

# Psych- ology



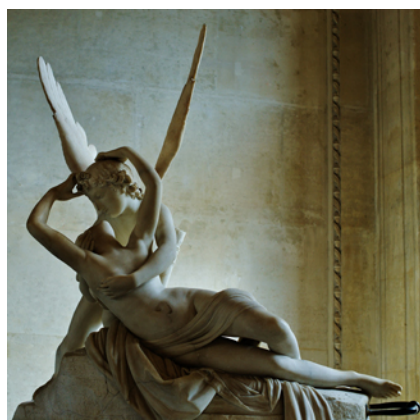
## 1.1 What Is Psychology?

### Learning Objectives

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

- Understand the etymology of the word “psychology”
- Define psychology
- Understand the merits of an education in psychology

In Greek mythology, Psyche was a mortal woman whose beauty was so great that it rivaled that of the goddess Aphrodite. Aphrodite became so jealous of Psyche that she sent her son, Eros, to make Psyche fall in love with the ugliest man in the world. However, Eros accidentally pricked himself with the tip of his arrow and fell madly in love with Psyche himself. He took Psyche to his palace and showered her with gifts, yet she could never see his face. While visiting Psyche, her sisters roused suspicion in Psyche about her mysterious lover, and eventually, Psyche betrayed Eros’ wishes to remain unseen to her (**Figure 1.2**). Because of this betrayal, Eros abandoned Psyche. When Psyche appealed to Aphrodite to reunite her with Eros, Aphrodite gave her a series of impossible tasks to complete. Psyche managed to complete all of these trials; ultimately, her perseverance paid off as she was reunited with Eros and was ultimately transformed into a goddess herself (Ashliman, 2001; Greek Myths & Greek Mythology, 2014).



**Figure 1.2** Antonio Canova's sculpture depicts Eros and Psyche.

Psyche comes to represent the human soul’s triumph over the misfortunes of life in the pursuit of true happiness (Bulfinch, 1855); in fact, the Greek word **psyche** means soul, and it is often represented as a butterfly. The word *psychology* was coined at a time when the concepts of soul and mind were not as clearly distinguished (Green, 2001). The root **ology** denotes scientific study of, and **psychology** refers to the scientific study of the mind. Since science studies only observable phenomena and the mind is not directly observable, we expand this definition to the scientific study of mind and behavior.

The scientific study of any aspect of the world uses the scientific method to acquire knowledge. To apply the scientific method, a researcher with a question about how or why something happens will propose a tentative explanation, called a hypothesis, to explain the phenomenon. A hypothesis is not just any explanation; it should fit into the context of a scientific theory. A scientific theory is a broad explanation or group of explanations for some aspect of the natural world that is consistently supported by evidence over time. A theory is the best understanding that we have of that part of the natural world. Armed with the hypothesis, the researcher then makes observations or, better still, carries out an experiment to test the validity of the hypothesis. That test and its results are then published so that others can check the results or build on them. It is necessary that any explanation in science be testable, which means that the phenomenon must be perceivable and measurable. For example, that a bird sings because it is happy is not

a testable hypothesis, since we have no way to measure the happiness of a bird. We must ask a different question, perhaps about the brain state of the bird, since this can be measured. In general, science deals only with matter and energy, that is, those things that can be measured, and it cannot arrive at knowledge about values and morality. This is one reason why our scientific understanding of the mind is so limited, since thoughts, at least as we experience them, are neither matter nor energy. The scientific method is also a form of empiricism. An **empirical method** for acquiring knowledge is one based on observation, including experimentation, rather than a method based only on forms of logical argument or previous authorities.

It was not until the late 1800s that psychology became accepted as its own academic discipline. Before this time, the workings of the mind were considered under the auspices of philosophy. Given that any behavior is, at its roots, biological, some areas of psychology take on aspects of a natural science like biology. No biological organism exists in isolation, and our behavior is influenced by our interactions with others. Therefore, psychology is also a social science.

## MERITS OF AN EDUCATION IN PSYCHOLOGY

Often, students take their first psychology course because they are interested in helping others and want to learn more about themselves and why they act the way they do. Sometimes, students take a psychology course because it either satisfies a general education requirement or is required for a program of study such as nursing or pre-med. Many of these students develop such an interest in the area that they go on to declare psychology as their major. As a result, psychology is one of the most popular majors on college campuses across the United States (Johnson & Lubin, 2011). A number of well-known individuals were psychology majors. Just a few famous names on this list are Facebook's creator Mark Zuckerberg, television personality and political satirist Jon Stewart, actress Natalie Portman, and filmmaker Wes Craven (Halonen, 2011). About 6 percent of all bachelor degrees granted in the United States are in the discipline of psychology (U.S. Department of Education, 2013).

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

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

### LINK TO LEARNING



Watch a brief **video** (<http://openstaxcollege.org//psycmajor>) that describes some of the questions a student should consider before deciding to major in psychology.

## 1.2 History of Psychology

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### Learning Objectives

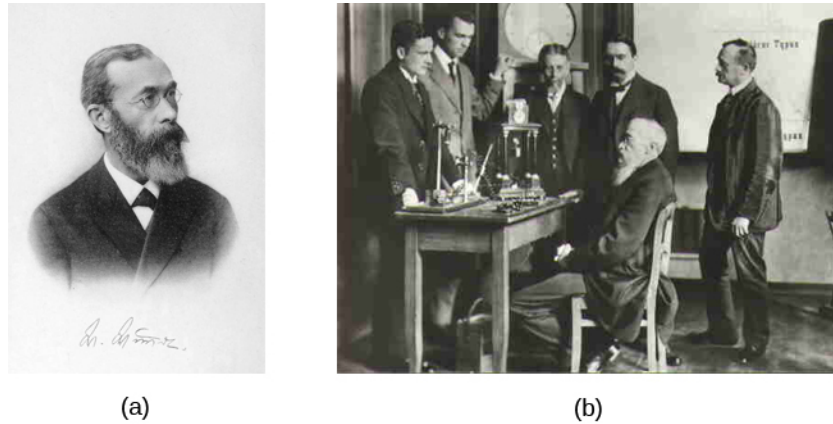
By the end of this section, you will be able to:

- Understand the importance of Wundt and James in the development of psychology
  - Appreciate Freud's influence on psychology
  - Understand the basic tenets of Gestalt psychology
  - Appreciate the important role that behaviorism played in psychology's history
  - Understand basic tenets of humanism
  - Understand how the cognitive revolution shifted psychology's focus back to the mind
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Psychology is a relatively young science with its experimental roots in the 19th century, compared, for example, to human physiology, which dates much earlier. As mentioned, anyone interested in exploring issues related to the mind generally did so in a philosophical context prior to the 19th century. Two men, working in the 19th century, are generally credited as being the founders of psychology as a science and academic discipline that was distinct from philosophy. Their names were Wilhelm Wundt and William James. This section will provide an overview of the shifts in paradigms that have influenced psychology from Wundt and James through today.

