobia, and agoraphobia.
2. Discuss OCD and PTSD.
3. Explain the biological and environmental causes of anxiety disorders, OCD, and PTSD.

Anxiety, *the nervousness or agitation that we sometimes experience, often about something that is going to happen*, is a natural part of life. We all feel anxious at times, maybe when we think about our upcoming visit to the dentist or the presentation we must give to our class next week. Anxiety is an important and useful human emotion; it is associated with the activation of the sympathetic nervous system and the physiological and behavioral responses that help protect us from danger. However, too much anxiety can be distressing and disabling, and every year millions of people suffer from **anxiety disorders**, which are *psychological disturbances marked by irrational fears, often of everyday objects and situations* (Kessler et al., 2005).

Generalized Anxiety Disorder

For a few months now, I've had a really bad feeling inside of me. The best way to describe it is like a really bad feeling of negative inevitability, like something really bad is impending, but I don't know what. It's like I'm on trial for murder or I'm just waiting to be sent down for something. I have it all of the time but it gets worse in waves that come from nowhere with no apparent triggers. I used to get it before going out for nights out with friends, and it kinda stopped me from doing it as I'd rather not go out and stress about the feeling, but now I have it all the time so it doesn't really make a difference anymore (Chase, 2010).

Chase is probably suffering from a **generalized anxiety disorder (GAD)**, *a psychological disorder diagnosed in situations in which a person has been excessively worrying about money, health, work, family life, or relationships for at least 6 months, even though he or she knows that the concerns are exaggerated, and when the anxiety causes significant distress and dysfunction* (APA, 2013).

In addition to their feelings of anxiety, people who have GAD may also experience a variety of physical symptoms, including irritability, sleep troubles, difficulty concentrating, muscle aches, trembling, perspiration, and hot flashes. The person cannot deal with what is causing the anxiety, nor avoid it, because there is no clear cause for anxiety. In fact, the preson frequently knows, at least cognitively, that there is really nothing to worry about.

About 10 million Americans suffer from GAD, and about two thirds are women (Kessler et al., 2005; Robins & Regier, 1991). Generalized anxiety disorder is most likely to develop between the ages of 7 and 40 years, but its influence may in some cases lessen with age (Rubio & Lopez-Ibor, 2007).

Panic Disorder

When I was about 30 I had my first panic attack. I was driving home, my three little girls were in their car seats in the back, and all of a sudden, I couldn't breathe, I broke out into a sweat, and my heart began racing and literally beating against my ribs! I thought I was going to die. I pulled off the road and put my head on the wheel. I remember songs playing on the CD for about 15 minutes and my kids' voices singing along. I was sure I'd never see them again. And then, it passed. I slowly got back on the road and drove home. I had no idea what it was (Ceejay, 2006).

Ceejay may be diagnosed with a **panic disorder**, *a psychological disorder characterized by sudden attacks of anxiety and terror, known as panic attacks, that have led to significant behavioral changes in the person's life*. Symptoms of a panic attack include shortness of breath, heart palpitations, trembling, dizziness, choking sensations, nausea, and an intense feeling of dread or impending doom. Panic attacks can often be mistaken for heart attacks or other serious physical illnesses, and they may lead the person experiencing them to go to a hospital emergency room. Panic attacks may last as little as one or as much as 20 minutes, but they often peak and subside within about 10 minutes.

Sufferers are often anxious because they fear that they will have another attack. They focus their attention on the thoughts and images of their fears, becoming excessively sensitive to cues that signal the possibility of threat (MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002). They may also become unsure of the source of their arousal, misattributing it to situations that are not actually the cause. As a result, they may begin to avoid places where attacks have occurred in the past, such as driving, using an elevator, or being in public places. Panic disorder affects about 2%-3% of the American population in a given year (APA, 2013).

Phobias

A **phobia** is *a specific fear of a certain object, situation, or activity that adversely affects an individual's functioning*. The condition generally lasts more than 6 months (APA, 2013). The fear experience can range from a sense of unease to a full-blown panic attack. Most people learn to live with their phobias, but for others the fear can be so debilitating that they go to extremes to avoid the fearful situation. For example, a person with arachnophobia (fear of spiders), may refuse to enter a room until it has been checked thoroughly for spiders, or may refuse to vacation in the countryside because spiders may be there. Phobias are out of proportion to the real danger in a situation, taking cultural factors into consideration. A person with acrophobia (a fear of height) could fearlessly sail around the world on a sailboat with no concerns, yet refuse to go out onto the balcony on the fifth floor of a building.

Figure 10.6

Source

Specific phobias *are unreasonable fears of a clearly identified object or situation.* Examples of specific phobias include animals, blood, flying in a plane, or thunder and lightning. Treatments for specific phobias are generally successful and will be discussed in the following chapter.

A common phobia is **social phobia,** also known as social anxiety disorder, which is an *extreme discomfort in social situations due to a fear of being negatively evaluated by others or humiliating oneself.* Social phobia may be specific to a certain event, such as speaking in public or using a public restroom. People with social phobia will often experience physical symptoms in public, such as sweating profusely, blushing, stuttering, nausea, and dizziness. They are convinced that everybody around them notices these symptoms as they are occurring.

Agoraphobia is defined as *anxiety about being in places or situations from which escape might be difficult or in which help may not be available*. Typical places that provoke this anxiety are parking

lots, crowded streets or shops, bridges, tunnels, or expressways. The individual must experience this anxiety in at least two situations and the condition must last more than 6 months. People (mostly women) who suffer from agoraphobia may have great difficulty leaving their homes and interacting with other people.

All phobias affect about 9% of American adults, and they are about twice as prevalent in women as in men (Fredrikson, Annas, Fischer, & Wik, 1996; Kessler, Meron-Ruscio, Shear, & Wittchen, 2009). In most cases phobias first appear in childhood and adolescence, and usually persist into adulthood. Table 10.1 presents a list of the most common phobias diagnosed by psychologists.

Table 10.1 The Most Common Phobias

Name	Description
Acrophobia	Fear of heights
Agoraphobia	Fear of situations in which escape is difficult
Arachnophobia	Fear of spiders
Astraphobia	Fear of thunder and lightning
Claustrophobia	Fear of closed-in spaces
Cynophobia	Fear of dogs
Mysophobia	Fear of germs or dirt
Ophidiophobia	Fear of snakes
Pteromerhanophobia	Fear of flying
Social phobia	Fear of social situations
Trypanophobia	Fear of injections
Zoophobia	Fear of small animals

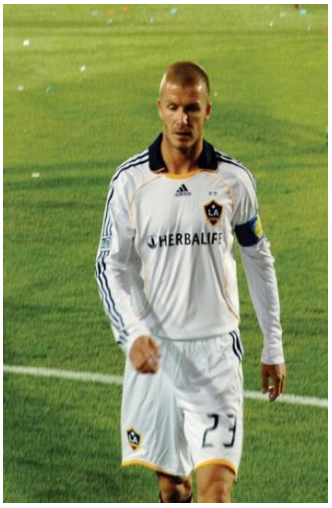
Obsessive-Compulsive Disorder (OCD)

I have got this obsessive-compulsive disorder where I have to have everything in a straight line or everything has to be in pairs. I'll put my Pepsi cans in the fridge and if there's one too many then I'll put it in another cupboard somewhere. I've got that problem. I'll go into a hotel room. Before I can relax, I have to move all the leaflets and all the books and put them in a drawer. Everything has to be perfect (Dave Beckham as reported in Dolan, 2006).

David Beckham's experience with obsessive behavior is not unusual. We all get a little obsessive at times. We may continuously replay a favorite song in our heads, worry about getting the right outfit for an upcoming party, or find ourselves analyzing a series of numbers that seem to have a

certain pattern. Our everyday compulsions can be useful. Going back inside the house once more to be sure that we really did turn off the sink faucet or checking the mirror a couple of times to be sure that our hair is combed, are not necessarily bad ideas. However, when the checking behavior becomes so persistent and time-consuming, it can then become a disorder.

Figure 10.7 David Beckam and OCD



The soccer star David Beckham suffers from obsessive-compulsive disorder (OCD). Source: Photo courtesy of Raj Patel

Obsessive-compulsive disorder (OCD) is *a psychological disorder that is diagnosed when an individual continuously experiences distressing or frightening thoughts, and then engages in repetitive behaviors.* **Obsessions** *are unwanted and distressing repetitive thoughts* and **compulsions** are the *repetitive behaviors done as a way to reduce the anxiety caused by the obsession.* OCD is diagnosed when the obsessive thoughts are so disturbing and the compulsive behaviors are so time consuming that they cause distress or interfere with functioning in a person's everyday life. Washing your hands once or even twice to make sure that they are clean is normal; washing them 20 times is not. Keeping your refrigerator neat is a good idea; spending hours a day organizing it is not. Those with OCD may know that these rituals are senseless, but they cannot bring themselves to stop them. One reason for the repetition is that the rituals reduce anxiety. This relief acts as a reinforcer, making the behavior more likely to occur again.

Individuals with OCD may avoid certain places that trigger the obsessive thoughts, or use alcohol or drugs to try to calm themselves down. In compariosn to anxiety disorders, OCD has a lower prevalence rate (about 1% of the population in a given year) and usually develops in adolescence or early adulthood (Horwath & Weissman, 2000; Samuels & Nestadt, 1997). The course of OCD varies from person to person. Also, symptoms can come and go, decrease, or get worse with time. OCD is listed in the DSM-5 in the category of Obsessive-Compulsive and Related Disorders, and this category also includes hoarding disorder and body dysmorphic disorder (APA, 2013).

Posttraumatic Stress Disorder (PTSD)

Jill, an Afghanistan war veteran, witnessed her fellow service members being hit by an improvised explosive device (IED) while driving a combat supply truck. The members of her truck survived, while those in the truck that hit the IED all died. Since returning home from Afghanistan, she has become increasingly depressed and began using alcohol on a daily basis. She has had difficulties in her employment, missing many days of work, and she reported feeling disconnected and numb around her husband and children. Additionally, she has experienced nightly sleep problems and has a recurring nightmare of all the images she experienced of the event. With no decrease in her symptoms, she sought help from a clinician (American Psychological Association, 2017).

People with **Posttraumatic stress disorder (PTSD)** *feel stress and fear that cause distress and interfere with their lives after having been exposed to a traumatic event*. People who have survived a terrible ordeal, such as combat, torture, sexual assault, imprisonment, abuse, natural disasters, or witnessing the death of someone, may develop PTSD. PTSD comes under the category of Trauma-

and Stressor-Related Disorders in the DSM-5 (APA, 2013). PTSD may begin months or even years after the event. People with PTSD experience **flashbacks** or *high levels of anxiety or arousal along with re-experiencing the trauma*, persistent negative alterations in mood or cognitions, and a strong desire to avoid any reminders of the event. They may lose interest in things they used to enjoy, startle easily, have difficulty feeling affection, and may experience terror, rage, depression, or insomnia. Behavioral changes may include irritability, aggression, recklessness, and self-destructive acts. The symptoms may be felt especially when approaching the area where the event took place or when the anniversary of that event is near. Diagnostic thresholds are lower for children and adolescents.

PTSD affects about 5 million Americans, including victims of the 9/11 terrorist attacks, the wars in Afghanistan and Iraq, hurricanes, fires and floods. Sixteen percent of Iraq war veterans, for example, reported experiencing symptoms of PTSD (Hoge & Castro, 2006). PTSD is a frequent outcome of childhood or adult sexual abuse. Women are more likely to develop PTSD than men (Davidson, 2000).

Risk factors for PTSD include the degree of the trauma's severity, the lack of family and community support, and additional life stressors (Brewin, Andrews, & Valentine, 2000). Many people with PTSD also suffer from another mental disorder, particularly depression, anxiety disorders, and substance abuse (Brady, Back, & Coffey, 2004).

Explaining Anxiety, OCD, and PTSD

Both nature and nurture contribute to the development of anxiety disorders. In terms of our evolutionary experiences, humans have evolved to fear dangerous situations. Those of us who had a healthy fear of the dark, of storms, of high places, of closed spaces, and of spiders and snakes were more likely to survive and have descendants. Our evolutionary experience can account for some modern fears as well. A fear of elevators may be a modern version of our fear of closed spaces, while a fear of flying may be related to a fear of heights.

Also supporting the role of biology, anxiety disorders, OCD, and PTSD are heritable (Hettema, Neale, & Kendler, 2001), and molecular genetics studies have found a variety of genes that are important in the expression of such disorders (Smoller et al., 2008; Thoeringer et al., 2009). Neuroimaging studies have found that anxiety disorders are linked to areas of the brain that are associated with emotion, blood pressure and heart rate, decision making, and action monitoring (Brown & McNiff, 2009; Damsa, Kosel, & Moussally, 2009). People who experience PTSD also have a somewhat smaller hippocampus in comparison with those who do not, and this difference may lead them to have a very strong sensitivity to traumatic events (Gilbertson et al., 2002).

Whether the genetic predisposition to anxiety becomes expressed as a disorder depends on environmental factors. People who were abused in childhood are more likely to be anxious than those who had normal childhoods, even with the same genetic disposition to anxiety sensitivity (Stein, Schork, & Gelernter, 2008), and PTSD is triggered by the experience of a major stressful event. One problem is that modern life creates a lot of anxiety. Although our life expectancy and quality of life have improved over the past 50 years, the same period has also created a sharp increase in anxiety levels (Twenge, 2006). These changes suggest that most anxiety disorders stem from perceived, rather than actual, threats to our well-being.

Anxiety, OCD, and PTSD are also learned through classical and operant conditioning. Just as rats that are shocked in their cages develop a chronic anxiety toward their laboratory environment, which has become a conditioned stimulus for fear, rape victims may feel anxiety when passing by the scene of the crime, and victims of PTSD may react to memories or reminders of the stressful event. Classical conditioning may also be accompanied by stimulus generalization. A single dog bite can lead to generalized fear of all dogs; a panic attack that follows an embarrassing moment in one place may be generalized to a fear of all public places. People's responses to their anxieties are often reinforced. Behaviors become compulsive because they provide relief from the torment of anxious thoughts. Similarly, leaving or avoiding fear-inducing stimuli leads to feelings of calmness or relief, which reinforces phobic behavior.

Key Takeaways

- Anxiety is a natural part of life, but too much anxiety can be debilitating. Every year millions of people suffer from anxiety disorders.
- People who suffer from generalized anxiety disorder experience chronic anxiety, while those who are identified with a panic disorder suffer from sudden attacks of extreme anxiety that mimic a heart attack.
- Phobias are specific fears of a certain object, situation, or activity.
- Social phobia is discomfort in social situations in which the individual feels that they will be negatively evaluated.
- Obsessive-compulsive disorder is diagnosed when a person's repetitive thoughts are so disturbing and their compulsive behaviors so time consuming that they cause distress and significant disruption in a person's everyday life.
- People who have survived a terrible ordeal may develop PTSD.
- Both nature and nurture contribute to the development of anxiety disorders, OCD, and PTSD.

Exercises and Critical Thinking

1. Under what situations do you experience anxiety? Are these experiences rational or irrational? Does the anxiety keep you from doing some things that you would like to be able to do?
2. Do you or people you know suffer from phobias? If so, what are the phobias and how do you think the phobias began? Do they seem more genetic or more environmental in origin?

Depressive and Bipolar Disorders

Learning Objectives

1. Describe and differentiate the various disorders related to mood, in particular, major depressive disorder, and bipolar disorder.
2. Explain the genetic and environmental factors that increase the likelihood that a person will develop a disorder related to mood.
3. Discuss the risk factors for suicide.

The everyday variations in our feelings of happiness and sadness reflect our **mood,** which can be defined as *the positive or negative feelings that are in the background of our everyday experiences*. In most cases, we are in a relatively good mood, and this positive mood has some positive consequences. It encourages us to do what needs to be done and to make the most of the situations we are in (Isen, 2003). When we are in a good mood our thought processes open-up, and we are more likely to approach others. We are more friendly and helpful to others when we are in a good mood than we are when we are in a bad mood, and we may think more creatively (De Dreu, Baas, & Nijstad, 2008). On the other hand, when we are in a bad mood we are more likely to prefer to be alone rather than interact with others, we focus on the negative things around us, and our creativity suffers.

Major Depressive Disorder

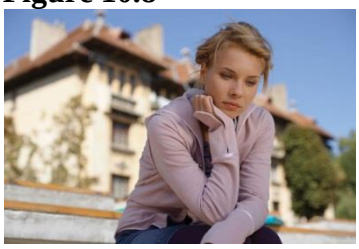
I didn't want to face anyone; I didn't want to talk to anyone. I didn't really want to do anything for myself…I couldn't sit down for a minute really to do anything that took deep concentration…It was like I had big huge weights on my legs and I was trying to swim and just kept sinking. And I'd get a little bit of air, just enough to survive and then I'd go back down again. It was just constantly, constantly just fighting, fighting, fighting, fighting, fighting (NIMH, 2010b).

It is not unusual to feel "down" or "low" at times, particularly after a painful event such as the death of someone close to us, a disappointment at work, or an argument with a partner. We often get depressed when we are tired, and many people report being particularly sad during the winter when the days are shorter. Depressive disorders are diagnosed when depressive symptoms cause serious distress and negatively influence physical, perceptual, social, and cognitive processes.

The level of depression observed in people with depressive disorders varies widely. If the depression is deep and lasts two or more weeks, the diagnosis may become that of major depressive disorder. **Major depressive disorder,** also known as clinical depression, is *a mental disorder characterized by significant distress or impairment in important areas of function* (APA, 2013). Those who suffer from major depressive disorder feel an intense sadness, despair, and loss of interest in pursuits that once gave them pleasure. These negative feelings profoundly limit the individual's day-to-day functioning and ability to maintain and develop interests in life (Fairchild & Scogin, 2008).

Depressive disorders can occur at any age, and the median age of onset is 32 years (Kessler, Berglund, Demler, Jin, & Walters, 2005). Recurrence of depressive episodes is fairly common and is greatest for those who first experience depression before the age of 15 years. About twice as many women suffer from depression than do men (Culbertson, 1997; Kessler et al., 2003; Kessler et al., 2005). This gender difference is consistent across many countries and cannot be explained entirely by the fact that women are more likely to seek treatment for their depression.

Figure 10.8



It is not unusual to feel "down" or "low" at times, but about 10% of the population suffers from dysfunctional and distressing disorders related to mood. © Thinkstock

About 21 million American adults suffer from a major depressive disorder in any given year; this is approximately 7% of the American population and 1.5% suffer from chronic major depressive disorder (APA, 2013). Rates of depression have been increasing over the past years, although the reasons for this increase are not known (Kessler et al., 2003). In some, clinically depressed people lose contact with reality and experience delusions and hallucinations.

Behaviors Associated with Depression

- Changes in appetite; weight loss or gain
- Difficulty concentrating, remembering details, and making decisions
- Fatigue and decreased energy
- Feelings of hopelessness, helplessness, and pessimism
- Increased use of alcohol or drugs
- Irritability, restlessness
- Loss of interest in activities or hobbies once pleasurable, including sex
- Loss of interest in personal appearance
- Persistent aches or pains, headaches, cramps, or digestive problems that do not improve with treatment
- Sleep disorders, either trouble sleeping or excessive sleeping
- Thoughts of suicide or attempts at suicide

Persistent Depressive Disorder

A significant change in the DSM-5 was the consolidation of chronic major depression and dysthymic disorder resulting in the classification of **Persistent Depressive Disorder** (APA, 2013). The essential feature of this disorder is a *depressed mood that occurs for most days for at least two years (one year for children or adolescents)*. If the full criteria for a major depressive disorder occurs during the time of the disorder, the individual should be diagnosed with major depressive disorder. Those identified with persistent depressive disorder describe their moods as "sad or down in the dumps" (APA, 2013, p. 169). These individuals are more likely to demonstrate comorbidity with other mental disorders, especially anxiety and substance use disorders, than those identified with major depressive disorder (APA, 2013).

Suicide

The experience of depression can also have a variety of negative effects on our behaviors. Individuals may become less productive and socially withdrawn. The person's sense of hopelessness and sadness may become so severe that he or she considers, attempts, or even succeeds in committing suicide. Suicide is the 10th leading cause of death in the United States (American Foundation for Suicide Prevention (AFSP), 2018).

According to AFSP (2018), women are more likely to attempt suicide, but men are more likely to succeed. One reason men are more likely to succeed is the method that they choose. Women will more often take an overdose of medication, while men will choose a gun. European Americans and Native Americans are more likely to kill themselves than members of other groups in the U.S. White, middle-aged and older males are most likely to commit suicide. Sometimes suicide in this group is related to a serious physical illness rather than depression. The older male may not want to burden his family financially or emotionally during a prolonged illness.

While the rate of suicide is low among young children, during adolescence the number of attempts, including successful attempts, is higher. Suicide can result from the interaction of mental disorders and other factors, and thus was the second leading cause of death among adolescents aged 12–17 years in 2010 (CDC, 2018). About 2.8 percent of teenagers make an attempt at suicide that is serious enough for medical attention to be sought (AFSP, 2018). Other factors that also increase the likelihood of suicide include prior suicide attempt, family history of mental disorder or substance abuse, family history of suicide, history of physical or sexual abuse, incarceration, or exposure to the suicidal behavior of others in general (NIMH, 2011).

Bipolar Disorders

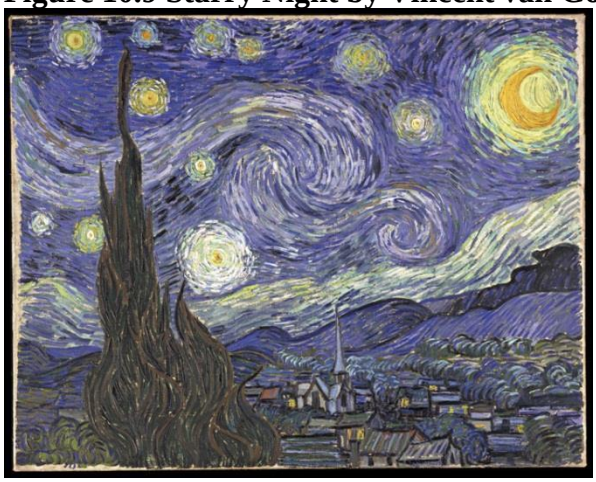
Juliana is a 21-year-old single woman. Over the past several years she had been treated by a psychologist for depression, but for the past few months she had been feeling a lot better. Juliana had landed a good job in a law office and found a steady boyfriend. She told her friends and parents that she had been feeling particularly good as her energy level was high and she was confident in herself and her life.

One day, Juliana was feeling so good that she impulsively quit her new job and left town with her boyfriend on a road trip. But the trip did not turn out well because Juliana became impulsive, impatient, and easily angered. Her euphoria continued, and in one of the towns that they visited she left her boyfriend and went to a party with some strangers that she had met. She danced into the early morning and ended up having sex with several of the men.

Eventually Juliana returned home to ask for money, but when her parents found out about her recent behavior, and when she acted aggressively and abusively to them when they confronted her about it, they referred her to a social worker. Juliana was hospitalized, where she was diagnosed with bipolar disorder.

While major depressive disorder is characterized by overwhelming negative moods, a **bipolar disorder** is *characterized by swings in mood and activity from overly high and energetic to sad and fatigued, and back again, with periods of near-normal mood and energy in between.* Bipolar disorder is diagnosed in cases such as Juliana's, where experiences with depression are followed by a more normal period and then a period of **mania** or *euphoria in which the person feels particularly awake, alive, talkative, excited, energetic, and involved in everyday activities.* However, the individual is also impulsive, agitated, distracted, and involved excessively in activities that have a high potential for negative consequences, such as buying sprees, gambling, sexual indiscretions, and foolish business investments (APA, 2013). Without treatment, it is likely that Juliana would cycle back into depression and then eventually into mania again, with the likelihood that she would harm herself or others in the process.

Figure 10.9 Starry Night by Vincent van Gogh



Based on his intense bursts of artistic productivity (in one 2-month period in 1889 he produced 60 paintings), personal writings, and behavior (including cutting off his own ear), it is commonly thought that van Gogh suffered from bipolar disorder. He committed suicide at age 37 (Thomas & Bracken, 2001).

Cyclothymic Disorder

Cyclothymic disorder is diagnosed for those individuals demonstrating numerous fluctuating periods of **hypomanic** *or persistently elevated, expansive or irritable mood,* and depressive symptoms, but these behaviors do not meet the criteria for a bipolar disorder (APA, 2013). These behaviors should have been present for at least half the time during a two-year period (at least one year for children and adolescents), and the individual has not been without the symptoms for more than two months.

Bipolar disorders are often chronic and lifelong conditions. Although the normal pattern involves swings from high to low, in some cases the person may experience both highs and lows at the same time. In this case, it may be difficult to determine if the individual has bipolar disorder or two separate diagnoses, anxiety and depression. Bipolar disorder is more likely to be diagnosed when it is initially observed at an early age, when the frequency of depressive episodes is high, and when there is a sudden onset of the symptoms (Bowden, 2001).

Explaining Mood Disorders

Disorders related to mood are known to be at least, in part, genetic (Berrettini, 2006; Merikangas et al., 2002). Neurotransmitters also play an important role in these disorders. Serotonin, dopamine, and norepinephrine are all known to influence mood (Sher & Mann, 2003), and drugs that influence the actions of these chemicals are often used to treat disorders of mood.

The brains of those with depressive disorders may, in some cases, show structural differences from those without them. Videbech and Ravnkilde (2004) found that the hippocampus was smaller in depressed subjects than in normal subjects, and this may be the result of reduced **neurogenesis** or the *process of generating new neurons* in depressed people (Warner-Schmidt & Duman, 2006). Antidepressant drugs may alleviate depression in part by increasing neurogenesis (Duman & Monteggia, 2006).

Box 10.1

Research Focus: Using Molecular Genetics to Unravel the Causes of Depression

Caspi and colleagues (Caspi et al., 2003) used a longitudinal study to test whether genetic predispositions might lead some people, but not others, to suffer from depression as a result of environmental stress. Their research focused on a particular gene, the 5-HTT gene, which is known to be important in the production and use of the neurotransmitter serotonin. The researchers focused on this gene because serotonin is known to be important in depression, and because selective serotonin reuptake inhibitors (SSRIs) have been shown to be effective in treating depression.

People who experience stressful life events, for instance, those involving threat, loss, humiliation, or defeat, are likely to experience depression. However, biological-situational models suggest that a person's sensitivity to stressful events depends on his or her genetic makeup. The researchers, therefore, expected that people with one type of genetic pattern would show depression following stress to a greater extent than people with a different type of genetic pattern.

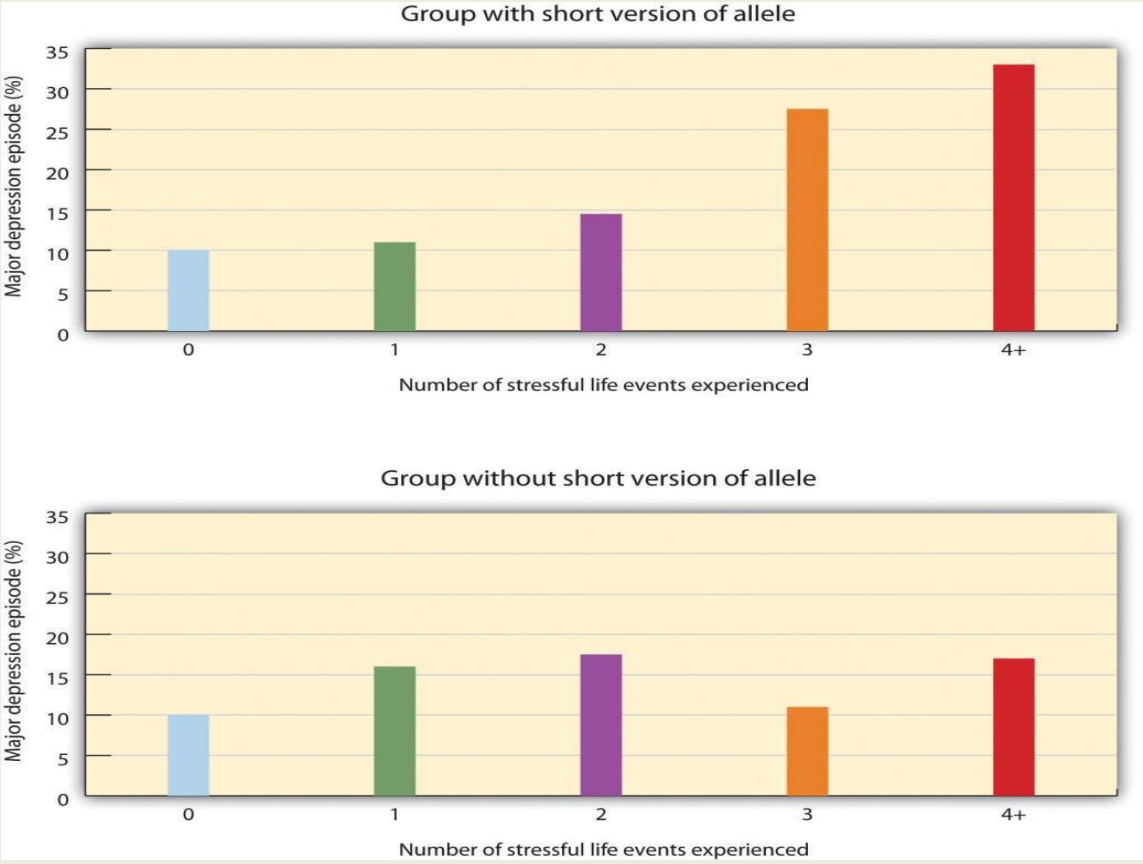
The research included a sample of 1,037 adults from Dunedin, New Zealand. Genetic analysis on the basis of DNA samples allowed the researchers to divide the sample into two groups on the basis of the characteristics of their 5-HTT gene. One group had a short version (or allele) of the gene, whereas the other group did not have the short allele of the gene.

The participants also completed a measure where they indicated the number and severity of stressful life events that they had experienced over the past 5 years. The events included employment, financial, housing, health, and relationship stressors. The dependent measure in the study was the level of depression reported by the participant, as assessed using a structured interview test (Robins, Cottler, Bucholtz, & Compton, 1995).

As you can see in Figure 10.10, when the number of stressful experiences the participants reported increased from 0 to 4, depression also significantly increased for the participants with the short version of the gene (top panel). For the participants who did not have a short allele, increasing stress did not increase depression (bottom panel). Furthermore, for the participants who experienced 4 stressors over the past 5 years, 33% of the participants who carried the short version of the gene became depressed, whereas only 17% of participants who did not have the short version did.

This important study provides an excellent example of how genes and environment work together: An individual's response to environmental stress was influenced by his or her genetic makeup.

Figure 10.10



Psychological and social determinants are also important in creating disorders of mood, including depression. Some situation, like loss of a loved one, may lead a person to become overwhelmed by negative emotions. In terms of psychological characteristics, mood states are influenced in large part by our cognitions. Negative thoughts about ourselves and our relationships to others create negative moods, and a goal of cognitive therapy for depressive disorders is to attempt to change people's cognitions to be more positive. Negative moods also create negative behaviors toward others, such as acting sad, slouching, and avoiding others, which may lead those others to respond negatively to the person, for instance by isolating that person, which then creates even more depression. In Figure 10.11 you can see how it might become difficult for people to break out of this "cycle of depression".

According to the WHO (2017), in 2015 the depression rate for the global population was approximately 4.4%, with females (5.1%) exhibiting rates higher than males (3.6%). Results by region indicated that Africa had the highest rates of depression (5.4%), while the Western Pacific region had the lowest (3.6%). The United States's rate of 5.9% was the second highest rate behind Ukraine (6.3%) and the same as Australia and Estonia. Differences among countries may be due to discrepancies between individual feelings and cultural expectations about what one should feel. People from America report that it is important to experience emotions such as happiness and excitement, whereas the Chinese report that it is more important to be stable and

calm. Because Americans may feel that they are not happy or excited, but think they are supposed to be, this may increase their depression (Tsai, Knutson, & Fung, 2006).

Figure 10.11 Cycle of Depression

Negative emotions create negative behavior which lead people to respond negatively to the depressed individual, creating even more depression.

Key Takeaways

- Mood is the positive or negative feelings that are in the background of our everyday experiences.
- We all may get depressed in our daily lives, but people who suffer from depressive disorders tend to experience more intense, and particularly more intense negative, moods.
- If a depression lasts longer than 2 weeks and is severe, the diagnosis may be a major depressive disorder.
- Bipolar disorders are characterized by swings in mood and energy from overly high to sad and fatigued, and back again, with periods of near-normal mood and energy in between.
- Depressive disorders are caused by the interplay among biological, psychological, and social variables.

Exercises and Critical Thinking

1. Give a specific example of the negative cognitions, behaviors, and responses of others that might contribute to a cycle of depression like that shown in Figure 10.11 "Cycle of Depression."
2. Given the discussion about the causes of negative moods and depression, what might people do to feel better on days that they are experiencing negative moods?

Schizophrenia

Learning Objectives

1. Define schizophrenia
2. Categorize and describe the major symptoms of schizophrenia.
3. Identify the biological and social factors that increase the likelihood that a person will develop schizophrenia.

I first started to experience symptoms of schizophrenia in college. I started having a common symptom of mental illness-grandiose thinking. I believed that I was going to discover some fabulous new mathematical principle that would transform the way we view the universe. I told no one about these thoughts. I started looking for clues to this mathematical theory in math books I found at the library. I actually learned very little about math though, because I couldn't focus on any of the material for any significant length of time. During my third year of college, I developed other symptoms more loosely related to paranoid schizophrenia. Once, I saw a police car behind me and I thought the police were following me. Later on, I cut my leg and decided to go to the university medical clinic. While I was there, I started to feel very vulnerable. I wondered if the nurses would try to hurt me in some way. I thought they might try to infect me with the AIDS virus by using a tainted needle. I started to think I was under surveillance 24 hours a day by some unseen group of people. At one point I wondered whether my whole life was manufactured by some type of virtual reality machine, operated by aliens (Snyder, 2007).

According to Ray (2018), the term schizophrenia, which in Greek means "to split the mind," (p. 455) was first used to describe a psychological disorder by Eugen Bleuler (1857–1939), a Swiss psychiatrist who was studying patients who had very severe thought disorders. **Schizophrenia** is *a serious psychological disorder marked by delusions, hallucinations, loss of contact with reality, inappropriate affect, disorganized speech, social withdrawal, and deterioration of adaptive behavior* (APA, 2013). *When the patient has lost contact with reality,* they are experiencing **psychosis.**

Acording to the NIMH (2010c) schizophrenia is the most chronic and debilitating of all psychological disorders. It affects males and females equally, although males typically have an earlier onset. Schizophrenia occurs in similar rates across ethnicities and across cultures, and affects at any one time approximately 3 million people in the United States. Onset of

schizophrenia is usually between the ages of 16 and 30 and rarely after the age of 45 or in children (Mueser & McGurk, 2004; Nicholson et al., 2000). Late onset cases (over age 40) are overrepresented by females, and characterized predominantly by psychotic symptoms and greater preservation of affect and social functioning. Diagnosing children is more difficult because delusions and hallucinations must be distinguished from normal fantasy play. Further, disorganized speech and behavior can occur in many childhood disorders (APA, 2013).

Symptoms of Schizophrenia

Schizophrenia is accompanied by a variety of symptoms, but not all patients have all of them (Lindenmayer & Khan, 2006). The symptoms are divided into positive symptoms, negative symptoms, and cognitive symptoms (APA, 2003; National Institute of Mental Health, 2010c).

Figure 10.12

People with schizophrenia may exhibit disorganized behavior, as this person does. Source: Photo courtesy of Max Avdeev

Positive symptoms: Positive symptoms *refer to the presence of abnormal behaviors or experiences that are not observed in other people*. People with schizophrenia almost always suffer from **hallucinations**, which are *imaginary sensations that occur in the absence of a real stimulus or which are gross distortions of a real stimulus*.

Auditory hallucinations are the most common and are reported by approximately 75% of patients (Nicolson, Mayberg, Pennell, & Nemeroff, 2006). People with schizophrenia frequently report hearing imaginary voices that curse them, comment on their behavior, order them to do things, or warn them of danger (NIMH, 2009). Visual hallucinations are less common and frequently involve seeing God or the devil (De Sousa, 2007).