### WUNDT AND STRUCTURALISM

Wilhelm Wundt (1832–1920) was a German scientist who was the first person to be referred to as a psychologist. His famous book entitled *Principles of Physiological Psychology* was published in 1873. Wundt viewed psychology as a scientific study of conscious experience, and he believed that the goal of psychology was to identify components of consciousness and how those components combined to result in our conscious experience. Wundt used **introspection** (he called it “internal perception”), a process by which someone examines their own conscious experience as objectively as possible, making the human mind like any other aspect of nature that a scientist observed. Wundt's version of introspection used only very specific experimental conditions in which an external stimulus was designed to produce a scientifically observable (repeatable) experience of the mind (Danziger, 1980). The first stringent requirement was the use of “trained” or practiced observers, who could immediately observe and report a reaction. The second requirement was the use of repeatable stimuli that always produced the same experience in the subject and allowed the subject to expect and thus be fully attentive to the inner reaction. These experimental requirements were put in place to eliminate “interpretation” in the reporting of internal experiences and to counter the argument that there is no way to know that an individual is observing their mind or consciousness accurately, since it cannot be seen by any other person. This attempt to understand the structure or characteristics of the mind was known as **structuralism**. Wundt established his psychology laboratory at the University at Leipzig in 1879 (**Figure 1.3**). In this laboratory, Wundt and his students conducted experiments on, for example, reaction times. A subject, sometimes in a room isolated from the scientist, would receive a stimulus such as a light, image, or sound. The subject's reaction to the stimulus would be to push a button, and an apparatus would record the time to reaction. Wundt could measure reaction time to one-thousandth of a second (Nicolas & Ferrand, 1999).



**Figure 1.3** (a) Wilhelm Wundt is credited as one of the founders of psychology. He created the first laboratory for psychological research. (b) This photo shows him seated and surrounded by fellow researchers and equipment in his laboratory in Germany.

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

## JAMES AND FUNCTIONALISM

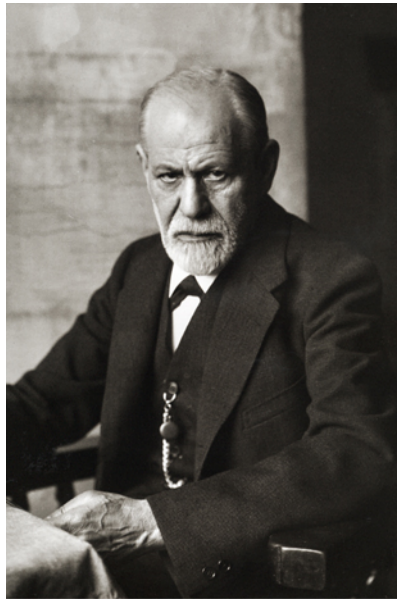
William James (1842–1910) was the first American psychologist who espoused a different perspective on how psychology should operate (**Figure 1.4**). James was introduced to Darwin's theory of evolution by natural selection and accepted it as an explanation of an organism's characteristics. Key to that theory is the idea that natural selection leads to organisms that are adapted to their environment, including their behavior. Adaptation means that a trait of an organism has a function for the survival and reproduction of the individual, because it has been naturally selected. As James saw it, psychology's purpose was to study the function of behavior in the world, and as such, his perspective was known as **functionalism**. Functionalism focused on how mental activities helped an organism fit into its environment. Functionalism has a second, more subtle meaning in that functionalists were more interested in the operation of the whole mind rather than of its individual parts, which were the focus of structuralism. Like Wundt, James believed that introspection could serve as one means by which someone might study mental activities, but James also relied on more objective measures, including the use of various recording devices, and examinations of concrete products of mental activities and of anatomy and physiology (Gordon, 1995).



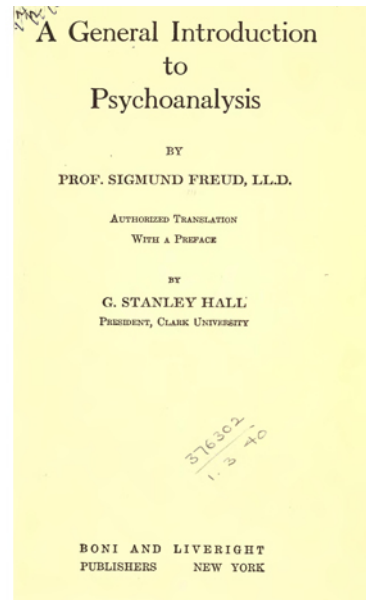
**Figure 1.4** William James, shown here in a self-portrait, was the first American psychologist.

## FREUD AND PSYCHOANALYTIC THEORY

Perhaps one of the most influential and well-known figures in psychology's history was Sigmund Freud (**Figure 1.5**). Freud (1856–1939) was an Austrian neurologist who was fascinated by patients suffering from “hysteria” and neurosis. Hysteria was an ancient diagnosis for disorders, primarily of women with a wide variety of symptoms, including physical symptoms and emotional disturbances, none of which had an apparent physical cause. Freud theorized that many of his patients' problems arose from the unconscious mind. In Freud's view, the unconscious mind was a repository of feelings and urges of which we have no awareness. Gaining access to the unconscious, then, was crucial to the successful resolution of the patient's problems. According to Freud, the unconscious mind could be accessed through dream analysis, by examinations of the first words that came to people's minds, and through seemingly innocent slips of the tongue. **Psychoanalytic theory** focuses on the role of a person's unconscious, as well as early childhood experiences, and this particular perspective dominated clinical psychology for several decades (Thorne & Henley, 2005).



(a)



(b)

**Figure 1.5** (a) Sigmund Freud was a highly influential figure in the history of psychology. (b) One of his many books, *A General Introduction to Psychoanalysis*, shared his ideas about psychoanalytical therapy; it was published in 1922.