Those with schizophrenia also commonly experience **delusions**, which are *false beliefs not commonly shared by others within one's culture, and maintained even though they are obviously out of touch with reality*. People with **delusions of grandeur** *believe that they are important, famous, or powerful.* They often become convinced that they are someone else, such as the president, or that they have some special talent or ability. Some claim to have been assigned to a special covert mission (Buchanan & Carpenter, 2005). People with **delusions of persecution** *believe that a person or group seeks to harm them*. They may think that people are able to read their minds and control their thoughts (Maher, 2001). If a person suffers from delusions of persecution, there is an increased risk of violence (Buchanan & Carpenter, 2005).

People suffering from schizophrenia also experience the positive symptom of **derailment**, or *the shifting from one subject to another, without following any one line of thought to conclusion*. In addition, they may exhibit grossly disorganized behavior, including inappropriate sexual

behavior, peculiar appearance and dress, unusual agitation (e.g., shouting and swearing), strange body movements, and awkward facial expressions. It is also common for those with schizophrenia to experience inappropriate affect. For example, a patient may uncontrollably laugh when hearing sad news. Movement disorders are also noted and can appear as repeating a certain motion again and again, or random and frenzied motor activity during which they become hyperactive and incoherent (Kirkpatrick & Tek, 2005). In other cases, a movement disorder can include **catatonia**, *a state in which a person does not move and appears oblivious to the environment* (Janno, Holi, Tuisku, & Wahlbeck, 2004; Rosebush & Mazurek, 2010). At least one of the core positive symptoms (hallucinations, delusions, derailment) must be present for schizophrenia to be diagnosed.

Negative symptoms: **Negative symptoms** *refer to the loss or deterioration of thoughts and behavior of typical functioning.* Negative symptoms include social withdrawal, poor hygiene and grooming, poor problem-solving abilities, and a distorted sense of time (Skrabalo, 2000). Patients often suffer from **flat affect**, *which means that they have a blank facial expression and speak in a monotone,* even though they may report feeling emotions (Kring, 1999). Many individuals with a long-standing history of schizophrenia exhibit a lack of speech output. Not all those with schizophrenia exhibit negative symptoms, but those who do also tend to have the poorest outcomes (Fenton & McGlashan, 1994). Negative symptoms are predictors of deteriorated functioning in everyday life, and often make it impossible for sufferers to work or to care for themselves.

Cognitive Symptoms: Finally, **cognitive symptoms** *are the changes in cognitive processes, including comprehending information and then using it to make decisions* (Skrabalo, 2000). Additional symptoms include difficulty maintaining focus and attention, problems with working memory, and trouble using information immediately after it is learned. The cognitive symptoms of schizophrenia are typically difficult for outsiders to recognize, but make it extremely difficult for the person with schizophrenia to lead a normal life. Table 10.2 reviews the main symptoms of schizophrenia.

Table 10.2 Positive, Negative, and Cognitive Symptoms of Schizophrenia

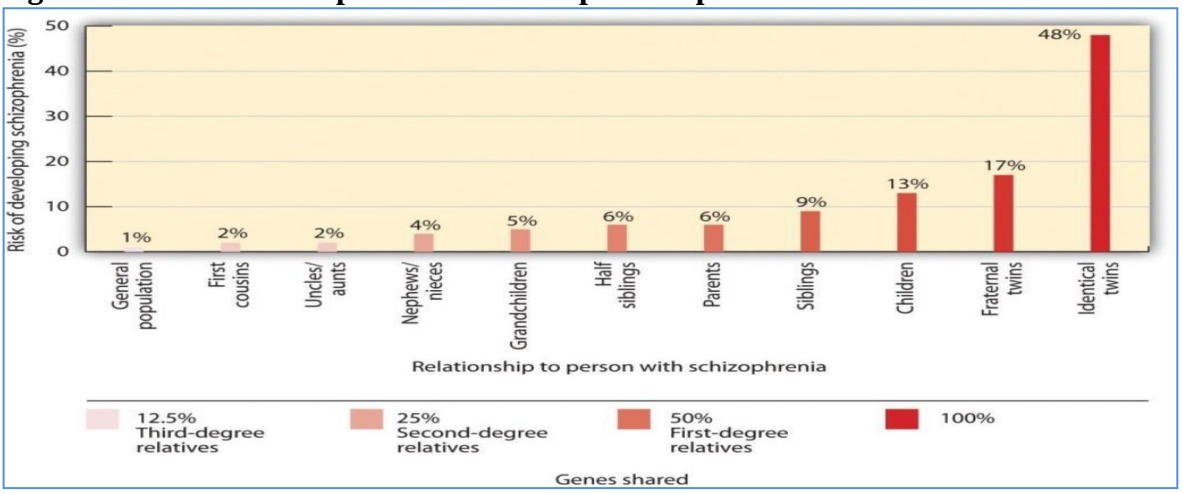
Positive Symptoms	Negative Symptoms	Cognitive Symptoms
Hallucinations	Social withdrawal	Poor executive control
Delusions	Flat affect and lack of pleasure in everyday life	Trouble focusing
Derailment	Apathy and loss of motivation	Working memory problems
Grossly disorganized behavior	Distorted sense of time	Poor problem-solving abilities
Inappropriate affect	Lack of goal-oriented activity and limited speech	
Movement disorders	Poor hygiene and grooming	

Explaining Schizophrenia

There is no single cause of schizophrenia. Rather, a variety of biological and environmental risk factors interact in a complex way to increase the likelihood that someone might develop schizophrenia (Walker, Kestler, Bollini, & Hochman, 2004).

Studies in molecular genetics have not yet identified the particular genes responsible for schizophrenia, but it is evident from research using family, twin, and adoption studies that genetics are important (Walker & Tessner, 2008). As you can see in Figure 10.13, the likelihood of developing schizophrenia increases dramatically if a close relative also has the disease.

Figure 10.13 Genetic Disposition to Develop Schizophrenia



The risk of developing schizophrenia increases substantially if a person has a relative with the disease. Adapted from Gottesman (1991).

Neuroimaging studies have found some differences in brain structure between schizophrenic and normal patients. In some people with schizophrenia, the cerebral ventricles (fluid-filled spaces in the brain) are enlarged (Suddath, Christison, Torrey, Casanova, & Weinberger, 1990). People with schizophrenia also frequently show an overall loss of neurons in the cerebral cortex, and some show less activity in the frontal and temporal lobes, which are the areas of the brain involved in language, attention, and memory. This would explain the deterioration of functioning in language and thought processing that is commonly experienced by schizophrenic patients (Galderisi et al., 2008). Woods (1998) indicated that this loss of brain volume occurs suddenly and rapidly. According to Carlson (2011) this loss coincides with a smaller decrease noted with nonschizophrenic young adults and may be due to an increase in synaptic pruning that occurs during this time.

Many researchers believe that schizophrenia is caused in part by excess dopamine, and this theory is supported by the fact that most of the drugs useful in treating schizophrenia inhibit dopamine activity in the brain (Javitt & Laruelle, 2006). Levels of serotonin may also play a part (Inayama et al., 1996). However, recent evidence suggests that the role of neurotransmitters in schizophrenia is more complicated than was once believed. It also remains unclear whether

observed differences in the neurotransmitter systems of people with schizophrenia cause the disease, or if they are the result of the disease itself or its treatment (Csernansky & Grace, 1998).

A genetic predisposition to developing schizophrenia does not always develop into the actual disorder. Even if a person has an identical twin with schizophrenia, he still has less than a 50% chance of getting it himself, and over 60% of all schizophrenic people have no first- or second-degree relatives with schizophrenia (Gottesman & Erlenmeyer-Kimling, 2001; Riley & Kendler, 2005). This suggests that there are important environmental causes as well.

One hypothesis is that schizophrenia is caused in part by disruptions to normal brain development in infancy that may be caused by poverty, malnutrition, and disease (Brown et al., 2004; Murray & Bramon, 2005; Susser et al., 1996; Waddington, Lane, Larkin, O'Callaghan, 1999). Stress also increases the likelihood that a person will develop schizophrenic symptoms; onset and relapse of schizophrenia typically occur during periods of increased stress (Walker, Mittal, & Tessner, 2008). However, it may be that people who develop schizophrenia are more vulnerable to stress than others and not necessarily that they experience more stress than others (Walker, Mittal, & Tessner, 2008). For example, many homeless people are likely to be suffering from undiagnosed schizophrenia.

Another social factor that has been found to be important in schizophrenia is the degree to which one or more of the patient's relatives is highly critical or highly emotional in their attitude toward the patient. Hooley and Hiller (1998) found that schizophrenic patients who ended a stay in a hospital and returned to a family with high expressed emotion were three times more likely to relapse than patients who returned to a family with low expressed emotion. It may be that the families with high expressed emotion are a source of stress to the patient.

Key Takeaways

- Schizophrenia is a serious psychological disorder marked by delusions, hallucinations, and loss of contact with reality. Schizophrenia is accompanied by a variety of symptoms, but not all patients have all of them.
- Because the schizophrenic patient has lost contact with reality, he or she is experiencing psychosis.
- Positive symptoms of schizophrenia include hallucinations, delusions, derailment, disorganized behavior, inappropriate affect, and catatonia.
- Negative symptoms of schizophrenia include social withdrawal, poor hygiene and grooming, poor problem-solving abilities, and a distorted sense of time.
- Cognitive symptoms of schizophrenia include difficulty comprehending and using information, problems maintaining focus, and problems with working memory.
- There is no single cause of schizophrenia. Rather, there are a variety of biological and environmental risk factors that interact in a complex way to increase the likelihood that someone might develop schizophrenia.

Exercise and Critical Thinking

1. How should society deal with people with schizophrenia? Is it better to keep patients in psychiatric facilities against their will, but where they can be observed and supported, or to allow them to live in the community, where they may get worse and have problems functioning. What factors influence your opinion?

Personality Disorders

Learning Objectives

1. Describe the different types of personality disorders and differentiate antisocial personality disorder from borderline personality disorder.
2. Outline the biological and environmental factors that may contribute to a person developing a personality disorder.

A **personality disorder** is *a disorder characterized by inflexible patterns of thinking, feeling, or relating to others that cause problems in personal, social, and work situations*. Personality disorders tend to emerge during late childhood or adolescence and usually continue throughout adulthood (Widiger, 2006). The disorders can be problematic for the people who have them, but they are less likely to bring people to a therapist for treatment.

The personality disorders are summarized in Table 10.3. They are categorized into three types:

- Characterized by odd or eccentric behavior
- Characterized by dramatic or erratic behavior
- Characterized by anxious or inhibited behavior.

As you consider the personality types described in Table 10.3, you will probably think of people that you know who have each of these traits, at least to some degree. Probably you know someone who seems a bit suspicious and paranoid, who feels that other people are always "ganging up on him," and who really does not trust other people very much. Perhaps you know someone who fits the bill of being overly dramatic, such as the "drama queen", who is always raising a stir and whose emotions seem to turn everything into a big deal. Also, you might have a friend who is overly dependent on others and cannot seem to get a life of her own.

The personality traits that make up the personality disorders are common. We see them in the people whom we interact with every day, yet they may become problematic when they are rigid, overused, or interfere with everyday behavior (Lynam & Widiger, 2001). What is perhaps common to all the disorders, is the person's inability to accurately understand and be sensitive to the motives and needs of the people around them.

Table 10.3 Descriptions of the Personality Disorders

Cluster	Personality Disorder	Characteristics
Odd/Eccentric	Schizotypal	Peculiar or eccentric manners of speaking or dressing; strange beliefs or magical thinking, such as belief in ESP or telepathy; difficulty forming relationships and conversing.
	Paranoid	Distrust in others, suspicious, and apt to challenge the loyalties of friends; prone to anger and aggressive outbursts, but otherwise emotionally cold; often jealous, guarded, secretive, and overly serious.
	Schizoid	Extreme introversion and withdrawal from relationships; prefers to be alone, little interest in others, humorless, distant, and often absorbed with own thoughts and feelings.
Dramatic/Erratic	Antisocial	Impoverished moral sense or "conscience"; history of deception, crimes, and legal problems; impulsive, aggressive or violent behavior; little emotional empathy or remorse; manipulative.
	Borderline	Unstable moods and intense, stormy personal relationships, frequent mood changes and anger; unpredictable impulses; self-mutilation or suicidal threats or gestures; self-image fluctuation.
	Histrionic	Constant attention seeking, grandiose language, provocative dress, exaggerated illnesses, overly dramatic, and excessively flirtatious.
	Narcissistic	Inflated sense of self-importance, absorbed by fantasies of self andsuccess, exaggerates own achievement, and exploitative of others.
Anxious/Fearful	Avoidant	Socially anxious and uncomfortable; yearns for social contact, but fears criticism and worries about being embarrassed in front of others; avoids social situations due to fear of rejection.
	Dependent	Submissive, dependent, requires excessive approval, reassurance, and advice; clings to people and fears losing them; lacks self-confidence and uncomfortable when alone.
	Obsessive-compulsive	Conscientious, orderly, perfectionist, and an excessive need to do everything "right"; inflexibly high standards and fear of errors can make this person strict and controlling; poor expression of emotions. **Obsessive compulsive personality disorder is not the same as obsessive-compulsive disorder.

Source: American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

The personality disorders create a bit of a problem for diagnosis. For one, it is frequently difficult for the clinician to accurately diagnose which of the many personality disorders a person has, although the friends and colleagues of the person can generally do a good job of it (Oltmanns & Turkheimer, 2006). Further, the personality disorders are highly comorbid; if a person has one, it is likely that he or she has others as well. Also, the number of people with personality disorders is estimated to be as high as 15% of the population (Grant et al., 2004), which might make us wonder if these are really "disorders" in any real sense of the word.

Although they are considered as separate disorders, some clinicians believe the personality disorders are essentially milder versions of more severe disorders (Huang et al., 2009). For example, obsessive-compulsive personality disorder is a milder version of obsessive-compulsive disorder (OCD), and schizoid and schizotypal personality disorders are characterized by symptoms similar to those of schizophrenia. This overlap in classification causes some confusion, and some theorists have argued that the personality disorders should be eliminated from the DSM. However, clinicians normally differentiate milder from more severe disorders, and thus the distinction is useful for them (Krueger, 2005; Phillips, Yen, & Gunderson, 2003; Verheul, 2005).

Two personality disorders that have important implications for behavior, will be further discussed. The first, borderline personality disorder (BPD), is important because it is so often associated with suicide, and the second, antisocial personality disorder (APD), because it is the foundation of criminal behavior. Borderline and antisocial personality disorders are also good examples to consider because they are so clearly differentiated in terms of their focus. BPD is known as an **internalizing disorder** *because the behaviors that it entails are mostly directed toward the self* (e.g., suicide and self-mutilation). APD, on the other hand, is a type of **externalizing disorder** *in which the problem behaviors focus primarily on harm to others* (e.g., lying, fighting, vandalism, and other criminal activity).

Borderline Personality Disorder (BPD)

Borderline personality disorder (BPD) is *a psychological disorder characterized by a prolonged disturbance of personality accompanied by mood swings, unstable personal relationships, identity problems, threats of self-destructive behavior, fears of abandonment, and impulsivity*. BPD is widely diagnosed as up to 20% of psychiatric patients are given the diagnosis, and it may occur in up to 2% of the general population (Hyman, 2002). About three-quarters of diagnosed cases of BDP are women.

People with BPD fear being abandoned by others, show a clinging dependency on others, and engage in manipulation to try to maintain relationships. They become angry if a partner limits the relationship, but deny that they care about the person. As a defense against fear of abandonment, those with BPD are compulsively social, but their behaviors, including intense anger, demands, and suspiciousness, repel people. People with BPD often deal with stress by engaging in self-destructive behaviors, such as, being sexually promiscuous, getting into fights, binge eating and purging, engaging in self-mutilation or drug abuse, and threatening suicide. These behaviors are designed to call forth a "saving" response from the other person. People with BPD are a continuing burden for police, hospitals, and therapists. Individuals with BPD also show disturbance in their concepts of identity: They are often uncertain about self-image, gender identity, values, loyalties, and goals. They may have chronic feelings of emptiness or boredom and be unable to tolerate being alone.

BPD has both genetic and environmental roots. In terms of genetics, research has found that those with BPD frequently have neurotransmitter imbalances (Zweig-Frank et al., 2006), and the disorder is heritable (Minzenberg, Poole, & Vinogradov, 2008). In terms of environment, many theories about the causes of BPD focus on a disturbed early relationship between the child and his or her parents. Some theories focus on the development of attachment in early childhood, while others point to parents who fail to provide adequate attention to the child's feelings. Others focus on parental abuse (both sexual and physical) in adolescence, as well as on divorce, alcoholism, and other stressors (Lobbestael & Arntz, 2009). The dangers of BPD are greater when they are associated with childhood sexual abuse, early age of onset, substance abuse, and aggressive behaviors. The problems are amplified when the diagnosis is comorbid, as it often is, with other disorders, such as substance related disorders, major depressive disorder, and PTSD (Skodol et al., 2002).

Box 10.2 Research Focus: Affective and Cognitive Deficits in BPD

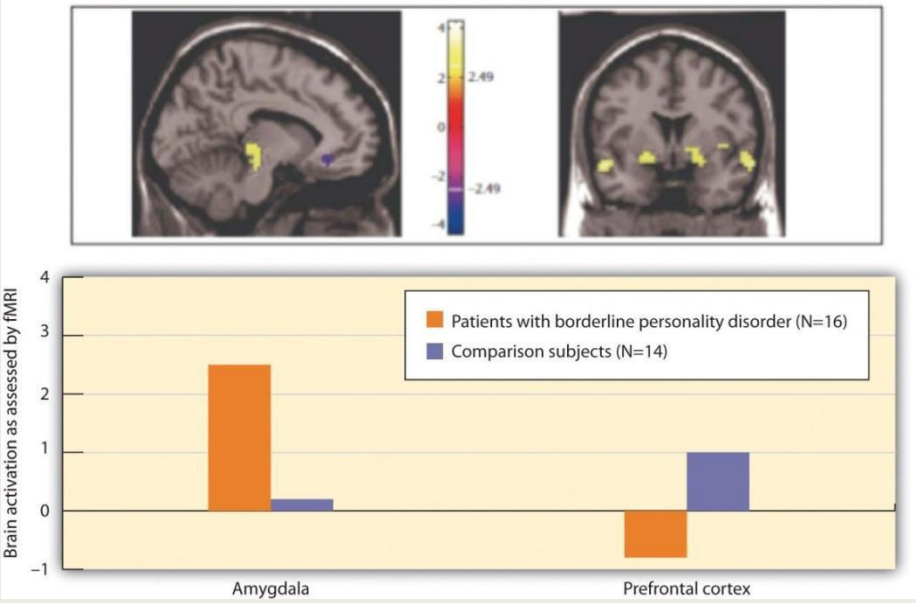
Posner et al. (2003) hypothesized that the difficulty that individuals with BPD have in regulating their lives, such as in developing meaningful relationships with other people, may be due to imbalances in the fast and slow emotional pathways in the brain. Specifically, they hypothesized that the fast emotional pathway through the amygdala is too active, and the slow cognitive-emotional pathway through the prefrontal cortex is not active enough in those with BPD.

The participants in their research were 16 patients with BPD and 14 healthy comparison participants. All participants were tested in a functional magnetic resonance imaging (fMRI) machine while they performed a task that required them to read emotional and nonemotional words, and then press a button as quickly as possible whenever a word appeared in a normal font and not press the button whenever the word appeared in an italicized font.

The researchers found that while all participants performed the task well, the patients with BPD had more errors than the controls, both in terms of pressing the button when they should not have and not pressing it when they should have. These errors primarily occurred on the negative emotional words.

Figure 10.14 shows the comparison of the level of brain activity in the emotional centers in the amygdala (left panel) and the prefrontal cortex (right panel). In comparison to the controls, the borderline patients showed relatively larger affective responses when they were attempting to quickly respond to the negative emotions, and showed less cognitive activity in the prefrontal cortex in the same conditions. This research suggests that excessive affective reactions and lessened cognitive reactions to emotional stimuli may contribute to the emotional and behavioral volatility of borderline patients.

Figure 10.14



Individuals with BPD showed less cognitive and greater emotional brain activity in response to negative emotional words. Source: Adapted from Posner et al. (2003).

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Antisocial Personality Disorder (APD)

In contrast to borderline personality disorder, which involves primarily feelings of inadequacy and a fear of abandonment, **antisocial personality disorder (APD)** is *a pervasive pattern of violation of the rights of others and a tendency to violate those rights without being concerned about doing so.* APD is about three times more likely to be diagnosed in men than in women. To be diagnosed with APD, the person must be 18 years of age or older. People having antisocial personality disorder are sometimes referred to as "sociopaths" or "psychopaths."

People with APD feel little distress for the pain they cause others. They lie, engage in violence against animals and people, and frequently have drug and alcohol abuse problems. They are egocentric and frequently impulsive, for instance suddenly changing jobs or relationships. People with APD soon end up with a criminal record and often spend time incarcerated. The intensity of antisocial symptoms tends to peak during the 20s and then may decrease over time.

Biological and environmental factors are both implicated in the development of antisocial personality disorder (Rhee & Waldman, 2002). Twin and adoption studies suggest a genetic predisposition (Rhee & Waldman, 2002), and biological abnormalities include low autonomic activity during stress, biochemical imbalances, right hemisphere abnormalities, and reduced gray matter in the frontal lobes (Lyons-Ruth et al., 2007; Raine, Lencz, Bihrle, LaCasse, & Colletti, 2000). Environmental factors include neglectful and abusive parenting styles, such as the use of harsh and inconsistent discipline and inappropriate modeling (Huesmann & Kirwil, 2007).

Key Takeaways

- A personality disorder is a disorder characterized by inflexible patterns of thinking, feeling, or relating to others that causes problems in personal, social, and work situations.
- Personality disorders are categorized into three clusters: Those characterized by odd or eccentric behavior, dramatic or erratic behavior, and anxious or inhibited behavior.
- Although they are considered as separate disorders, the personality disorders are essentially milder versions of more severe disorders.
- Borderline personality disorder is a prolonged disturbance of personality accompanied by mood swings, unstable personal relationships, and identity problems, and it is often associated with suicide.
- Antisocial personality disorder is characterized by a disregard of others' rights and a tendency to violate those rights without being concerned about doing so.

Exercises and Critical Thinking

1. What characteristics of men and women do you think make them more likely to have APD and BDP, respectively? Do these differences seem to you to be more genetic or more environmental?
2. Do you know people who suffer from antisocial personality disorder? What behaviors do they engage in, and why are these behaviors so harmful to them and others?

Disorders Originating in Childhood

Learning Objectives

1. Describe the characterisitcs of ADHD and autism.
2. Outline the biological and environmental factors that may contribute to a person developing ADHD and autism.

Lastly, we will review two common disorders that originate in childhood: Attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD). These two disorders have recently raised concerns because they are being diagnosed significantly more frequently than they were in the past. Assessing children is more difficult than adults, and this difficulty contributes to the controvery regarding the increased prevalence.

Attention-Deficit/Hyperactivity Disorder (ADHD)

Zack, aged 7 years, has always had trouble settling down. He is easily bored and distracted. In school, he cannot stay in his seat for very long and he frequently does not follow instructions. He is constantly fidgeting or staring into space. Zack has poor social skills and may overreact when someone accidentally bumps into him or uses one of his toys. At home, he chatters constantly and rarely settles down to do a quiet activity, such as reading a book.

Symptoms such as Zack's are common among 7-year-olds, and particularly among boys, but what do the symptoms mean? Does Zack simply have a lot of energy and a short attention span? Boys mature more slowly than girls at this age, and perhaps Zack will catch up in the next few years. One possibility is for the parents and teachers to work with Zack to help him be more attentive, to put up with the behavior, and to wait it out. Another option Zack's parents might choose, often on the advice of the child's school, is to take him to a psychologist for an assessment and diagnosis when these behaviors occur.

If Zack were taken for testing today, it is very possible that he would be diagnosed with a psychological disorder known as **attention-deficit/hyperactivity disorder (ADHD)**. **ADHD** is *a behavior disorder characterized by inattention and/or hyperactivity/impulsivity, in which symptoms are present before 12 years of age* (American Psychiatric Association, 2013). Although it is usually first diagnosed in childhood, ADHD can remain problematic in adults, and up to 7% of college students are diagnosed with it (Weyandt & DuPaul, 2006). In adults, the symptoms of ADHD include forgetfulness, difficulty paying attention to details, procrastination, disorganized work habits, and not listening to others. ADHD is about 70% more likely to occur in males than in females (Kessler et al., 2005), and is often comorbid with other disorders.

The diagnosis of ADHD has quadrupled over the past 20 years such that it is now diagnosed in about 1 out of every 20 American children and it is the most common psychological disorder among children in the world (Olfson, Gameroff, Marcus, & Jensen, 2003). ADHD is also being diagnosed much more frequently in adolescents and adults (Barkley, 1998). You might wonder what this all means. Are the increases in the diagnosis of ADHD due to the fact that today's children and adolescents are actually more distracted and hyperactive than their parents were, due to a greater awareness of ADHD among teachers and parents, or due to psychologists and psychiatrists' tendency to overdiagnose the problem? Perhaps drug companies are also involved, because ADHD is often treated with prescription medications, including stimulants, such as Ritalin.

Although skeptics argue that ADHD is overdiagnosed and is a handy excuse for behavioral problems, most psychologists believe that ADHD is a real disorder that is caused by a combination of genetic and environmental factors. Twin studies have found that ADHD is heritable (National Institute of Mental Health, 2010a), and neuroimaging studies have found that people with ADHD may have structural differences in areas of the brain that influence self-control and attention (Seidman, Valera, & Makris, 2005). Other studies have also pointed to environmental factors, such as mothers' smoking and drinking alcohol during pregnancy, and the consumption of lead and food additives by those who are affected (Braun, Kahn, Froehlich, Auinger, & Lanphear, 2006; Linnet et al., 2003; McCann et al., 2007). Social factors, such as family stress and poverty, also contribute to ADHD (Burt, Krueger, McGue, & Iacono, 2001).

Autism Spectrum Disorder (ASD)

Jared's kindergarten teacher has voiced her concern to Jared's parents about his difficulties with interacting with other children and his delay in developing normal language. Jared is unable to maintain eye contact and avoids mixing with other children. He also cannot communicate with people very well. He often responds to questions or comments with long-winded, immature speeches about trucks or some other topic that interests him, and he seems to lack awareness of other children's wishes and needs.

Jared's concerned parents took him to a multidisciplinary child development center for consultation. Here he was tested by a pediatric neurologist and a child psychologist. The pediatric neurologist found that Jared's hearing was normal, and there were no signs of any neurological disorder. He diagnosed Jared with an intellectual disability because his language skills and adaptive functioning were not age appropriate.

Based on her observation of Jared's difficulty interacting with his peers, and the fact that he did not respond warmly to his parents, the psychologist diagnosed Jared with **autism spectrum disorder (ASD) or autism**, *a disorder of neural development characterized by impaired social interaction and communication and by restricted repetitive behaviors, interests, and activities (RRBs).* If RRB's are not present, a social communication disorder is diagnosed. The psychologist believed that the autism diagnosis was correct because, like other children with autism, Jared has a poorly developed ability to see the world from the perspective of others; engages in unusual behaviors, such as talking about trucks for hours; and responds to stimuli, such as the sound of a car or an airplane, in unusual ways. According to the DSM-5 (APA, 2013), Jared would most probably receive a diagnosis of autism spectrum disorder, with accompanying intellectual impairment as a specifier.

The number of children diagnosed with an atism spectrum disorder is increasing dramatically. The most recent comprehensive report on the prevalence of autism in the United States indicated that in 2014, 1 in 59 children (1.7%) aged 8 years was identified with autism (Baio et al., 2018). Males were four times more likely than females to be identified with ASD, and prevalence estimates were higher for non-Hispanic white children compared with non-Hispanic black children, and both groups were more likely to be identified with ASD than Hispanic children. This information was obtained from The Autism and Developmental Disabilities Monitoring (ADDM) Network, which assesses 11 ADDM sites in the United States.

For many years autism was thought to be primarily a socially determined disorder, in which parents who were cold, distant, and rejecting created the problem, but current research suggests that biological factors are most important. The heritability of autism has been established (Freitag, 2007), and scientists speculate that autism is caused by an unknown genetically determined brain abnormality that occurs early in development. Epigenetic factors, such as prenatal exposure to viruses, may be responsible for turning on or off the genes that cause this disorder, resulting in the dramatic increase in the number of children currently affected. It is likely that several different brain sites are affected (Moldin, 2003), and the search for these areas is being conducted in many scientific laboratories. For example, a lack of synaptic pruning has been theorized as one cause. Neuroscientists at Columbia University Medical Center reported that children with autism have an excess amount of brain synapses due to a slowing down in the normal "pruning" process during development (Tang et al., 2014). Because synapses are the points where neurons connect and

communicate with each other, the excessive synapses affect how the brain functions. Paternal age at conception has also been identified in an autism diagnosis due to the accumulation of mutations that occur overtime in sperm (Janecka et al., 2017).

Key Takeaways

- ADHD is a behavior disorder characterized by inattention, hyperactivity, and impulsivity that occurs prior to 12 years of age.
- Autism is a disorder characterized by impaired social interaction and communication and by restricted repetitive behaviors, interests, and activities.
- Both genetic and prenatal factors are hypothesized to cause ADHD and autism.
- There is controversy regarding the overdiagnosis of both ADHD and autism.

Exercises and Critical Thinking

1. Consider the diagnoses of ADHD and autism from the biological, personal and social-cultural perspectives. Do you think that these disorders are overdiagnosed? How might clinicians determine if ADHD and autism are distressing to the individual?

Videos

1. This video course, titled The World of Abnormal Psychology, provides additional information about many specific disorders, including some not covered in this chapter. In addition, you will see interviews with patients, scenes from treatment facilities, demonstrations from research studies, and discussions by mental health professionals. Thirteen one-hour programs can be viewed for free. http://www.learner.org/resources/series60.html These videos are based on an earlier version of the DSM.

Chapter Summary

Abnormal psychology is defined as the application of psychological science to understanding and treating mental disorders.

More psychologists are involved in the diagnosis and treatment of psychological disorder than in any other aspect of psychology.

About 1 in every 5 Americans (approximately 44.7 million people) are estimated to be affected by a psychological disorder during any one year. The impact of mental illness is particularly strong on people who are poorer, of lower socioeconomic class, and from disadvantaged ethnic groups.

The biopsychosocial model of mental disorders is used to explain the causes of mental illness.

A psychological disorder is a deviant, distressing, and dysfunctional pattern of thought, emotion, or behavior. Psychological disorders are often comorbid, meaning that a given person suffers from more than one disorder.

The stigma of mental disorders affects people while they are ill, while they are healing, and even after they have healed. Mental illness is not a "fault," and it is important to work to help overcome the stigma associated with disorder.

Psychologists diagnose disorders using the Diagnostic and Statistical Manual of Mental Disorders (DSM). The DSM uses categories, and patients with close approximations to the characteristics in the category are said to have that disorder. The current version is the DSM-5

Anxiety disorders are psychological disturbances marked by irrational fears, often of everyday objects and situations. They include generalized anxiety disorder (GAD), panic disorder, and phobias. Anxiety disorders affect about 9% of American adults every year.

Obsessive-compulsive disorder (OCD) and posttraumatic stress disorder (PTSD) are other disorders in which anxiety is a major symptom.

Major depressive disorder, persistent depressive disorder, bipolar disorder, and cyclothymia also involve inappropriate moods that interfere with daily life. The cycle of depression involves negative cognitions, leading to negative emotions, leading to negative behaviors towards others that ultimately lead to negative responses from others that keep the negative cognitions active.

Schizophrenia is a serious psychological disorder marked by delusions, hallucinations, loss of contact with reality, inappropriate affect, disorganized speech, social withdrawal, and deterioration of adaptive behavior. About 3 million Americans have schizophrenia.

A personality disorder is a long-lasting, but frequently less severe disorder, characterized by inflexible patterns of thinking, feeling, or relating to others that causes problems in personal, social, and work situations. They are characterized by odd or eccentric behavior, by dramatic or erratic behavior, or by anxious or inhibited behavior. Two of the most important personality disorders are borderline personality disorder (BPD) and antisocial personality disorder (APD).

Attention-deficit/hyperactivity disorder (ADHD) and autistic spectrum disorder are two disorders identified in childhood. They are both being diagnosed significantly more frequently than they were in the past.

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Chapter 11 Treating Psychological Disorders

Learning Objectives

1. Explain the psychological, biomedical, and social approaches to treatment.
2. Define therapy.
3. Explain psychological assessment.

Psychological disorders create a tremendous individual, social, and economic drain on society. Disorders make it difficult for people to engage in productive lives and effectively contribute to their family and to society. Disorders lead to disability and absenteeism in the workplace, as well as physical problems, premature death, and suicide. At a societal level the costs are staggering. It has been estimated that the annual financial burden of each case of anxiety disorder is over $3,000 per year, meaning that the annual cost of anxiety disorders alone in the United States runs into the trillions of dollars (Konnopka, Leichsenring, Leibing, & König, 2009; Smit et al., 2006).

The goal of this chapter is to review the various techniques that are used to treat psychological disorders. Just as psychologists consider the causes of a disorder in terms of the biopsychosocial model of mental disorders, treatment is also based on psychological, biological, and social approaches. A clinician may focus on any or all of the three approaches to treatment, but when deciding which to use, research on the effectiveness of different treatments should prevail.

- The psychological approach to reducing a disorder involves providing help to individuals or families through psychological therapy, known as psychotherapy. These include psychodynamic, humanistic, and cognitive-behavioral therapeutic approaches.
- The biomedical approach to reducing a disorder is based on the use of medications to treat mental disorders, as well as the employment of brain intervention techniques, including electroconvulsive therapy (ECT), transcranial magnetic stimulation (TMS), and psychosurgery.
- The social approach to reducing a disorder focuses on changing the social environment in which individuals live to reduce the underlying causes of disorders. These approaches include group, couples, and family therapy, as well as community outreach programs. The community approach is likely to be the most effective of the three approaches because it focuses not only on treatment, but also on prevention of disorders (World Health Organization (WHO), 2004).

Individuals may seek **therapy,** *which is treatment for psychological problems,* when their distress becomes severe or when they find themselves unable to function normally. Other individuals may be referred to therapy by a physician, court, parent, or school. Couples or family groups might also attend therapy to address problems with relationships. Possible settings for this therapy include clinics, hospitals, counseling centers, or private practice. The individual who attends therapy may be referred to as a client or a patient, depending on the theoretical views of the therapist and the nature of the problem.

Psychological Assessment

A psychologist may begin therapy by systematically learning about the patient's needs through a formal **psychological assessment**, which is *an evaluation of the patient's psychological and mental health*. During the assessment the psychologist will conduct a thorough interview with the individual seeking help. Objective or projective tests might be administered. The therapist may also get more information from family members, school personnel, medical records, or other sources. In addition to the psychological assessment, the patient may be seen by a physician to gain information about potential physical problems.

After the medical and psychological assessments are completed, the therapist might make a formal diagnosis using the detailed descriptions of the disorder provided in the Diagnostic and Statistical Manual of Mental Disorders (DSM) (APA, 2013). Insurance companies require a DSM diagnosis in order to justify payment for the treatment.

Some psychotherapists will not use a formal diagnosis. This is particularly true for those therapists who are helping with relationship issues or other problems that are not being paid for with insurance. However, all therapists will keep records of the initial assessment and identified problem areas. The therapist will discuss with the client how the problems might be addressed and goals for the therapy. Written informed consent documents will be signed which outline financial and procedural issues of the therapeutic contract. Referrals to other professionals might be made if the client will need therapy in addition to or instead of the type of services the original therapist can provide.