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

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

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

## WERTHEIMER, KOFFKA, KÖHLER, AND GESTALT PSYCHOLOGY

Max Wertheimer (1880–1943), Kurt Koffka (1886–1941), and Wolfgang Köhler (1887–1967) were three German psychologists who immigrated to the United States in the early 20th century to escape Nazi Germany. These men are credited with introducing psychologists in the United States to various Gestalt principles. The word Gestalt roughly translates to “whole;” a major emphasis of Gestalt psychology deals with the fact that although a sensory experience can be broken down into individual parts, how those parts relate to each other as a whole is often what the individual responds to in perception. For example, a song may be made up of individual notes played by different instruments, but the real nature of the song is perceived in the combinations of these notes as they form the melody, rhythm, and harmony. In many ways, this particular perspective would have directly contradicted Wundt's ideas of structuralism (Thorne & Henley, 2005).

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

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

## PAVLOV, WATSON, SKINNER, AND BEHAVIORISM

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

John B. Watson (1878–1958) was an influential American psychologist whose most famous work occurred during the early 20th century at Johns Hopkins University (**Figure 1.6**). While Wundt and James were concerned with understanding conscious experience, Watson thought that the study of consciousness was flawed. Because he believed that objective analysis of the mind was impossible, Watson preferred to focus directly on observable behavior and try to bring that behavior under control. Watson was a major proponent of shifting the focus of psychology from the mind to behavior, and this approach of observing and controlling behavior came to be known as **behaviorism**. A major object of study by behaviorists was learned behavior and its interaction with inborn qualities of the organism. Behaviorism commonly used animals in experiments under the assumption that what was learned using animal models could, to some degree, be applied to human behavior. Indeed, Tolman (1938) stated, “I believe that everything important in psychology (except ... such matters as involve society and words) can be investigated in essence through the continued experimental and theoretical analysis of the determiners of rat behavior at a choice-point in

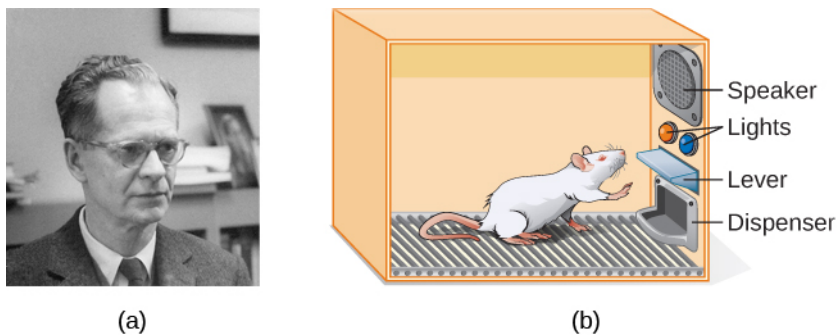
a maze.”



**Figure 1.6** John B. Watson is known as the father of behaviorism within psychology.

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

B. F. Skinner (1904–1990) was an American psychologist (**Figure 1.7**). Like Watson, Skinner was a behaviorist, and he concentrated on how behavior was affected by its consequences. Therefore, Skinner spoke of reinforcement and punishment as major factors in driving behavior. As a part of his research, Skinner developed a chamber that allowed the careful study of the principles of modifying behavior through reinforcement and punishment. This device, known as an operant conditioning chamber (or more familiarly, a Skinner box), has remained a crucial resource for researchers studying behavior (Thorne & Henley, 2005).



**Figure 1.7** (a) B. F. Skinner is famous for his research on operant conditioning. (b) Modified versions of the operant conditioning chamber, or Skinner box, are still widely used in research settings today. (credit a: modification of work by "Silly rabbit"/Wikimedia Commons)

The Skinner box is a chamber that isolates the subject from the external environment and has a behavior indicator such as a lever or a button. When the animal pushes the button or lever, the box is able to deliver a positive reinforcement of the behavior (such as food) or a punishment (such as a noise) or a token conditioner (such as a light) that is correlated with either the positive reinforcement or punishment.

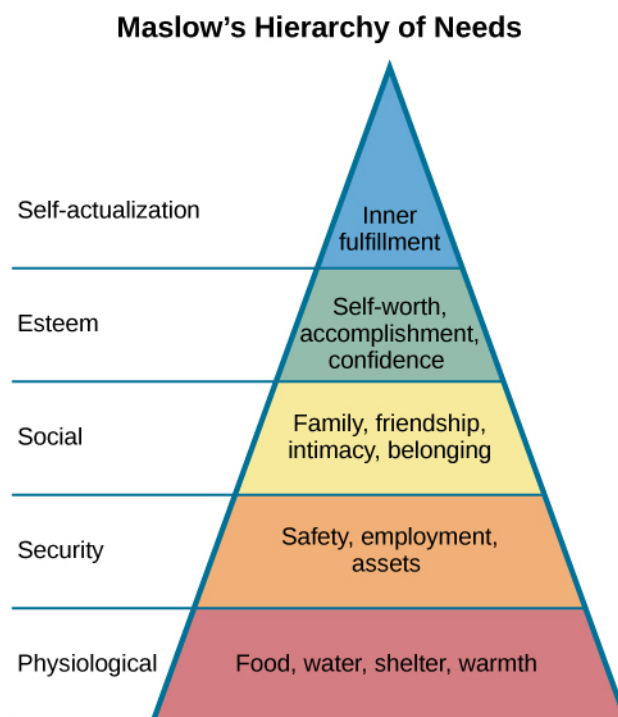
Skinner’s focus on positive and negative reinforcement of learned behaviors had a lasting influence in psychology that has waned somewhat since the growth of research in cognitive psychology. Despite this, conditioned learning is still used in human behavioral modification. Skinner’s two widely read and controversial popular science books about the value of operant conditioning for creating happier lives

remain as thought-provoking arguments for his approach (Greengrass, 2004).

## MASLOW, ROGERS, AND HUMANISM

During the early 20th century, American psychology was dominated by behaviorism and psychoanalysis. However, some psychologists were uncomfortable with what they viewed as limited perspectives being so influential to the field. They objected to the pessimism and determinism (all actions driven by the unconscious) of Freud. They also disliked the reductionism, or simplifying nature, of behaviorism. Behaviorism is also deterministic at its core, because it sees human behavior as entirely determined by a combination of genetics and environment. Some psychologists began to form their own ideas that emphasized personal control, intentionality, and a true predisposition for “good” as important for our self-concept and our behavior. Thus, humanism emerged. **Humanism** is a perspective within psychology that emphasizes the potential for good that is innate to all humans. Two of the most well-known proponents of humanistic psychology are Abraham Maslow and Carl Rogers (O’Hara, n.d.).

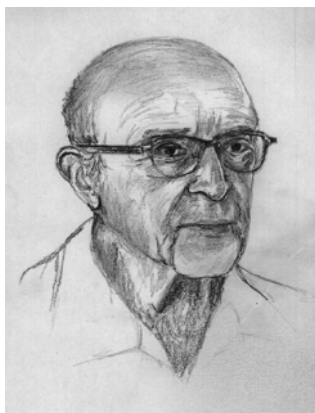
Abraham Maslow (1908–1970) was an American psychologist who is best known for proposing a hierarchy of human needs in motivating behavior (**Figure 1.8**). Although this concept will be discussed in more detail in a later chapter, a brief overview will be provided here. Maslow asserted that so long as basic needs necessary for survival were met (e.g., food, water, shelter), higher-level needs (e.g., social needs) would begin to motivate behavior. According to Maslow, the highest-level needs relate to self-actualization, a process by which we achieve our full potential. Obviously, the focus on the positive aspects of human nature that are characteristic of the humanistic perspective is evident (Thorne & Henley, 2005). Humanistic psychologists rejected, on principle, the research approach based on reductionist experimentation in the tradition of the physical and biological sciences, because it missed the “whole” human being. Beginning with Maslow and Rogers, there was an insistence on a humanistic research program. This program has been largely qualitative (not measurement-based), but there exist a number of quantitative research strains within humanistic psychology, including research on happiness, self-concept, meditation, and the outcomes of humanistic psychotherapy (Friedman, 2008).



**Figure 1.8** Maslow's hierarchy of needs is shown.

Carl Rogers (1902–1987) was also an American psychologist who, like Maslow, emphasized the potential

for good that exists within all people (**Figure 1.9**). Rogers used a therapeutic technique known as client-centered therapy in helping his clients deal with problematic issues that resulted in their seeking psychotherapy. Unlike a psychoanalytic approach in which the therapist plays an important role in interpreting what conscious behavior reveals about the unconscious mind, client-centered therapy involves the patient taking a lead role in the therapy session. Rogers believed that a therapist needed to display three features to maximize the effectiveness of this particular approach: unconditional positive regard, genuineness, and empathy. Unconditional positive regard refers to the fact that the therapist accepts their client for who they are, no matter what he or she might say. Provided these factors, Rogers believed that people were more than capable of dealing with and working through their own issues (Thorne & Henley, 2005).



**Figure 1.9** Carl Rogers, shown in this portrait, developed a client-centered therapy method that has been influential in clinical settings. (credit: "Didius"/Wikimedia Commons)

Humanism has been influential to psychology as a whole. Both Maslow and Rogers are well-known names among students of psychology (you will read more about both men later in this text), and their ideas have influenced many scholars. Furthermore, Rogers' client-centered approach to therapy is still commonly used in psychotherapeutic settings today (O'hara, n.d.)

### LINK TO LEARNING



View a brief **video** (<http://openstaxcollege.org//crogers1>) of Carl Rogers describing his therapeutic approach.

## THE COGNITIVE REVOLUTION

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

Although no one person is entirely responsible for starting the cognitive revolution, Noam Chomsky

was very influential in the early days of this movement (**Figure 1.10**). Chomsky (1928–), an American linguist, was dissatisfied with the influence that behaviorism had had on psychology. He believed that psychology's focus on behavior was short-sighted and that the field had to re-incorporate mental functioning into its purview if it were to offer any meaningful contributions to understanding behavior (Miller, 2003).



**Figure 1.10** Noam Chomsky was very influential in beginning the cognitive revolution. In 2010, this mural honoring him was put up in Philadelphia, Pennsylvania. (credit: Robert Moran)

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

## DIG DEEPER

### Feminist Psychology

The science of psychology has had an impact on human wellbeing, both positive and negative. The dominant influence of Western, white, and male academics in the early history of psychology meant that psychology developed with the biases inherent in those individuals, which often had negative consequences for members of society that were not white or male. Women, members of ethnic minorities in both the United States and other countries, and individuals with sexual orientations other than heterosexual had difficulties entering the field of psychology and therefore influencing its development. They also suffered from the attitudes of white, male psychologists, who were not immune to the nonscientific attitudes prevalent in the society in which they developed and worked. Until the 1960s, the science of psychology was largely a “womanless” psychology (Crawford & Marecek, 1989), meaning that few women were able to practice psychology, so they had little influence on what was studied. In addition, the experimental subjects of psychology were mostly men, which resulted from underlying assumptions that gender had no influence on psychology and that women were not of sufficient interest to study.

An article by Naomi Weisstein, first published in 1968 (Weisstein, 1993), stimulated a feminist revolution in psychology by presenting a critique of psychology as a science. She also specifically criticized male psychologists for constructing the psychology of women entirely out of their own cultural biases and without careful experimental tests to verify any of their characterizations of women. Weisstein used, as examples, statements by prominent psychologists in the 1960s, such as this quote by Bruno Bettelheim: “. . . we must start with the realization that, as much as women want to be good scientists or engineers, they want first and foremost to be womanly companions of men and to be mothers.” Weisstein’s critique formed the foundation for the subsequent development of a feminist psychology that attempted to be free of the influence of male cultural biases on our knowledge of the psychology of women and, indeed, of both genders.

Crawford & Marecek (1989) identify several feminist approaches to psychology that can be described as

feminist psychology. These include re-evaluating and discovering the contributions of women to the history of psychology, studying psychological gender differences, and questioning the male bias present across the practice of the scientific approach to knowledge.

## MULTICULTURAL PSYCHOLOGY

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

This history of multicultural psychology in the United States is a long one. The role of African American psychologists in researching the cultural differences between African American individual and social psychology is but one example. In 1920, Cecil Sumner was the first African American to receive a PhD in psychology in the United States. Sumner established a psychology degree program at Howard University, leading to the education of a new generation of African American psychologists (Black, Spence, and Omari, 2004). Much of the work of early African American psychologists (and a general focus of much work in first half of the 20th century in psychology in the United States) was dedicated to testing and intelligence testing in particular (Black et al., 2004). That emphasis has continued, particularly because of the importance of testing in determining opportunities for children, but other areas of exploration in African-American psychology research include learning style, sense of community and belonging, and spiritualism (Black et al., 2004).

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

### LINK TO LEARNING



Read a **news story** (<http://openstaxcollege.org//crogers2>) about the influence of an African American's psychology research on the historic *Brown v. Board of Education* civil rights case.