Psychotherapy

Learning Objectives

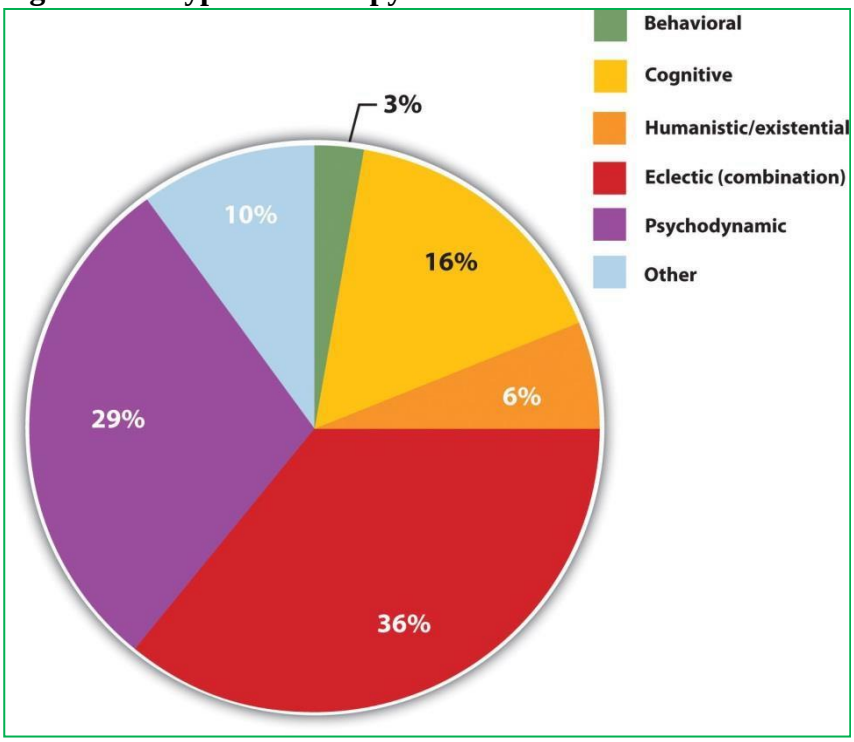
1. Define psychotherapy.
2. Differentiate among psychodynamic, humanistic, behavioral, and cognitive therapies.
3. Explain the behavioral and cognitive aspects of cognitive-behavioral therapy and how CBT is used to reduce psychological disorders.
4. Describe the effectiveness of psychotherapy.

One approach to treatment is **psychotherapy**, *the professional treatment of psychological disordersd through techniques designed to encourage communication of conflicts and insight*. The fundamental aspect of psychotherapy is that the patient directly confronts the disorder and works with the therapist to help reduce it. Therapy includes assessing the client's issues and problems, planning a course of treatment, setting goals for change, the treatment itself, and an evaluation of the patient's progress. Therapy is practiced by thousands of psychologists and other trained practitioners in the United States and around the world.

To many people, therapy involves a patient lying on a couch with a therapist sitting behind and nodding sagely as the patient speaks. However, this approach to therapy is outdated (Hansell, Ehrlich, Katz, Lerner, & Minter, 2008). It is estimated that there are over 400 different kinds of

therapy practiced by people in many fields (Norcross, Hodges, & Castle, 2002), and the most important of these are shown in Figure 11.1. The therapists who provide these treatments include psychiatrists, who have a medical degree and can prescribe drugs, clinical or counseling psychologists, social workers, psychiatric nurses, and couples, marriage, and family therapists.

Figure 11.1 Types of Therapy Practiced in the U.S.



Source: Adapted from Norcross, Hedges, & Castle (2002).

Psychodynamic Therapy

Psychodynamic therapy is *a psychological treatment based on Freudian and neo-Freudian theories in which the therapist helps the patient explore early childhood relationships and the unconscious dynamics of the individual.* The patient's personal concerns and anxieties are discussed, and through interpretation, the therapist tries to understand the underlying unconscious problems that are causing the symptoms. The analyst may try out some interpretations on the patient and observe how he or she responds to them.

According to Shedler (2010), the current psychodynamic approach to treatment has seven distinct features:

- Encourages exploration and discussion of the full range of a patient's emotions
- Explores resistance, or the attempts of the patient to avoid distressing thoughts and feelings
- Identifies recurring themes and patterns in the patient's thoughts, feelings, self-concept, relationships, and life experiences
- Discusses past experiences, especially early experiences with attachment figures
- Focuses on patients' relationships and interpersonal experiences
- Focuses on the therapeutic relationship, including transference
- Explores the patient's desires, fears, fantasies, dreams, and daydreams to gain insight into how the patient views self, others, and experiences

The patient may be asked to verbalize his or her thoughts through **free association**, in which the *therapist listens while the client talks about whatever comes to mind, without any censorship or filtering.* The goal of psychoanalysis is to help the patient develop **insight**; that is, *an understanding of the unconscious causes of the disorder* (Epstein, Stern, & Silbersweig, 2001; Lubarsky & Barrett, 2006). Unfortunately, the patient may show **resistance,** *or an unconscious refusal to accept these new understandings,* to avoid the painful feelings in his or her unconscious.

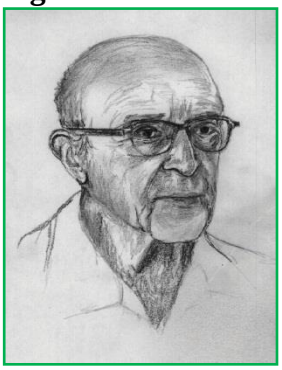
For example, the patient might forget or miss appointments, or act out with hostile feelings toward the therapist. The therapist attempts to help the patient develop insight into the causes of the resistance. The sessions may also lead to **transference**, in which *the patient unconsciously redirects feelings experienced in an important personal relationship toward the therapist*. For instance, the patient may transfer feelings of guilt or anger that come from the father or mother to the therapist.

The psychodynamic approach to therapy has been criticized for several reasons including: Incorporating aspects of Freud's unproven ideas, being too "abstract" by focusing on unconscious experiences, lacking research on the therapy's effectiveness, and utilizing a long-term therapeutic model that is not efficient in today's insurance-limited world (Novotney, 2017). Current psychodynamic approaches frequently use shorter-term, focused, and goal-oriented approaches. In these "brief psychodynamic therapies," the therapist helps the client determine the important issues to be discussed at the beginning of treatment and usually takes a more active role (Levenson, 2010). Additionally, psychodynamic researchers and therapists have focused their efforts on using research to demonstrate the effectiveness of their approach to treatment. According to Shedler (2010) and Novotney (2017), early research results assessing the effectiveness of psychodynamic therapy have been promising.

Humanistic Therapy

Just as psychodynamic therapy is based on the theories of Freud and the neo-Freudians, humanistic therapy is a psychological treatment based on the theories of Carl Rogers and other humanistic psychologists. **Humanistic therapy** *is based on the idea that people develop psychological problems when they are burdened by limits and expectations placed on them by themselves and others.* The treatment emphasizes the person's capacity for self-realization and fulfillment. Humanistic therapies attempt to promote growth and responsibility by helping clients consider their own situations and the world around them and how they can work to achieve their life goals.

Figure 11.2



Carl Rogers was among the founders of the humanistic approach to therapy and developed the fundamentals of person-centered therapy. Source

Carl Rogers developed **person-centered therapy also known as client-centered therapy,** which is *an approach to treatment in which the client is helped to grow and develop.* The therapist provides a comfortable, nonjudgmental environment. Rogers (1980) argued that therapy was most productive when the therapist created a positive relationship with the client through a therapeutic alliance. The **therapeutic alliance** is *a relationship between the client and the therapist that is facilitated by several techniques.* These include:

- **Genuineness** or *no barriers to free-flowing thoughts and feelings.*
- **Unconditional positive regard** in which *the therapist values the client without any qualifications and displays an accepting attitude toward whatever the client is feeling at the moment.*
- **Empathy** *by actively listening to and accurately perceiving the personal feelings that the client expresses.*

The development of a positive therapeutic alliance has been found to be exceedingly important to successful therapy. The ideas of genuineness, unconditional positive regard, and empathy in a nurturing relationship in which the therapist actively listens to and reflects the feelings of the client is probably the most fundamental part of contemporary psychotherapy (Prochaska & Norcross, 2007).

Behavioral Therapy

The goals of some people with psychological disorders are very specific. A person with a social phobia may want to be able to leave his or her house. A person with OCD may want to stop his obsessions or compulsions from interfering with everyday activities. In these cases, it is not necessary to revisit childhood experiences or consider our capacities for self-realization, we simply want to deal with what is happening in the present, and behavioral therapy does that.

Behavioral therapy is *psychological treatment that is based on principles of learning*. The most direct approach is through operant conditioning, which uses rewards or punishments. Reinforcement may be used to teach new skills to people, for instance, those with autism or schizophrenia (Granholm et al., 2008; Herbert et al., 2005; Scattone, 2007). If the patient has trouble dressing or grooming, then reinforcement techniques, such as providing tokens that can be exchanged for snacks, are used to reinforce appropriate behaviors such as putting on one's clothes in the morning or taking a shower at night. If the patient has trouble interacting with others, reinforcement will be used to teach the client how to more appropriately respond in public, for instance, by maintaining eye contact, smiling when appropriate, and modulating tone of voice.

As the patient practices the different techniques, the appropriate behaviors are shaped through reinforcement to allow the client to manage more complex social situations. In some cases, observational learning may also be used. The client may be asked to observe the behavior of others who are more socially skilled to acquire appropriate behaviors. People who learn to improve their interpersonal skills through skills training may be more accepted by others, and this social support may have substantial positive effects on their emotions.

When the disorder is anxiety or a phobia, then the goal of the therapy is to reduce the negative affective responses to the feared stimulus. **Exposure therapy** is *a behavioral therapy based on the classical conditioning principle of extinction, in which people are confronted with a feared stimulus with the goal of decreasing their negative emotional responses to it* (Wolpe, 1973). Exposure treatment can be carried out in real situations or through imagination, and it is used in the treatment of panic disorder, agoraphobia, social phobia, OCD, and posttraumatic stress disorder (PTSD).

In **flooding,** *a client is exposed to the source of his fear all at once*. A person with agoraphobia might be taken to a crowded shopping mall or someone with an extreme fear of heights to the top of a tall building. The assumption is that the fear will subside as the client habituates to the situation while receiving emotional support from the therapist during the stressful experience. An advantage of the flooding technique is that it is quick and often effective, but a disadvantage is that the patient may relapse after a short period of time.

Table 11.1 Hierarchy of Fears in Systematic Desensitization

Behavior	Fear rating
Think about a spider	10
Look at a photo of a spider	25
Look at a real spider in a closed box	50
Hold the box with the spider	60
Let a spider crawl on your desk	70
Let a spider crawl on your shoe	80
Let a spider crawl on your pants leg	90
Let a spider crawl on your sleeve	95
Let a spider crawl on your bare arm	100

More frequently, the exposure is done more gradually. **Systematic desensitization** is *a behavioral treatment that combines imagining or experiencing the feared object or situation with relaxation exercises* (Wolpe, 1973). The client and the therapist work together to prepare a hierarchy of fears, starting with the least frightening, and moving to the most frightening scenario surrounding the object (see Table 11.1). The patient then confronts his or her fears in a systematic manner, sometimes using imagination, but usually, when possible, in real life situations.

Desensitization techniques use the principle of **counterconditioning,** in which *a second incompatible response, such as relaxation, is conditioned to an already conditioned response, the fear response.* The continued pairing of the relaxation responses with the feared stimulus as the patient works up the hierarchy gradually leads the fear response to be extinguished, and the relaxation response to take its place.

Behavioral therapy works best when people directly experience the feared object. Fears of spiders are more directly habituated when the patient interacts with a real spider, and fears of flying are best extinguished when the patient gets on a real plane, but it is often difficult and expensive to create these experiences.

Figure 11.3 Virtual Reality Equipment

Source

Recent advances in virtual reality have allowed clinicians to provide therapy in what seem like real situations to the patient. In **virtual reality therapy**, *the therapist uses computer-generated, three-dimensional, lifelike images of the feared stimulus in a systematic desensitization program.* Specially designed computer equipment, often with a head-mount display, is used to create a simulated environment. A common use is in helping soldiers who are experiencing PTSD return to the scene of the trauma and learn how to cope with the stress it invokes.

Some of the advantages of the virtual reality treatment approach are that it is economical, the treatment session can be held in the therapist's office with no loss of time or confidentiality, the session can easily be terminated as soon as a patient feels uncomfortable, and many patients who

have resisted live exposure to the object of their fears are willing to try the new virtual reality option first (Hofmann, 2018).

Aversion therapy is *a type of behavior therapy in which classical conditioning is used to reduce the frequency of an undesirable behavior*. An unpleasant stimulus is intentionally paired with a harmful or socially unacceptable behavior until the behavior becomes associated with unpleasant sensations and is hopefully reduced. A child who wets the bed may be required to sleep on a pad that sounds an alarm when it senses moisture. Over time, the conditioned response produced by the alarm reduces the bedwetting behavior (Houts, Berman, & Abramson, 1994). Aversion therapy is also used to stop other specific behaviors, such as nail biting (Allen, 1996).

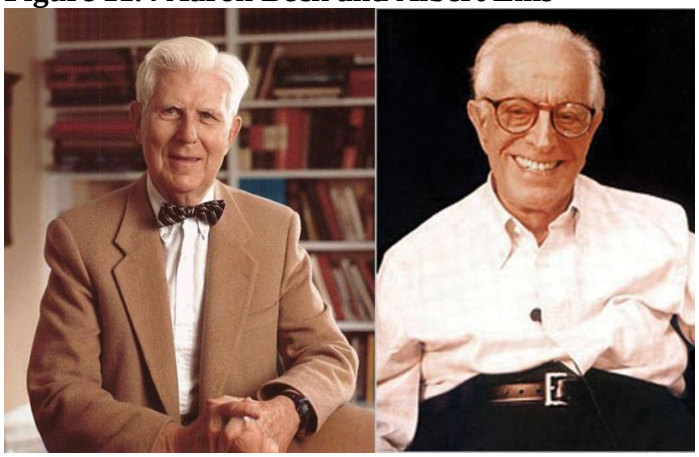
Alcoholism has long been treated with aversion therapy (Baker & Cannon, 1988). In a standard approach, patients are treated at a hospital where they are administered a drug, antabuse, that makes them nauseous if they consume any alcohol. The technique works very well if the user keeps taking the drug (Krampe et al., 2006), but unless it is combined with other approaches the patients are likely to relapse after they stop taking the drug.

Cognitive Therapy

While behavioral approaches focus on the actions of the patient, **cognitive therapy** is *a psychological treatment that helps clients identify incorrect or distorted beliefs that are contributing to disorders*. In cognitive therapy, the therapist helps the patient develop new, healthier ways of thinking about themselves and about the others around them. The idea of cognitive therapy is that changing thoughts will change emotions, and that the new emotions will then influence behavior.

The goal of cognitive therapy is not necessarily to get people to think more positively, but rather to think more accurately. For instance, a person who thinks "no one cares about me" is likely to feel rejected, isolated, and lonely. If the therapist can remind the client that the client has a mother or daughter who does care, more positive feelings will likely follow. Similarly, it may be helpful to change beliefs from: "I have to be perfect" to "No one is always perfect"; from "I am a terrible student" to "I am doing well in some of my courses,"; and from "She did that on purpose to hurt me" to "Maybe she didn't realize how important it was to me."

Figure 11.4 Aaron Beck and Albert Ellis



Sources: Beck photo courtesy of Michael Britt
Ellis photo courtesy of the Albert Ellis Institute

The psychiatrist Aaron Beck and the psychologist Albert Ellis together provided the basic principles of cognitive therapy. Ellis (2004) called his approach rational emotive behavior therapy (REBT) or rational emotive therapy (RET), and he focused on pointing out the flaws in the

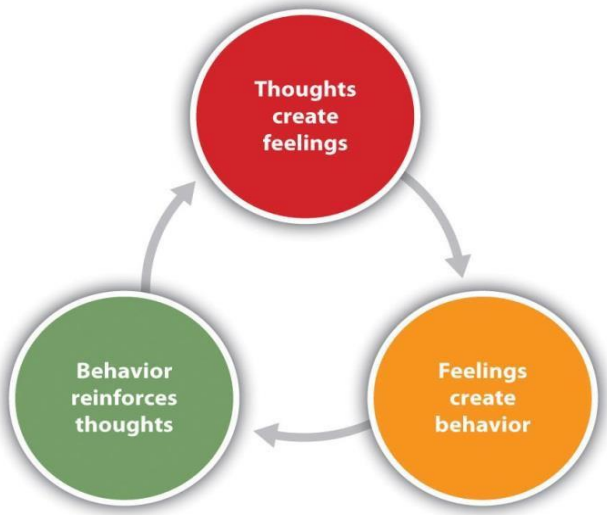
patient's thinking. Ellis noticed that people experiencing strong negative emotions tend to personalize and overgeneralize their beliefs, leading to an inability to see situations accurately (Leahy, 2003). In REBT, the therapist's goal is to challenge these irrational thought patterns, helping the patient replace the irrational thoughts with more rational ones, leading to the development of more appropriate emotional reactions and behaviors.

Beck's cognitive therapy was based on his observation that people who were depressed generally had a large number of highly accessible negative thoughts that influenced their thinking (Beck, 1995; Beck, Freeman, & Davis, 2004). His goal was to develop a short-term therapy for depression that would modify these unproductive thoughts. Beck's approach challenges the client to test beliefs against concrete evidence. If a client claims that "everybody at work is out to get me," the therapist might ask to provide instances to corroborate the claim. At the same time, the therapist might point out contrary evidence, such as the fact that a certain coworker is actually a loyal friend or that the patient's boss had recently offered praise.

Cognitive-Behavioral Therapy

Since the 1980s, therapists have combined the principles of the behavioral perspective with the foundations of the cognitive perspective to create cognitive-behavioral therapy (Hofmann, 2018). **Cognitive-behavior therapy (CBT)** is *a structured approach to treatment that attempts to reduce psychological disorders through systematic procedures based on cognitive and behavioral principles*. As you can see in Figure 11.5, CBT is based on the idea that there is a link among our thoughts, our feelings, and our behavior. For instance, if we are feeling depressed, our negative thoughts ("I am doing poorly in my chemistry class") lead to negative feelings ("I feel hopeless and sad"), which then contribute to negative behaviors (lethargy, disinterest, lack of studying). When we or other people look at the negative behavior, the negative thoughts are reinforced and the cycle repeats itself (Beck, 1976). Similarly, in panic disorder a patient may misinterpret his or her feelings of anxiety as a sign of an impending physical or mental catastrophe (such as a heart attack), leading to an avoidance of a particular place or social situation. The fact that the patient is avoiding the situation reinforces the negative thoughts. Again, the thoughts, feelings, and behavior amplify and distort each other.