## 1.3 Contemporary Psychology

### Learning Objectives

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

- Appreciate the diversity of interests and foci within psychology
- Understand basic interests and applications in each of the described areas of psychology
- Demonstrate familiarity with some of the major concepts or important figures in each of the described areas of psychology

Contemporary psychology is a diverse field that is influenced by all of the historical perspectives described in the preceding section. Reflective of the discipline's diversity is the diversity seen within the **American Psychological Association (APA)**. The APA is a professional organization representing psychologists in the United States. The APA is the largest organization of psychologists in the world, and its mission is to advance and disseminate psychological knowledge for the betterment of people. There are 56 divisions within the APA, representing a wide variety of specialties that range from Societies for the Psychology of Religion and Spirituality to Exercise and Sport Psychology to Behavioral Neuroscience and Comparative Psychology. Reflecting the diversity of the field of psychology itself, members, affiliate members, and associate members span the spectrum from students to doctoral-level psychologists, and come from a variety of places including educational settings, criminal justice, hospitals, the armed forces, and industry (American Psychological Association, 2014). The Association for Psychological Science (APS) was founded in 1988 and seeks to advance the scientific orientation of psychology. Its founding resulted from disagreements between members of the scientific and clinical branches of psychology within the APA. The APS publishes five research journals and engages in education and advocacy with funding agencies. A significant proportion of its members are international, although the majority is located in the United States. Other organizations provide networking and collaboration opportunities for professionals of several ethnic or racial groups working in psychology, such as the National Latina/o Psychological Association (NLPAA), the Asian American Psychological Association (AAPA), the Association of Black Psychologists (ABPsi), and the Society of Indian Psychologists (SIP). Most of these groups are also dedicated to studying psychological and social issues within their specific communities.

This section will provide an overview of the major subdivisions within psychology today in the order in which they are introduced throughout the remainder of this textbook. This is not meant to be an exhaustive listing, but it will provide insight into the major areas of research and practice of modern-day psychologists.

### LINK TO LEARNING



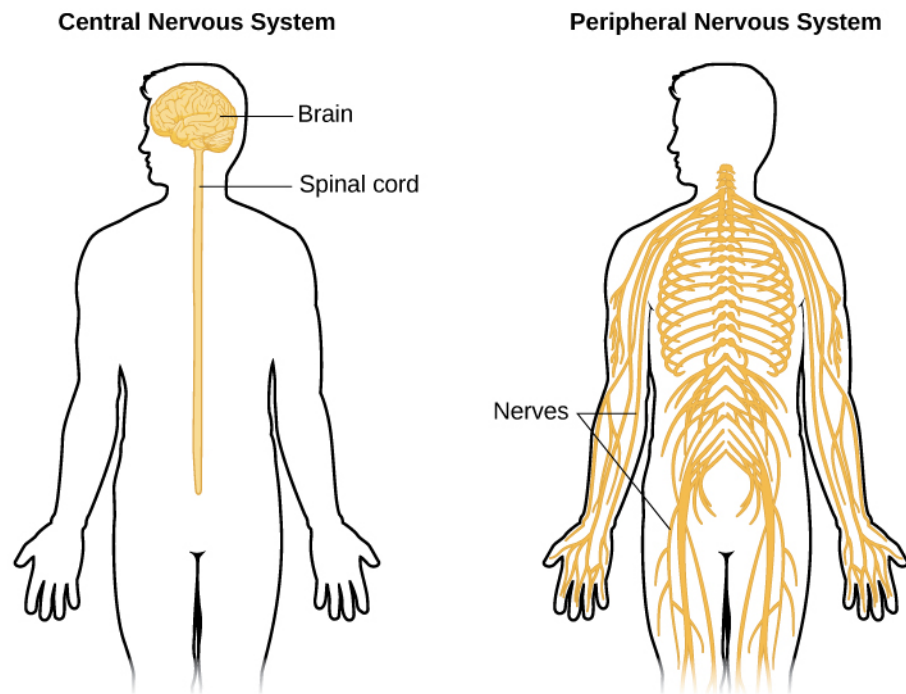
Please visit this **website** (<http://openstaxcollege.org//biopsychology>) to learn about the divisions within the APA.

Student **resources** (<http://openstaxcollege.org//studentresource>) are also provided by the APA.

### BIOPSYCHOLOGY AND EVOLUTIONARY PSYCHOLOGY

As the name suggests, **biopsychology** explores how our biology influences our behavior. While biological psychology is a broad field, many biological psychologists want to understand how the structure and function of the nervous system is related to behavior (**Figure 1.11**). As such, they often combine the research strategies of both psychologists and physiologists to accomplish this goal (as discussed in Carlson,

2013).



**Figure 1.11** Biological psychologists study how the structure and function of the nervous system generate behavior.

The research interests of biological psychologists span a number of domains, including but not limited to, sensory and motor systems, sleep, drug use and abuse, ingestive behavior, reproductive behavior, neurodevelopment, plasticity of the nervous system, and biological correlates of psychological disorders. Given the broad areas of interest falling under the purview of biological psychology, it will probably come as no surprise that individuals from all sorts of backgrounds are involved in this research, including biologists, medical professionals, physiologists, and chemists. This interdisciplinary approach is often referred to as neuroscience, of which biological psychology is a component (Carlson, 2013).

While biopsychology typically focuses on the immediate causes of behavior based in the physiology of a human or other animal, evolutionary psychology seeks to study the ultimate biological causes of behavior. To the extent that a behavior is impacted by genetics, a behavior, like any anatomical characteristic of a human or animal, will demonstrate adaption to its surroundings. These surroundings include the physical environment and, since interactions between organisms can be important to survival and reproduction, the social environment. The study of behavior in the context of evolution has its origins with Charles Darwin, the co-discoverer of the theory of evolution by natural selection. Darwin was well aware that behaviors should be adaptive and wrote books titled, *The Descent of Man* (1871) and *The Expression of the Emotions in Man and Animals* (1872), to explore this field.

Evolutionary psychology, and specifically, the evolutionary psychology of humans, has enjoyed a resurgence in recent decades. To be subject to evolution by natural selection, a behavior must have a significant genetic cause. In general, we expect all human cultures to express a behavior if it is caused genetically, since the genetic differences among human groups are small. The approach taken by most evolutionary psychologists is to predict the outcome of a behavior in a particular situation based on evolutionary theory and then to make observations, or conduct experiments, to determine whether the results match the theory. It is important to recognize that these types of studies are not strong evidence that a behavior is adaptive, since they lack information that the behavior is in some part genetic and not entirely cultural (Endler, 1986). Demonstrating that a trait, especially in humans, is naturally selected is extraordinarily difficult; perhaps for this reason, some evolutionary psychologists are content to assume the behaviors they study have genetic determinants (Confer et al., 2010).