Figure 11.5 Cognitive-Behavior Therapy



Cognitive-behavior therapy (CBT) is based on the idea that our thoughts, feelings, and behavior reinforce each other and that changing our thoughts or behavior can make us feel better.

CBT is a very broad approach that is used for the treatment of a variety of problems including: Depression, bipolar disorder, anxiety, OCD, PTSD, eating, substance use disorders, ADHD, and psychotic disorders (Hofmann, 2018). CBT directly treats the inappropriate behaviors or distorted cognitions, and does not attempt to address the underlying issues that cause the problem. The goal

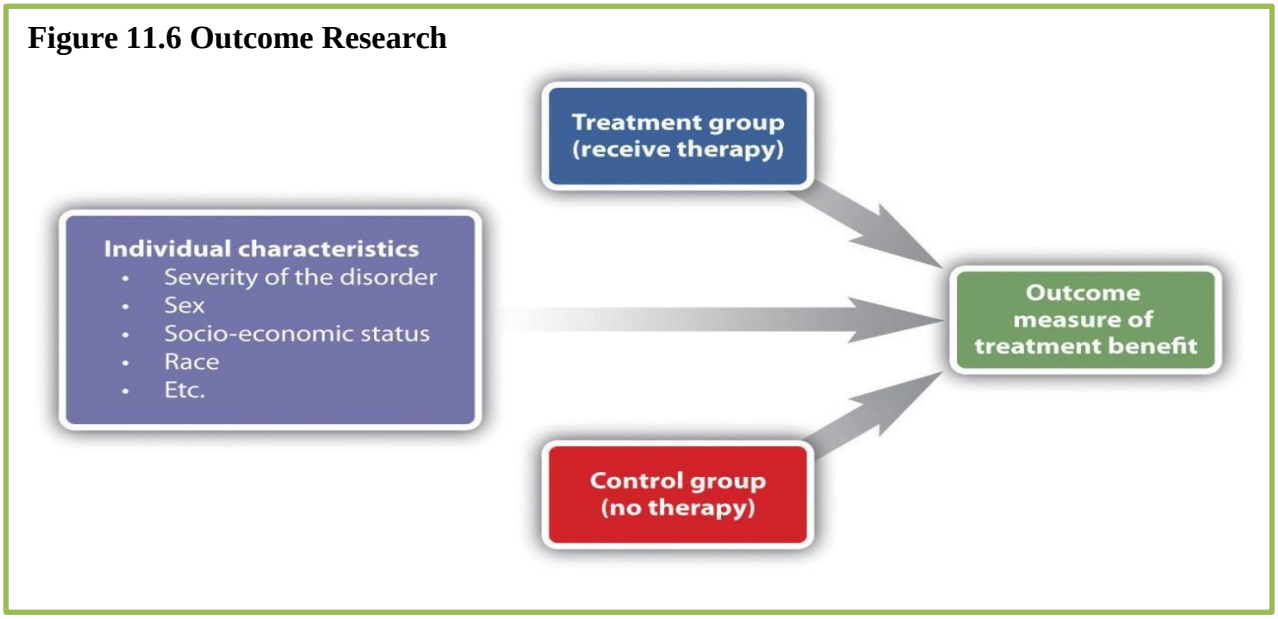
is simply to stop the negative cycle by intervening to change cognition or behavior. With CBT, the client and the therapist work together to develop the goals of the therapy, the particular ways that the goals will be reached, and the timeline for reaching them. The procedures are problem-solving and action-oriented, and the client is forced to take responsibility for his or her own treatment. The client is assigned tasks tocomplete that will help improve the disorder and takes an active part in the therapy. The treatment usually lasts between 10 and 20 sessions.

Depending on the particular disorder, some CBT treatments may be primarily behavioral in orientation. These treatments focus on the principles of classical, operant, and observational learning. Other treatments are more cognitive, focused on changing negative thoughts related to the disorder, but almost all CBT treatments use a combination of behavioral and cognitive approaches.

Effectiveness of Psychotherapy

To determine if therapy is helpful, psychologists use **outcome research**, that is, *studies that assess the effectiveness of different therapies*. As you can see in Figure 11.6, in these studies the independent variable is the type of the treatment. For instance, what type of psychotherapy was

Figure 11.6 Outcome Research



used or how long it lasted, is manipulated. In most cases, characteristics of the client, such as gender, age, disease severity, and prior psychological histories, are also collected as control variables. The dependent measure is an assessment of the benefit received by the client. In some cases, we might simply ask the client if he or she feels better, and in other cases we may directly measure behavior. This can include such specific situations as whether the client can now get in an airplane and take a flight. Accurate empirical answers to these questions are important as they help practitioners focus their efforts on the techniques that have been proven to be most promising. They also may guide societies as they decide how to spend public money to improve their citizens quality (Hunsley & Di Giulio, 2002).

In every case the scientists evaluating the therapy must keep in mind that other effects, rather than the treatment itself, might be important, that some treatments that seem effective might not be, and that some treatments might actually be harmful. One threat to the validity of outcome research studies is **natural improvement** or *the possibility that people might get better over time, even without treatment.* People who begin therapy or join a self-help group do so because they are feeling bad or engaging in unhealthy behaviors. After being in a program over a period of time, people frequently feel that they are getting better, but it is possible that they would have improved even if they had not attended the program, and that the program is not actually making a difference. To demonstrate that the treatment is effective, the people who participate in it must be compared with another group of people who do not get treatment.

Another possibility is that therapy works, but that it does not really matter which type of therapy is used. **Nonspecific treatment effects** occur *when the patient gets better over time simply by coming to therapy, even though it does not matter what actually happens at the therapy sessions*. The idea is that therapy works, in the sense that it is better than doing nothing, but that all therapies are pretty much equal in what they are able to accomplish. Finally, **placebo effects** are *improvements that occur due to the expectation one will get better rather than the actual effects of a treatment.*

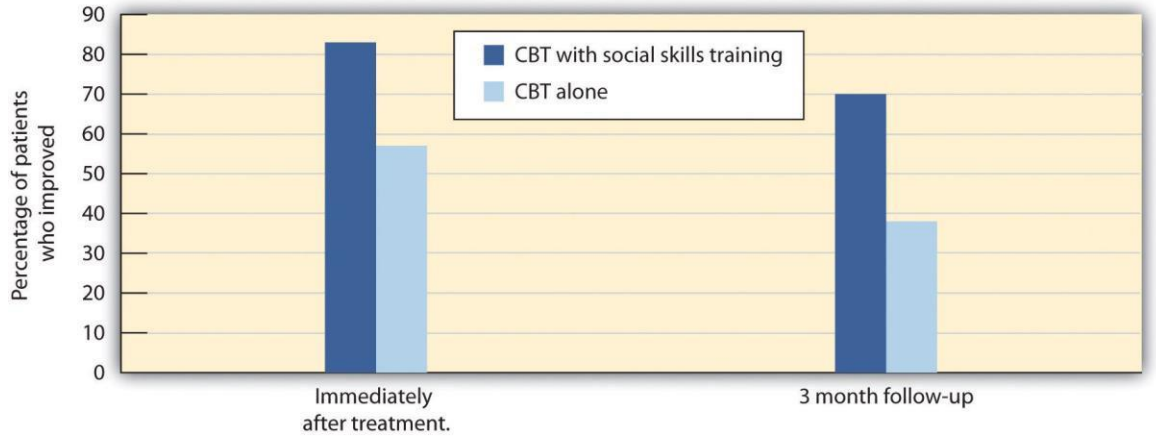
Thousands of studies have been conducted to test the effectiveness of psychotherapy, and by and large they find evidence that it works. Some outcome studies compare a group that gets treatment with another (control) group that gets no treatment. For instance, Ruwaard, Broeksteeg, Schrieken, Emmelkamp, and Lange (2010) found that patients who interacted with a therapist over a website showed more reduction in symptoms of panic disorder than did a similar group of patients who were on a waiting list but did not get therapy. Although studies such as this one control for the possibility of natural improvement, they do not control for either nonspecific treatment effects or for placebo effects. The people in the treatment group might have improved simply by being in the therapy (nonspecific effects), or they may have improved because they expected the treatment to help them (placebo effects).

Studies that use a control group that gets no treatment, or a group that gets only a placebo, are informative, but they raise ethical questions. If the researchers believe that their treatment is going to work, why would they deprive participants in need of help the possibility for improvement by putting them in a control group? Researchers do this because when there is no control group in which to compare the improvement, they cannot state that the changes are due to the treatment. The improvement could have been due to other factors, so without a control group, any improvements caused by the treatment are difficult to interpret (Kring, Johnson, Davison, & Neale, 2016).

Some studies have not used a control group (Crits-Christoph, 1992; Crits-Christoph et al., 2004). These studies compared brief sessions of psychoanalysis with longer-term psychodynamic in the treatment of anxiety disorder, humanistic therapy with psychodynamic therapy in treating depression, and cognitive therapy with drug therapy in treating anxiety (Dalgleish, 2004; Hollon, Thase, & Markowitz, 2002). These studies are advantageous because they compare the specific effects of one type of treatment with another, while allowing all patients to get treatment

Herbert et al. (2005) tested whether social skills training could boost the results received for the treatment of social anxiety disorder with cognitive-behavioral therapy (CBT) alone. As you can see in Figure 11.7, they found that people in both groups improved, but CBT coupled with social skills training showed significantly greater gains than CBT alone.

Figure 11.7 CBT with Social Skills Training



Herbert et al. (2005) compared the effectiveness of CBT alone with CBT along with social skills training. Both groups improved, but the group that received both therapies had significantly greater gains than the group that received CBT alone.

Some meta-analyses have found substantial support for the effectiveness of specific therapies, including cognitive therapy, CBT (Butler, Chapman, Forman, & Beck, 2006; Deacon & Abramowitz, 2004), couples and family therapy (Shadish & Baldwin, 2002), and psychodynamic (Shedler, 2010). On the basis of these and other meta-analyses, a list of empirically supported therapies known to be effective, has been developed (Chambless & Hollon, 1998; Hollon, Stewart, & Strunk, 2006). These therapies include cognitive therapy and behavioral therapy for depression; cognitive therapy, exposure therapy, and stress inoculation training for anxiety; CBT for bulimia; and behavior modification for bed-wetting.

Smith, Glass, and Miller (1980) did not find much evidence that any one type of therapy was more effective than any other type, and more recent meta-analyses have not tended to find many differences either (Cuijpers, van Straten, Andersson, & van Oppen, 2008). What this means is that a good part of the effect of therapy is nonspecific, in the sense that simply coming to any type of therapy is helpful in comparison to not coming. This is true partly because there are fewer distinctions among the ways that different therapies are practiced than the theoretical differences among them would suggest. What a good therapist practicing psychodynamic approaches does in therapy is often not much different from what a humanist or a cognitive-behavioral therapist does, and so no one approach is really likely to be better than the other. What all good therapies have in common is that they give people hope; help them think more carefully about themselves and about their relationships with others; and provide a positive, empathic, and trusting relationship with the therapist (Ahn &Wampold, 2001).

Key Takeaways

- Psychotherapy is treatment for psychological disorders.
- Psychodynamic therapy, based on the principles of Freud and neo-Freudians, attempt to assist the patient in developing insight into their current disorders.

- Humanist therapy, derived from the theory of Carl Rogers, is based on the idea that people experience psychological problems when they are burdened by limits and expectations placed on them by themselves and others. It also focuses on helping people reach their life goals.
- Behavioral therapy applies the principles of learning therapy to the elimination of maladaptive behaviors and to replace them with more adaptive responses.
- Albert Ellis and Aaron Beck developed cognitive-based therapies to help clients stop negative thoughts and replace them with more objective thoughts.
- Cognitive-behavioral therapy combines the behavioral and cognitive perspectives in the treatment of many types of disorders.
- Outcome research studies the effectiveness of different therapies and demonstrates that all therapies offer some benefit and no one type of therapy is overall more effective. Some therapies are more effective than others for specific disorders.
- Threats to the validity of outcome research include natural improvement, nonspecific treatment effects, and placebo effects.
- Research shows that getting psychological therapy is better at reducing disorder than not getting it. All good therapies give people hope and help them think more carefully about themselves and about their relationships with others.

Exercises and Critical Thinking

1. Imagine that your friend has been feeling depressed for several months, but refuses to consider therapy as an option. What might you tell your friend that might help her or him feel more comfortable about seeking treatment?
2. Imagine that you have developed a debilitating fear of bees after recently being attacked by a swarm of them. What type of therapy do you think would be best for your disorder?
3. Imagine that your friend has a serious drug abuse problem. Based on what you have learned in this section, what treatment options would you explore in your attempt to provide your firend with the best help available? Which combination of therapies might work best?

Biomedical Therapy

Learning Objectives

1. Define biomedical therapy.
2. Classify the different types of drugs used in the treatment of mental disorders and explain how they each work to reduce disorders.
3. Critically evaluate direct brain intervention methods that may be used by doctors to treat patients who do not respond to drug or other therapy.
4. Describe the effectiveness of biomedical therapy.

In addition to psychotherapy, psychological disorders may in some cases be treated biologically. **Biomedical therapies** are *treatments designed to reduce psychological disorder by influencing the action of the central nervous system*. These therapies primarily involve the use of medications, but also include direct methods of brain intervention, including electroconvulsive therapy (ECT), transcranial magnetic stimulation (TMS), and psychosurgery.

Drug Therapies

Psychologists understand that an appropriate balance of neurotransmitters in the brain is important for mental health. A psychological disorder might result if there is a chemical imbalance. The most frequently used biological treatments provide the patient with medication that influences the production and reuptake of neurotransmitters in the central nervous system (CNS).

Unlike some medical therapies that can be targeted toward specific symptoms, current psychological drug therapies are not so specific; they do not change particular behaviors or thought processes, and they do not really solve psychological disorders. However, although they cannot "cure" disorder, drug therapies are nevertheless useful therapeutic approaches, particularly when combined with psychological therapy, in treating a variety of psychological disorders. The best drug combination for the individual patient is usually found through trial and error (Biedermann & Fleischhacker, 2009).

Antidepressant medications: *Drugs designed to improve moods are referred to as* **antidepressants.** Although they are used primarily in the treatment of depression, they are also effective for patients who suffer from anxiety, phobias, and obsessive-compulsive disorders. Antidepressants work by influencing the production and reuptake of neurotransmitters that relate to emotion, including serotonin, norepinephrine, and dopamine. Although exactly why they work is not yet known, as the amount of the neurotransmitters in the CNS is increased through the action of the drugs, the person often experiences less depression.

The antidepressants most prescribed today are the selective serotonin reuptake inhibitors (SSRIs), including Prozac, Paxil, and Zoloft, which are designed to selectively block the reuptake of serotonin at the synapse, thereby leaving more serotonin available in the CNS. SSRIs are safer and have fewer side effects than the tricyclics or the MAOIs (Fraser, 2000; Hollon, Thase, & Markowitz, 2002). SSRIs are effective, but patients taking them often suffer a variety of sometimes unpleasant side effects, including dry mouth, constipation, blurred vision, headache, agitation, drowsiness, as well as a reduction in sexual enjoyment.

Recently, there has been concern that SSRIs may increase the risk of suicide among teens and young adults, probably because when the medications begin working they give patients more energy, which may lead them to commit the suicide that they had been planning, but lacked the energy to go through with. This concern has led the FDA to put a warning label on SSRI medications and has led doctors to be more selective about prescribing antidepressants to this age group (Healy & Whitaker, 2003; Simon, 2006; Simon, Savarino, Operskalski, & Wang, 2006).

Because the effects of antidepressants may take weeks or even months to develop, doctors usually work with each patient to determine which medications are most effective, and may frequently change medications over the course of therapy. In some cases, other types of antidepressants may

be used instead of or in addition to the SSRIs. These medications also work by blocking the reuptake of neurotransmitters, including serotonin, norepinephrine, and dopamine.
Patients who are suffering from bipolar disorders are not helped by the SSRIs or other antidepressants because their disorder also involves the experience of overly elevated moods. Treatment is more complicated for these patients, often involving a combination of antipsychotics and antidepressants along with mood stabilizing medications (McElroy & Keck, 2000). The most well-known mood stabilizer, lithium carbonate or lithium, was approved by the FDA in the 1970s for treating both manic and depressive episodes, and it has proven very effective. Anticonvulsant medications can also be used as mood stabilizers. Another drug, Depakote, has also proven very effective, and some bipolar patients may do better with it than with lithium (Kowatch et al., 2000).

People who take lithium must have regular blood tests to be sure that the levels of the drug are in the appropriate range (Kring et al., 2016). Potential negative side effects of lithium are loss of coordination, slurred speech, frequent urination, and excessive thirst. Though side effects often cause patients to stop taking their medication, it is important that treatment be continuous, rather than intermittent. There is no cure for bipolar disorder, but drug therapy does help many people.

Antianxiety medications: *Drugs that help relieve fear or anxiety* are called **antianxiety medication.** They work by increasing the action of the neurotransmitter GABA (Prus, 2018). The increased level of GABA helps inhibit the action of the sympathetic division of the autonomic nervous system, creating a calming experience.

The most common class of antianxiety medications is the tranquilizers, known as benzodiazepines. These drugs are relatively common, and in 2008, 5.2% of adults used a benzodiazepine for either short or long-term use (Prus, 2018). The benzodiazepines act within a few minutes to treat mild anxiety disorders, but also have major side effects. They are addictive, frequently leading to tolerance, and they can cause drowsiness, dizziness, and unpleasant withdrawal symptoms including relapses into increased anxiety (Otto et al., 1993). Furthermore, because the effects of the benzodiazepines are very similar to those of alcohol, they are very dangerous when combined with it.

Antipsychotic medications: In the 1950s, a drug called chlorpromazine (Thorazine) was discovered that could reduce many of the positive symptoms of schizophrenia. Chlorpromazine was the first of many antipsychotic drugs. **Antipsychotic drugs, also called neuroleptics,** are *drugs that treat the symptoms of schizophrenia and related psychotic disorders*. Today there are many antipsychotics, and these drugs treat the positive symptoms of chizophrenia, and some treat the positive, negative, and cognitive symptoms.