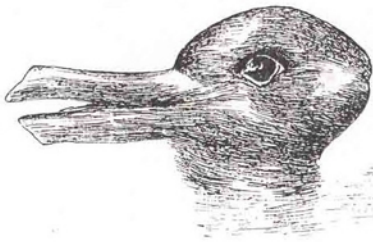
One other drawback of evolutionary psychology is that the traits that we possess now evolved under environmental and social conditions far back in human history, and we have a poor understanding of what these conditions were. This makes predictions about what is adaptive for a behavior difficult. Behavioral traits need not be adaptive under current conditions, only under the conditions of the past when they evolved, about which we can only hypothesize.

There are many areas of human behavior for which evolution can make predictions. Examples include memory, mate choice, relationships between kin, friendship and cooperation, parenting, social organization, and status (Confer et al., 2010).

Evolutionary psychologists have had success in finding experimental correspondence between observations and expectations. In one example, in a study of mate preference differences between men and women that spanned 37 cultures, Buss (1989) found that women valued earning potential factors greater than men, and men valued potential reproductive factors (youth and attractiveness) greater than women in their prospective mates. In general, the predictions were in line with the predictions of evolution, although there were deviations in some cultures.

## SENSATION AND PERCEPTION

Scientists interested in both physiological aspects of sensory systems as well as in the psychological experience of sensory information work within the area of sensation and perception (**Figure 1.12**). As such, sensation and perception research is also quite interdisciplinary. Imagine walking between buildings as you move from one class to another. You are inundated with sights, sounds, touch sensations, and smells. You also experience the temperature of the air around you and maintain your balance as you make your way. These are all factors of interest to someone working in the domain of sensation and perception.



**Figure 1.12** When you look at this image, you may see a duck or a rabbit. The sensory information remains the same, but your perception can vary dramatically.

As described in a later chapter that focuses on the results of studies in sensation and perception, our experience of our world is not as simple as the sum total of all of the sensory information (or sensations) together. Rather, our experience (or perception) is complex and is influenced by where we focus our attention, our previous experiences, and even our cultural backgrounds.

## COGNITIVE PSYCHOLOGY

As mentioned in the previous section, the cognitive revolution created an impetus for psychologists to focus their attention on better understanding the mind and mental processes that underlie behavior. Thus, **cognitive psychology** is the area of psychology that focuses on studying cognitions, or thoughts, and their relationship to our experiences and our actions. Like biological psychology, cognitive psychology is broad in its scope and often involves collaborations among people from a diverse range of disciplinary backgrounds. This has led some to coin the term cognitive science to describe the interdisciplinary nature of this area of research (Miller, 2003).

Cognitive psychologists have research interests that span a spectrum of topics, ranging from attention to problem solving to language to memory. The approaches used in studying these topics are equally diverse.

Given such diversity, cognitive psychology is not captured in one chapter of this text per se; rather, various concepts related to cognitive psychology will be covered in relevant portions of the chapters in this text on sensation and perception, thinking and intelligence, memory, lifespan development, social psychology, and therapy.

### LINK TO LEARNING



View a **brief video** (<http://openstaxcollege.org//cogpsys>) recapping some of the major concepts explored by cognitive psychologists.

## DEVELOPMENTAL PSYCHOLOGY

**Developmental psychology** is the scientific study of development across a lifespan. Developmental psychologists are interested in processes related to physical maturation. However, their focus is not limited to the physical changes associated with aging, as they also focus on changes in cognitive skills, moral reasoning, social behavior, and other psychological attributes.

Early developmental psychologists focused primarily on changes that occurred through reaching adulthood, providing enormous insight into the differences in physical, cognitive, and social capacities that exist between very young children and adults. For instance, research by Jean Piaget (**Figure 1.13**) demonstrated that very young children do not demonstrate object permanence. Object permanence refers to the understanding that physical things continue to exist, even if they are hidden from us. If you were to show an adult a toy, and then hide it behind a curtain, the adult knows that the toy still exists. However, very young infants act as if a hidden object no longer exists. The age at which object permanence is achieved is somewhat controversial (Munakata, McClelland, Johnson, and Siegler, 1997).



**Figure 1.13** Jean Piaget is famous for his theories regarding changes in cognitive ability that occur as we move from infancy to adulthood.

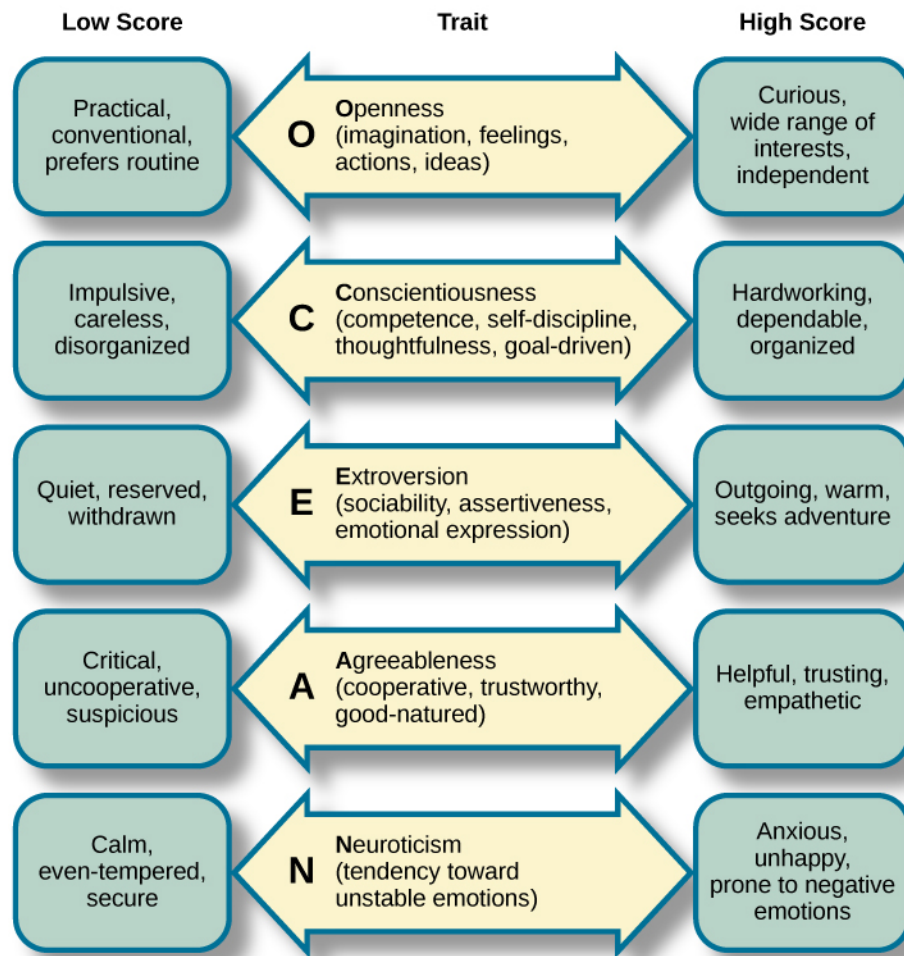
While Piaget was focused on cognitive changes during infancy and childhood as we move to adulthood, there is an increasing interest in extending research into the changes that occur much later in life. This may be reflective of changing population demographics of developed nations as a whole. As more and more people live longer lives, the number of people of advanced age will continue to increase. Indeed,