Antipsychotics reduce the positive symptoms of schizophrenia by reducing the transmission of dopamine at the synapses in the limbic system, and they improve negative symptoms by influencing levels of serotonin (Marangell, Silver, Goff, & Yudofsky, 2003). Despite their effectiveness, antipsychotics have some negative side effects, including restlessness, muscle spasms, dizziness, and blurred vision. In addition, their long-term use can cause permanent neurological damage, a condition called **tardive dyskinesia** *that causes uncontrollable muscle movements, usually in the mouth area* (NIMH, 2008). Newer antipsychotics treat more symptoms with fewer side effects than older medications (Casey, 1996).

The major classes and brand names of drugs used to treat psychological disorders are shown in Table 11.2.

Table 11.2 Common Medications Used to Treat Psychological Disorders

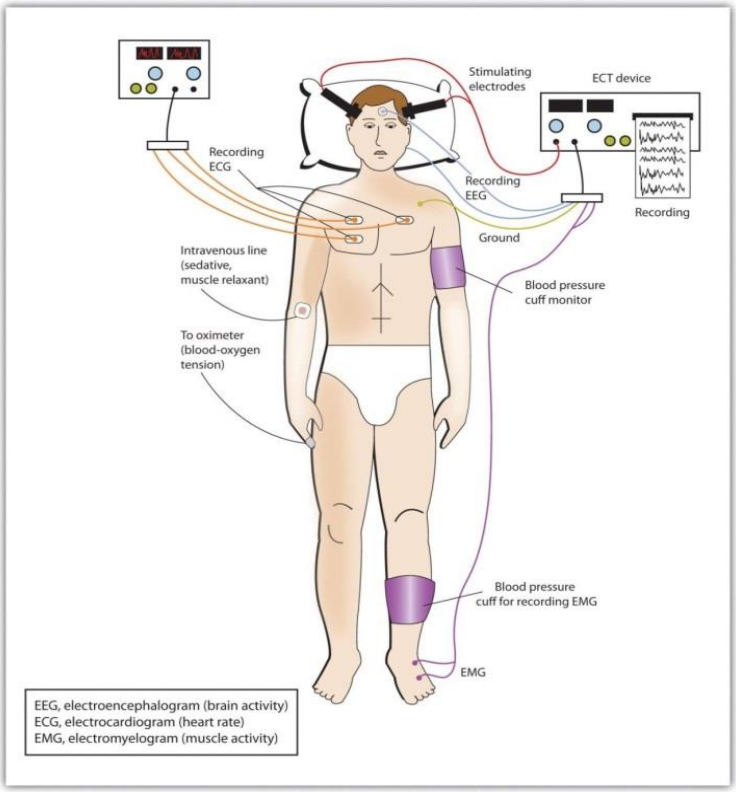
Class	Type	Brand names	Disorder	Notes
Psychostimulants		Ritalin, Adderall, Dexedrine	Attention-deficit/hyperactivity disorder (ADHD)	Very effective in most cases, at least in the short term, at reducing hyperactivity and inattention
Antidepressants	Tricyclics	Elavil, Tofranil	Depression and anxiety disorders	Less frequently prescribed today than are the serotonin reuptake inhibitors (SSRIs)
	SSRIs	Prozac, Paxil, Zoloft	Depression and anxiety disorders	Most frequently prescribed antidepressant medications; work by blocking the reuptake of serotonin
	Other reuptake inhibitors	Effexor, Celexa, Wellbutrin	Depression and anxiety disorders	Work by blocking the reuptake of serotonin, norepinephrine, and dopamine
Mood stabilizers		Eskalith, Lithobid, Depakene	Bipolar disorder	Effective in reducing the mood swings associated with bipolar disorder
Antianxiety drugs	Tranquilizers (benzodiazepines)	Valium, Xanax	Anxiety, panic, and depressive disorders	Work by increasing the action of the neurotransmitter GABA
Antipsychotics (Neuroleptics)		Thorazine, Haldol, Clozaril, Risperdal, Zyprexa	Schizophrenia	Treat the positive and, to some extent, the negative symptoms of schizophrenia by reducing the transmission of dopamine and increasing the transmission of serotonin

Direct Brain Intervention Therapies

Electroconvulsive therapy (ECT): In cases of severe disorder, it may be desirable to directly influence brain activity through electrical activation of the brain or through brain surgery. **Electroconvulsive therapy (ECT)** is *a medical procedure designed to alleviate psychological disorder in which electric currents are passed through the brain, deliberately triggering a brief seizure* (see Figure 11.8). ECT has been used since the 1930s to treat severe depression.

When it was first developed, the procedure involved strapping the patient to a table before the electricity was administered. The patient was knocked out by the shock, went into severe convulsions, and awoke later, usually without any memory of what had happened. Today ECT is used only in the most severe cases when all other treatments have failed, and the practice is more humane. The patient is first given muscle relaxants and a general anesthesia, and precisely calculated electrical currents are used to achieve the most benefit with the fewest possible risks.

Figure 11.8 Electroconvulsive Therapy (ECT)



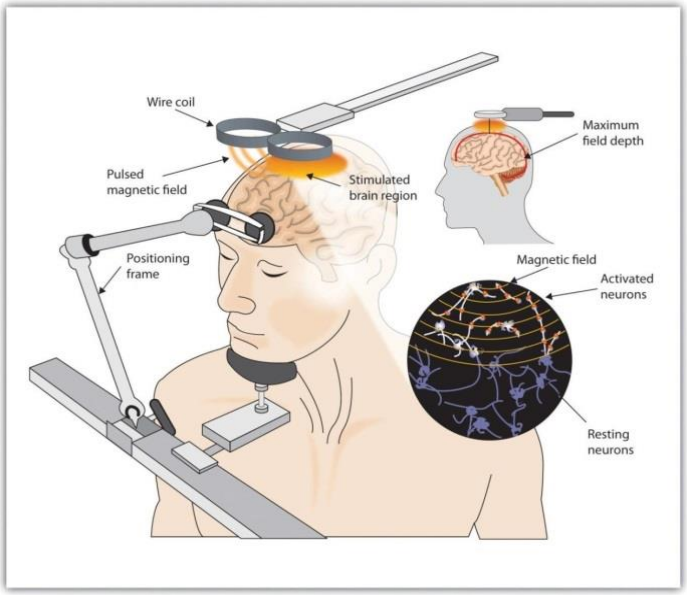
Today's ECT uses precisely calculated electrical currents to achieve the most benefit with the fewest possible risks.

ECT is very effective; approximately 60%-80% of people who undergo ECT report improvements in their depression (Comer, 2015). ECT reduces suicidal thoughts and is assumed to have prevented many suicides (Kellner et al., 2005). On the other hand, the positive effects of ECT do not always last; over one-half of patients who undergo ECT experience relapse within one year, although antidepressant medication can help reduce this outcome (Sackheim et al., 2001). ECT may also cause temporary failure to encode and store new memories or cognitive impairment (Abrams, 1997; Sackheim et al., 2007).

Transcranial magnetic stimulation: Although ECT continues to be used, newer approaches to treating chronic depression are also being developed. A newer and gentler method of brain stimulation is **transcranial magnetic stimulation (TMS)**, *a medical procedure designed to reduce psychological disorder that uses a pulsing magnetic coil to electrically stimulate the brain* (see Figure 11.9). TMS seems to work by activating neural circuits in the prefrontal cortex, which is less active in people with depression, causing an elevation of mood. TMS can be performed without sedation, does not cause seizures or memory loss, and may be as effective as ECT (Loo, Schweitzer, & Pratt, 2006; Rado, Dowd, & Janicak, 2008). However, Xia et al. (2008) found a slight risk of treatment-emergent mania with repetitive transcranial magnetic stimulation of depression after reviewing 53 controlled trials. The severity of the manic symptoms varied, but after a decrease or discontinuation of antidepressants and/or TMS, all cases responded to treatment. In addition to the treatment of depression, TMS has been effective in the treatment of mania, schizophrenia, seizure disorder, and substance abuse, although it has proved ineffective for obsessive-compulsive disorder (Mishra et al., 2011).

Vagus nerve stimulution: Still other biomedical therapies are being developed for people with severe depression that persists over years. One approach involves implanting a device in the chest that stimulates the vagus nerve, a major nerve that descends from the brain stem toward the heart (Corcoran, Thomas, Phillips, & O'Keane, 2006; Nemeroff et al., 2006). When the vagus nerve is stimulated by the device, it activates brain structures that are less active in severely depressed people.

Figure 11.9 Transcranial Magnetic Stimulation (TMS)



TMS is a noninvasive procedure that uses a pulsing magnetic coil to electrically stimulate the brain. Recently, TMS has been used in the treatment of Parkinson's disease.

Psychosurgery: B*rain surgery used to improve a psychological disorder,* is known as **psychosurgery** and is reserved for the most severe cases. The most well-known psychosurgery was the prefrontal lobotomy. Developed in 1935 by Nobel Prize winner Egas Moniz to treat severe phobias and anxiety, the procedure destroys the connections between the prefrontal cortex and the rest of the brain. Lobotomies were performed on thousands of patients. The procedure was never validated scientifically and left many patients in worse condition than before, subjecting the already suffering patients and their families to further heartbreak (Valenstein, 1986). Perhaps the most notable failure was the lobotomy performed on Rosemary Kennedy, the sister of President John F. Kennedy, which left her severely incapacitated.

There are very few centers that still conduct psychosurgery today, and when such surgeries are performed they are much more limited in nature (Dougherty et al., 2002). The ability to more accurately image and localize brain structures using modern neuroimaging techniques suggests that new, more accurate, and more beneficial developments in psychosurgery may soon be available (Sachdev & Chen, 2009).

Deep Brain Stimulation: One such development that holds promise for many neuropsychiatric disorders is **deep brain stimulation**, in which *electrodes are inserted into specific brain areas and constant electrical pulses are delivered via a battery pack inserted under the collar bone.* The goal of the pulses is to alter the brain circuits that are causing the disorders. Deep brain stimulation has been used to treat Parkinson's disease, depression, dementia, obsessive-compulsive disorder, substance use, and obesity (Fisher, 2014). Despite successful cases, deep brain stimulation is considered controversial given the ethical concerns raised when performing brain surgery for neuropsychiatric disorders.

Effectiveness of Biomedical Therapies

Overall, meta-analyses support the effectiveness of drug therapies for psychological disorders. For instance, the use of psychostimulants to reduce the symptoms of attention-deficit/hyperactivity disorder (ADHD) is well known to be successful (Kring et al. 2016), and many studies find that the positive and negative symptoms of schizophrenia are substantially reduced by the use of antipsychotic medications (Lieberman et al., 2005).

People who take antidepressants for depressive disorders or antianxiety medications for anxiety disorders almost always report feeling better, although drugs are less helpful for phobic disorder and obsessive-compulsive disorder. Some of these improvements are almost certainly the result of placebo effects (Cardeña & Kirsch, 2000), but the medications do work, at least in the short term. Keller et al. (2001) had adolescents who were experiencing anxiety disorders take pills that they thought would reduce anxiety for 8 weeks. However, one-half of the patients were randomly assigned to actually receive the antianxiety drug Paxil, while the other half received a placebo drug that did not have any medical properties. The researchers ruled out the possibility that only placebo effects were occurring because they found that both groups improved over the 8 weeks, but the group that received Paxil improved significantly more than the placebo group did.

One problem with drug therapies is that although they provide temporary relief, they do not treat the underlying cause of the disorder. Once the patient stops taking the drug, the symptoms often return in full force. In addition, many drugs have negative side effects, and some also have the potential for addiction and abuse. Different people have different reactions, and all drugs carry warning labels. As a result, although these drugs are frequently prescribed, doctors attempt to prescribe the lowest doses possible for the shortest possible periods of time.

Older patients face special difficulties when they take medications for mental illness. Older people are more sensitive to drugs, and drug interactions are more likely because older patients tend to take a variety of different drugs every day. They are more likely to forget to take their pills, to take too many or too few, or to mix them up due to poor eyesight or faulty memory (Youdin, 2016).

Like all types of drugs, medications used in the treatment of mental illnesses can carry risks to an unborn infant. Tranquilizers should not be taken by women who are pregnant or expecting to become pregnant, because they may cause birth defects or other infant problems, especially if taken during the first trimester. Some selective serotonin reuptake inhibitors (SSRIs) may also increase risks to the fetus (Louik, Lin, Werler, Hernandez, & Mitchell, 2007; U.S. Food and Drug Administration, 2004), as do antipsychotics (Diav-Citrin et al., 2005). Decisions on medication should be carefully weighed and based on each person's needs and circumstances. Medications should be selected based on available scientific research, and they should be prescribed at the lowest possible dose. All people must be monitored closely while they are on medications.

Key Takeaways

- Biomedical therapies treat psychological disorders by influencing the actions of the central nervous system (CNS).
- Psychostimulants are commonly prescribed to reduce the symptoms of ADHD.
- Antidepressant drugs are used in the treatment of depression, anxiety, phobias, and obsessive-compulsive disorder. They gradually elevate mood by working to balance neurotransmitters in the CNS. The most commonly prescribed antidepressants are the SSRIs.
- Mood stabilizers are prescribed to treat bipolar disorder.

- Antianxiety drugs relieve apprehension, tension, and nervousness and are prescribed for people with diagnoses of GAD, OCD, PTSD, and panic disorder. The drugs are effective, but have severe side effects including dependence and withdrawal symptoms.
- Antipsychotic drugs play a crucial role in the treatment of schizophrenia. They do not cure schizophrenia, but they help reduce the positive, negative, and cognitive symptoms, making it easier to live with the disease.
- Electroconvulsive therapy (ECT) is a controversial procedure used to treat severe depression, in which electric currents are passed through the brain, deliberately triggering a brief seizure.
- A newer method of brain stimulation is transcranial magnetic stimulation (TMS), a noninvasive procedure that employs a pulsing magnetic coil to electrically stimulate the brain.
- Deep brain stimulation uses constant electrical impulses delivered to the brain to reduce psychiatric symptoms.
- Biomedical treatments are effective, at least in the short term, but overall, they are less effective than psychotherapy.
- Meta-analyses support the effectiveness of drug therapies for disorders, however, regularly monitoring is necessary, especially among the elderly and pregnant.
- A significant problem with drug therapies is that although they provide temporary relief, they do not treat the underlying cause of the disorder

Exercises and Critical Thinking

1. What are your opinions about taking drugs to improve psychological disorders? Would you take an antidepressant or antianxiety medication if you were feeling depressed or anxious? Do you think children with ADHD should be given stimulants? Why or why not?
2. Based on what you have just read, would you be willing to undergo ECT or TMS if you were chronically depressed and drug therapy had failed? Why or why not?

Social and Community Therapy

Learning Objectives

1. Explain the advantages of group therapy and self-help groups for treating disorders.
2. Evaluate the procedures and goals of community mental health services.
3. Describe the effectiveness of social and community approaches.

Although the individual therapies that we have discussed so far in this chapter focus primarily on the psychological and biological aspects of the biopsychosocial model of mental disorders, the social dimension is never out of the picture. Therapists understand that disorders are caused, and potentially prevented, in large part by the people with whom we interact. People with schizophrenia do not live in a vacuum. They interact with family members and with the other members of the community, and the behavior of those people may influence their disease. Further, depression and anxiety are created primarily by the affected individual's perceptions, as well as misperceptions, of the important people around them. Thus, prevention and treatment are influenced in large part by the social context in which the person is living.

Group, Couples, and Family Therapy

Group therapy: Practitioners sometimes incorporate the social setting in which disorders occur by conducting therapy in groups. **Group therapy** is *psychotherapy in which clients receive psychological treatment together with others*. A professionally trained therapist guides the group, usually between 6 and 10 participants, to create an atmosphere of support and emotional safety for the participants (Yalom & Leszcz, 2005).

Figure 11.10 Group Therapy

Group therapy provides a therapeutic setting where people meet with others to share problems or concerns, to better understand their own situation, and to learn from and with each other. © Thinkstock

Group therapy provides a safe place where people come together to share problems or concerns, to better understand their own situations, and to learn from and with each other. Group therapy is often cheaper than individual therapy, as the therapist can treat more people at the same time, but economy is only one part of its attraction. Group therapy allows people to help each other, by sharing ideas, problems, and solutions. It provides social support, offers the knowledge that other people are facing and successfully coping with similar situations, and allows group members to model the successful behaviors of other group members. Group therapy makes explicit the idea that our interactions with others may create, intensify, and potentially alleviate disorders.

Group therapy has met with much success in the more than 50 years it has been in use, and it has generally been found to be as, or more effective than, individual therapy (McDermut, Miller, & Brown, 2001). Group therapy is particularly effective for people who have a life-altering illness, as it helps them cope better with their disease, enhances the quality of their lives, and in some cases, has even been shown to help them live longer (American Group Psychotherapy Association, 2000).

Couples therapy: Sometimes group therapy is conducted with people who are in close relationships. **Couples *therapy*** *is treatment in which two people who are cohabitating, married, or dating meet with the therapist to discuss their concerns and issues about their relationship.* These therapies are, in some cases, educational, providing the couple with information about what is to be expected in a relationship. The therapy may focus on such topics as sexual enjoyment, communication, or the symptoms of one of the partners (e.g., depression).

Family therapy: *Families meeting together with a therapist is* **family therapy**. In some cases, the meeting is precipitated by a particular problem with one family member, such as a diagnosis of bipolar disorder in a child. Family therapy is based on the assumption that the problem, even if it is primarily affecting one person, is the result of an interaction among the people in the family.

Self-Help Groups

Group therapy is based on the idea that people can be helped by the positive social relationships that others provide. One way for people to gain this social support is by joining a **self-help group**, which is *a voluntary association of people who share a common desire to overcome psychological disorders or improve their well-being* (Humphreys & Rappaport, 1994). Self-help groups have been used to help individuals cope with many types of addictive behaviors. Three of the best-known self-help groups are Alcoholics Anonymous, Gamblers Anonymous, and Overeaters Anonymous. The idea behind self-groups is very similar to that of group therapy, but the groups are open to a broader spectrum of people. As in group therapy, the benefits include social support, education, and observational learning. Religion and spirituality are often emphasized, and self-blame is discouraged. Regular group meetings are held with the supervision of a trained leader.