it is estimated that there were just over 40 million people aged 65 or older living in the United States in 2010. However, by 2020, this number is expected to increase to about 55 million. By the year 2050, it is estimated that nearly 90 million people in this country will be 65 or older (Department of Health and Human Services, n.d.).

## PERSONALITY PSYCHOLOGY

**Personality psychology** focuses on patterns of thoughts and behaviors that make each individual unique. Several individuals (e.g., Freud and Maslow) that we have already discussed in our historical overview of psychology, and the American psychologist Gordon Allport, contributed to early theories of personality. These early theorists attempted to explain how an individual's personality develops from his or her given perspective. For example, Freud proposed that personality arose as conflicts between the conscious and unconscious parts of the mind were carried out over the lifespan. Specifically, Freud theorized that an individual went through various psychosexual stages of development. According to Freud, adult personality would result from the resolution of various conflicts that centered on the migration of erogenous (or sexual pleasure-producing) zones from the oral (mouth) to the anus to the phallus to the genitals. Like many of Freud's theories, this particular idea was controversial and did not lend itself to experimental tests (Person, 1980).

More recently, the study of personality has taken on a more quantitative approach. Rather than explaining how personality arises, research is focused on identifying **personality traits**, measuring these traits, and determining how these traits interact in a particular context to determine how a person will behave in any given situation. Personality traits are relatively consistent patterns of thought and behavior, and many have proposed that five trait dimensions are sufficient to capture the variations in personality seen across individuals. These five dimensions are known as the "Big Five" or the Five Factor model, and include dimensions of conscientiousness, agreeableness, neuroticism, openness, and extraversion (**Figure 1.14**). Each of these traits has been demonstrated to be relatively stable over the lifespan (e.g., Rantanen, Metsäpelto, Feldt, Pulkkinen, and Kokko, 2007; Soldz & Vaillant, 1999; McCrae & Costa, 2008) and is influenced by genetics (e.g., Jang, Livesly, and Vernon, 1996).



**Figure 1.14** Each of the dimensions of the Five Factor model is shown in this figure. The provided description would describe someone who scored highly on that given dimension. Someone with a lower score on a given dimension could be described in opposite terms.

## SOCIAL PSYCHOLOGY

Social psychology focuses on how we interact with and relate to others. Social psychologists conduct research on a wide variety of topics that include differences in how we explain our own behavior versus how we explain the behaviors of others, prejudice, and attraction, and how we resolve interpersonal conflicts. Social psychologists have also sought to determine how being among other people changes our own behavior and patterns of thinking.

There are many interesting examples of social psychological research, and you will read about many of these in a later chapter of this textbook. Until then, you will be introduced to one of the most controversial psychological studies ever conducted. Stanley Milgram was an American social psychologist who is most famous for research that he conducted on obedience. After the holocaust, in 1961, a Nazi war criminal, Adolf Eichmann, who was accused of committing mass atrocities, was put on trial. Many people wondered how German soldiers were capable of torturing prisoners in concentration camps, and they were unsatisfied with the excuses given by soldiers that they were simply following orders. At the time, most psychologists agreed that few people would be willing to inflict such extraordinary pain and suffering, simply because they were obeying orders. Milgram decided to conduct research to determine whether or not this was true (**Figure 1.15**). As you will read later in the text, Milgram found that nearly two-thirds of his participants were willing to deliver what they believed to be lethal shocks to another

person, simply because they were instructed to do so by an authority figure (in this case, a man dressed in a lab coat). This was in spite of the fact that participants received payment for simply showing up for the research study and could have chosen not to inflict pain or more serious consequences on another person by withdrawing from the study. No one was actually hurt or harmed in any way, Milgram's experiment was a clever ruse that took advantage of research confederates, those who pretend to be participants in a research study who are actually working for the researcher and have clear, specific directions on how to behave during the research study (Hock, 2009). Milgram's and others' studies that involved deception and potential emotional harm to study participants catalyzed the development of ethical guidelines for conducting psychological research that discourage the use of deception of research subjects, unless it can be argued not to cause harm and, in general, requiring informed consent of participants.

### **Public Announcement**

#### **WE WILL PAY YOU \$4.00 FOR ONE HOUR OF YOUR TIME**

#### **Persons Needed for a Study of Memory**

\*We will pay five hundred New Haven men to help us complete a scientific study of memory and learning. The study is being done at Yale University.

\*Each person who participates will be paid \$4.00 (plus 50c carfare) for approximately 1 hour's time. We need you for only one hour: there are no further obligations. You may choose the time you would like to come (evenings, weekdays, or weekends).

\*No special training, education, or experience is needed. We want:

Factory workers	Businessmen	Construction workers
City employees	Clerks	Salespeople
Laborers	Professional people	White-collar workers
Barbers	Telephone workers	Others

All persons must be between the ages of 20 and 50. High school and college students cannot be used.

\*If you meet these qualifications, fill out the coupon below and mail it now to Professor Stanley Milgram, Department of Psychology, Yale University, New Haven. You will be notified later of the specific time and place of the study. We reserve the right to decline any application.

\*You will be paid \$4.00 (plus 50c carfare) as soon as you arrive at the laboratory.

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TO:  
PROF. STANLEY MILGRAM, DEPARTMENT OF PSYCHOLOGY,  
YALE UNIVERSITY, NEW HAVEN, CONN. I want to take part in  
this study of memory and learning. I am between the ages of 20 and  
50. I will be paid \$4.00 (plus 50c carfare) if I participate.

NAME (Please Print). . . . .

ADDRESS . . . . .

TELEPHONE NO. . . . . Best time to call you . . . . .

AGE . . . . . OCCUPATION . . . . . SEX . . . . .

CAN YOU COME:

WEEKDAYS . . . . . EVENINGS . . . . . WEEKENDS . . . . .