Community Mental Health Services

The social aspect of disorders is also understood and treated at the community level. **Community mental health services** are *psychological treatments and interventions that are distributed at the community level*. Community mental health services are provided by nurses, psychologists, social workers, and other professionals in sites, such as schools, hospitals, police stations, drug treatment clinics, and residential homes. The goal is to establish programs that will help people get the mental health services that they need (Gonzales, Kelly, Mowbray, Hays, & Snowden, 1991).

Unlike traditional therapy, the primary goal of community mental health services is prevention. Just as widespread vaccination of children has eliminated diseases, such as polio and smallpox, mental health services are designed to prevent psychological disorders (Institute of Medicine, 1994). Community prevention can be focused on one or more of three levels: Primary prevention, secondary prevention, and tertiary prevention:

- **Primary prevention** *is prevention in which all members of the community receive the treatment.* Examples of primary prevention are programs designed to encourage all pregnant women to avoid cigarettes and alcohol because of the risk of health problems for the fetus, and programs designed to remove dangerous lead paint from homes.

- **Secondary prevention** *is more limited and focuses on people who are most likely to need it.* This includes those who display risk factors for a given disorder. **Risk factors** *are the social, environmental, and economic vulnerabilities that make it more likely than average that a given individual will develop a disorder* (Werner & Smith, 1992).

- **Tertiary prevention** *is treatment, such as psychotherapy or biomedical therapy, that focuses on people who are already diagnosed with a disorder.*

Some Risk Factors for Psychological Disorders

Community mental health workers practicing secondary prevention will focus on youths with these markers of future problems:

- Academic difficulties
- Attention-deficit/hyperactivity disorder (ADHD)
- Child abuse and neglect
- Developmental disorders
- Drug and alcohol abuse
- Dysfunctional family
- Early pregnancy
- Emotional immaturity
- Homelessness
- Learning disorder
- Low birth weight
- Parental mental illness
- Poor nutrition
- Poverty

Finally, community prevention programs are designed to provide support during childhood or early adolescence with the hope that the interventions will prevent disorders from appearing or will keep existing disorders from expanding. Interventions include such things as help with housing, counseling, group therapy, emotional regulation, job and skills training, literacy training, social responsibility training, exercise, stress management, rehabilitation, family therapy, or removing a child from a stressful or dangerous home situation.

The goal of community interventions is to make it easier for individuals to continue to live a normal life in the face of their problems. Community mental health services are designed to make it less likely that vulnerable populations will end up in institutions or on the streets. In summary, their goal is to allow at-risk individuals to continue to participate in community life by assisting them within their own communities.

Effectiveness of Social-Community Approaches

Measuring the effectiveness of community action approaches to mental health is difficult because they occur in community settings and impact a wide variety of people, and it is difficult to find and assess valid outcome measures. Nevertheless, research has found that a variety of community interventions can be effective in preventing a variety of psychological disorders (Price, Cowen,

Lorion, & Ramos-McKay, 1988). Data suggest that federally funded prevention programs, such as the Special Supplemental Program for Women, Infants, and Children (WIC), which provides federal grants to states for supplemental foods, health-care referral, and nutrition education for low-income women and their children, are successful. WIC mothers have higher birth weight babies and lower infant mortality than other low-income mothers (Ripple & Zigler, 2003). The average blood-lead levels among children have fallen approximately 80% since the late 1970s as a result of federal legislation designed to remove lead paint from housing (Centers for Disease Control and Prevention, 2000).

Although some of the many community-based programs designed to reduce alcohol, tobacco, and drug abuse; violence and delinquency; and mental illness have been successful, the changes brought about by even the best of these programs are, on average, modest (Wandersman & Florin, 2003; Wilson, Gottfredson, & Najaka, 2001). This does not necessarily mean that the programs are not useful. What is important is that community members continue to work with researchers to help determine which aspects of which programs are most effective, and to concentrate efforts on the most productive approaches (Weissberg, Kumpfer, & Seligman, 2003). The most beneficial preventive interventions for young people involve coordinated, systemic efforts to enhance their social and emotional competence and health. Many psychologists continue to work to promote policies that support community prevention as a model of preventing disorders.

Key Takeaways

- Group therapy is psychotherapy in which clients receive psychological treatment together with others. A professionally trained therapist guides the group. Types of group therapy include couples therapy and family therapy.
- Self-help groups have been used to help individuals cope with many types of disorder.
- The goal of community health service programs is to act during childhood or early adolescence with the hope that interventions might prevent disorders from appearing or keep existing disorders from expanding. The prevention provided can be primary, secondary, or tertiary.
- Federally funded community mental health service programs are effective, but their preventive effects may in many cases be minor.

Exercise and Critical Thinking

1. Imagine the impact of a natural disaster like Hurricane Katrina on the population of the city of New Orleans. How would you expect such an event to affect the prevalence of psychological disorders in the community? What recommendations would you make in terms of setting up community support centers to help the people in the city?

Eclectic Approach to Therapy and Seeking Treatment

Learning Objectives

1. Explain the eclectic approach to providing therapy.
2. Describe how to seek treatment for a psychological disorder.

To this point, we have considered the different approaches to therapy under the assumption that a therapist will use only one approach with a given patient, but this is not the case as you saw in Figure 11.1. The most commonly practiced approach to therapy is **eclectic therapy**, *an approach to treatment in which the therapist uses whichever techniques seem most useful and relevant for a given patient*. For bipolar disorder, for instance, the therapist may use both psychotherapy to help the patient cope with the severe highs and lows, but may also suggest that the patient consider biomedical drug therapies (Newman, Leahy, Beck, Reilly-Harrington, & Gyulai, 2002). Treatment for major depressive disorder usually involves antidepressant drugs, as well as CBT, to help the patient deal with their specific problems (McBride, Farvolden, & Swallow, 2007).

As we have seen in Chapter 10, one of the most commonly diagnosed disorders is borderline personality disorder (BPD). Consider this description, typical of the type of borderline patient who arrives at a therapist's office:

Even as an infant, it seemed that there was something different about Bethany. She was an intense baby, easily upset and difficult to comfort. She had very severe separation anxiety. If her mother left the room, Bethany would scream until she returned. In her early teens, Bethany became increasingly sullen and angry. She started acting out more and more by yelling at her parents and teachers and engaging in impulsive behavior such as promiscuity and running away from home. At times Bethany would have a close friend at school, but some conflict always developed and the friendship would end.

By the time Bethany turned 17, her mood changes were totally unpredictable. She was fighting with her parents almost daily, and the fights often included violent behavior on Bethany's part. At times she seemed terrified to be without her mother, but at other times she would leave the house in a fit of rage and not return for a few days. One day, Bethany's mother noticed scars on Bethany's arms. When confronted about them, Bethany said that one night she just got more and more lonely and nervous about a recent breakup until she finally stuck a lit cigarette into her arm. She said, "I didn't really care for him that much, but I had to do something dramatic."

When she was 18 Bethany rented a motel room where she took an overdose of sleeping pills. Her suicide attempt was not successful, but the authorities required that she seek psychological help.

Most therapists will deal with a case such as Bethany's using an eclectic approach. First, because her negative mood states are so severe, the therapist will likely recommend that she see her physician or a psychiatrist to get a prescription for antidepressant medications. These drugs are likely to help her feel better and will reduce the possibility of another suicide attempt. However, some drugs have unwanted side effects and may increase the risk of suicide in younger people. In addition, drugs will not change the underlying psychological problems. Therefore, the therapist will also provide psychotherapy.

The therapy may be done at a psychiatric hospital if Bethany is still at high risk for self-destructive behavior. In addition to 24-hour supervision, hospitalization may also provide Bethany with ongoing support provided by a team of professionals. Before starting treatment, the therapist will conduct a thorough evaluation. The first sessions of the therapy will likely be based primarily on creating trust. Person-centered approaches will be used in which the therapist attempts to create a therapeutic alliance conducive to a frank and open exchange of information.

If the therapist is trained in a psychodynamic approach, he or she will probably begin intensive face-to-face psychotherapy sessions at least three times a week. The therapist may focus on childhood experiences related to Bethany's attachment difficulties, but will also focus in large part on the causes of the present behavior. The therapist will understand that because Bethany does not have good relationships with other people, she will likely seek a close bond with the therapist, but the therapist will probably not allow the transference relationship to develop fully. The therapist will also realize that Bethany will probably try to resist the work of the therapist.

Most likely the therapist will also use principles of CBT. For one, cognitive therapy will likely be used in an attempt to change Bethany's distortions of reality. She feels that people are rejecting her, but she is probably bringing these rejections on herself. If she can learn to better understand the meaning of other people's actions, she may feel better. Also, the therapist will likely begin using some techniques of behavior therapy, for instance, by rewarding Bethany for successful social interactions and progress toward meeting her important goals.

The eclectic therapist will continue to monitor Bethany's behavior as the therapy continues, bringing into play whatever therapeutic tools seem most beneficial. Hopefully, Bethany will stay in treatment long enough to make some real progress in repairing her broken life.

Another example of an eclectic treatment approach that has been shown to be successful in treating BPD is dialectical behavioral therapy (DBT) (Linehan & Dimeff, 2001). DBT is essentially a cognitive therapy, but it includes an emphasis on attempting to enlist the help of the patient in his or her own treatment. A dialectical behavioral therapist begins by attempting to develop a positive therapeutic alliance with the client, and then tries to encourage the patient to become part of the treatment process. In DBT the therapist aims to accept and validate the client's feelings at any given time, while nonetheless informing the client that some feelings and behaviors are maladaptive, and showing the client better alternatives. The therapist will use both individual and group therapy, helping the patient work toward improving interpersonal effectiveness, emotion regulation, and distress tolerance skills.

Seeking Treatment for Psychological Disorders

Many people who would benefit from psychotherapy do not get it, either because they do not know how to find it or because they feel that they will be stigmatized and embarrassed if they seek help. The decision to not seek help is a very poor choice because the effectiveness of mental health treatments is well documented, and no matter where a person lives, there are treatments available (U.S. Department of Health and Human Services, 1999).

The first step in seeking help for psychological problems is to accept the stigma. It is possible that some of your colleagues, friends, and family members will know that you are seeking help and some may at first think more negatively of you for it, but you must get past these unfair and close-minded responses. Feeling good about yourself is the most important thing you can do, and seeking help may be the first step in doing so.

The question of when someone needs help is not always easy to answer because there is no clear demarcation between "normal" and "abnormal" behavior. Generally, you will know that you or others need help when one's psychological state is negatively influencing everyday behavior, when the behavior is adversely affecting those around the person, and when the problems continue over a period of time. Often people seek therapy as a result of general depression and anxiety, but therapy is also effective for life-changing events, such as the diagnosis of a fatal illness, an upcoming marriage or divorce, or the death of a loved one, as well as specific everyday problems.

There are a wide variety of therapy choices, many of which are free. Begin in your school, community, or church, asking about community health or counseling centers and pastoral counseling. You may want to ask friends and family members for recommendations. You will probably be surprised at how many people have been to counseling, and how many recommend it.

There are many therapists who offer a variety of treatment options. Be sure to ask about the degrees that the therapist has earned, and about the reputation of the center in which the therapy occurs. If you have choices, try to find a person or location that you like, respect, and trust. This will allow you to be more open, and you will get more out of the experience. Your sessions with the help provider will require discussing your family history, personality, and relationships, and you should feel comfortable sharing this information.

Remember also that confronting issues requires time to reflect, energy to get to the appointments and deal with consequential feelings, and discipline to explore your issues on your own. Success at therapy is difficult, and it takes effort.

The bottom line is that going for therapy should not be a difficult decision for you. All people have the right to appropriate mental health care just as they have a right to general health care. Just as you go to a dentist for a toothache, you may go to therapy for psychological difficulties. Furthermore, you can be confident that you will be treated with respect and that your privacy will be protected, because therapists follow ethical principles in their practices.

The following is a summary of these principles as developed by the American Psychological Association (2010):

- Psychologists inform their clients/patients as early as possible in the therapeutic relationship about the nature and anticipated course of therapy, fees, involvement of third parties, and limits of confidentiality, and provide sufficient opportunity for the client/patient to ask questions and receive answers.
- Psychologists inform their clients/patients of the developing nature of the treatment, the potential risks involved, alternative treatments that may be available, and about the voluntary nature of their participation.

- When the therapist is a trainee, the client/patient is informed that the therapist is in training and is being supervised, and is given the name of the supervisor.
- When psychologists agree to provide services to several persons who have a relationship, such as spouses, significant others, or parents and children, they take reasonable steps to clarify at the outset which of the individuals are clients/patients and the relationship the psychologist will have with each person.
- If it becomes apparent that a psychologist may be called on to perform potentially conflicting roles, such as family therapist and then witness for one party in divorce proceedings, the psychologist takes reasonable steps to clarify and modify, or withdraw from, roles appropriately.
- When psychologists provide services to several persons in a group setting, they describe at the outset the roles and responsibilities of all parties and the limits of confidentiality.
- Psychologists do not engage in sexual intimacies with current therapy clients/patients, or with individuals they know to be close relatives, guardians, or significant others of current clients/patients. Psychologists do not terminate therapy to circumvent this standard. Psychologists do not accept as therapy clients, patients, or persons with whom they have engaged in sexual intimacies, nor do they have sexual intimacies with former clients/patients for at least 2 years after cessation or termination of therapy.
- Psychologists terminate therapy when it becomes reasonably clear that the client/patient no longer needs the service, is not likely to benefit, or is being harmed by continued service.

Key Takeaways

- Eclectic therapy is the most common approach to treatment. In eclectic therapy, the therapist uses whatever treatment approaches seem most likely to be effective for the client.
- Everyone has the right to appropriate mental health care.
- Licensed therapists follow ethical principles in their practices to protect the rights of clients.

Exercises and Critical Thinking

1. Given your knowledge about the effectiveness of therapies, what approaches would you take if you were making recommendations for a person who is seeking treatment for severe depression?

Chapter Summary

Psychological disorders create a tremendous individual, social, and economic drain on society. Psychologists work to reduce this burden by preventing and treating disorder. Psychologists base this treatment and prevention of disorders on the biopsychosocial model, which proposes that disorder has biological, psychological, and social causes, and that each of these aspects can be the focus of reducing disorder.

Therapy, or treatment for psychological disorders, begins with a formal psychological assessment. In addition to the psychological assessment, the patient is usually seen by a physician to gain information about physical problems.

One approach to treatment is psychotherapy. The fundamental aspect of psychotherapy is that the patient directly confronts the disorder and works with the therapist to help reduce it.

Psychodynamic therapy is a psychological treatment based on Freudian and neo-Freudian theories. The analyst engages with the patient in one-on-one sessions during which the patient verbalizes his or her thoughts through free associations. The goal of the therapy is to help the patient develop insight; that is, an understanding of early childhood relationships and the unconscious causes of the disorder.

Humanistic therapy is a psychological treatment based on the theories of Carl Rogers and other humanistic psychologists. Humanistic therapies attempt to promote growth and responsibility by helping clients consider their own situations and the world around them, and how they can work to achieve their life goals.

Humanistic therapy promotes the ideas of genuineness, empathy, and unconditional positive regard in a nurturing relationship in which the therapist actively listens to and reflects the feelings of the client. This relationship is probably the most fundamental part of contemporary psychotherapy.

Behavioral therapy may include operant conditioning using reward or punishment. When the disorder is anxiety or phobia, then the goal is to reduce the negative affective responses to the feared stimulus through exposure therapy, flooding, or systematic desensitization. Aversion therapy is a type of behavior therapy in which classical conditioning is used to reduce the frequency of an undesirable behavior.

Cognitive therapy includes treatment that helps clients identify incorrect or distorted beliefs that are contributing to disorder. Cognitive-behavior therapy (CBT) is a structured approach to treatment that attempts to reduce psychological disorders through systematic procedures based on cognitive and behavioral principles. CBT is a very broad approach used for the treatment of a variety of problems.

Psychologists use outcome research to determine the effectiveness of different therapies. These studies help determine if improvement is due to natural improvement, nonspecific treatment effects, or placebo effects. Research finds that psychotherapy is effective in treating disorders, but there is not much evidence that any one type of therapy is more effective than any other type.

What all good therapies have in common is that they give people hope; help them think more carefully about themselves and about their relationships with others; and provide a positive, empathic, and trusting relationship with the therapist, known as the therapeutic alliance.

Biomedical therapies are treatments designed to reduce psychological disorder by influencing the action of the central nervous system. These therapies primarily involve the use of medications, but also include direct methods of brain intervention, including electroconvulsive therapy (ECT), transcranial magnetic stimulation (TMS), and psychosurgery.

Depressive disorders are most commonly treated with the antidepressant medications known as selective serotonin reuptake inhibitors (SSRIs), including Prozac, Paxil, and Zoloft. The SSRIs selectively block the reuptake of serotonin at the synapse. Bipolar disorder is treated with mood stabilizing medications. Antianxiety medications, including the tranquilizers Ativan, Valium, and Xanax, are used to treat anxiety disorders.

Schizophrenia is treated with antipsychotic drugs, including Thorazine, Haldol, Clozaril, Risperdal, and Zyprexa. Some drugs treat the positive symptoms of schizophrenia, and others treat both the positive, negative, and cognitive symptoms. Attention-deficit/hyperactivity disorder (ADHD) is treated using psychostimulants, including Ritalin, Adderall, and Dexedrine.
One problem with drug therapies is that, although they provide temporary relief, they do not treat the underlying cause of the disorder. Once the patient stops taking the drug, the symptoms often return in full force.

Practitioners frequently incorporate the social setting in which disorder occurs by conducting therapy in groups, with couples, or with families. One way for people to gain this social support is by joining a self-help group.

Community mental health services refer to psychological treatments and interventions that are distributed at the community level. These centers provide primary, secondary, and tertiary prevention.

Data suggest that although some community prevention programs are successful, the changes brought about by even the best of these programs are, on average, modest.

The most commonly used approaches to therapy are eclectic, such that the therapist uses whichever techniques seem most useful and relevant for a given patient.

Licensed therapists follow ethical principles in their practices to protect the rights of clients.

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