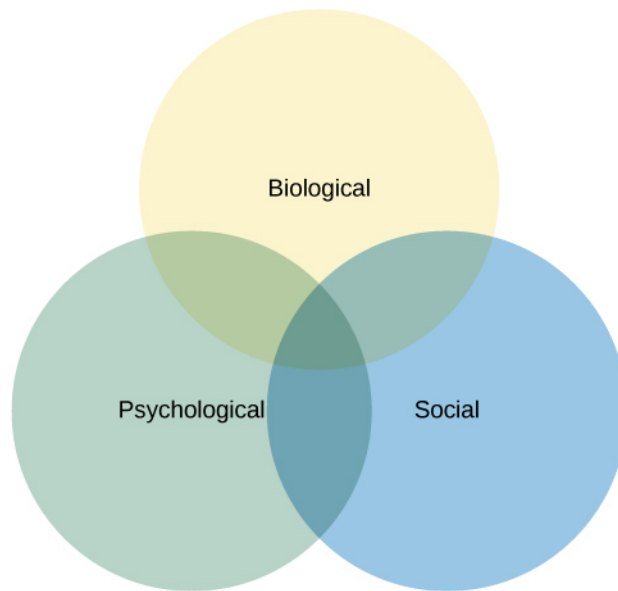
**Figure 1.15** Stanley Milgram's research demonstrated just how far people will go in obeying orders from an authority figure. This advertisement was used to recruit subjects for his research.

## **INDUSTRIAL-ORGANIZATIONAL PSYCHOLOGY**

Industrial-Organizational psychology (I-O psychology) is a subfield of psychology that applies psychological theories, principles, and research findings in industrial and organizational settings. I-O psychologists are often involved in issues related to personnel management, organizational structure, and workplace environment. Businesses often seek the aid of I-O psychologists to make the best hiring decisions as well as to create an environment that results in high levels of employee productivity and efficiency. In addition to its applied nature, I-O psychology also involves conducting scientific research on behavior within I-O settings (Riggio, 2013).

## HEALTH PSYCHOLOGY

Health psychology focuses on how health is affected by the interaction of biological, psychological, and sociocultural factors. This particular approach is known as the **biopsychosocial model** (Figure 1.16). Health psychologists are interested in helping individuals achieve better health through public policy, education, intervention, and research. Health psychologists might conduct research that explores the relationship between one's genetic makeup, patterns of behavior, relationships, psychological stress, and health. They may research effective ways to motivate people to address patterns of behavior that contribute to poorer health (MacDonald, 2013).



**Figure 1.16** The biopsychosocial model suggests that health/illness is determined by an interaction of these three factors.

## SPORT AND EXERCISE PSYCHOLOGY

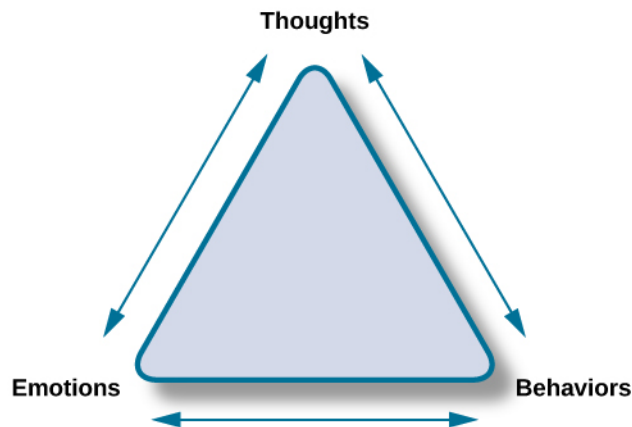
Researchers in **sport and exercise psychology** study the psychological aspects of sport performance, including motivation and performance anxiety, and the effects of sport on mental and emotional wellbeing. Research is also conducted on similar topics as they relate to physical exercise in general. The discipline also includes topics that are broader than sport and exercise but that are related to interactions between mental and physical performance under demanding conditions, such as fire fighting, military operations, artistic performance, and surgery.

## CLINICAL PSYCHOLOGY

**Clinical psychology** is the area of psychology that focuses on the diagnosis and treatment of psychological disorders and other problematic patterns of behavior. As such, it is generally considered to be a more applied area within psychology; however, some clinicians are also actively engaged in scientific research. **Counseling psychology** is a similar discipline that focuses on emotional, social, vocational, and health-related outcomes in individuals who are considered psychologically healthy.

As mentioned earlier, both Freud and Rogers provided perspectives that have been influential in shaping how clinicians interact with people seeking psychotherapy. While aspects of the psychoanalytic theory are still found among some of today's therapists who are trained from a psychodynamic perspective, Roger's ideas about client-centered therapy have been especially influential in shaping how many clinicians operate. Furthermore, both behaviorism and the cognitive revolution have shaped clinical practice in the forms of behavioral therapy, cognitive therapy, and cognitive-behavioral therapy (Figure 1.17). Issues

related to the diagnosis and treatment of psychological disorders and problematic patterns of behavior will be discussed in detail in later chapters of this textbook.



**Figure 1.17** Cognitive-behavioral therapists take cognitive processes and behaviors into account when providing psychotherapy. This is one of several strategies that may be used by practicing clinical psychologists.

By far, this is the area of psychology that receives the most attention in popular media, and many people mistakenly assume that all psychology is clinical psychology.

## FORENSIC PSYCHOLOGY

**Forensic psychology** is a branch of psychology that deals questions of psychology as they arise in the context of the justice system. For example, forensic psychologists (and forensic psychiatrists) will assess a person's competency to stand trial, assess the state of mind of a defendant, act as consultants on child custody cases, consult on sentencing and treatment recommendations, and advise on issues such as eyewitness testimony and children's testimony (American Board of Forensic Psychology, 2014). In these capacities, they will typically act as expert witnesses, called by either side in a court case to provide their research- or experience-based opinions. As expert witnesses, forensic psychologists must have a good understanding of the law and provide information in the context of the legal system rather than just within the realm of psychology. Forensic psychologists are also used in the jury selection process and witness preparation. They may also be involved in providing psychological treatment within the criminal justice system. Criminal profilers are a relatively small proportion of psychologists that act as consultants to law enforcement.

### LINK TO LEARNING



The APA provides **career information** (<http://openstaxcollege.org//careers>) about various areas of psychology.

## 1.4 Careers in Psychology

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### Learning Objectives

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

- Understand educational requirements for careers in academic settings
  - Understand the demands of a career in an academic setting
  - Understand career options outside of academic settings
- 

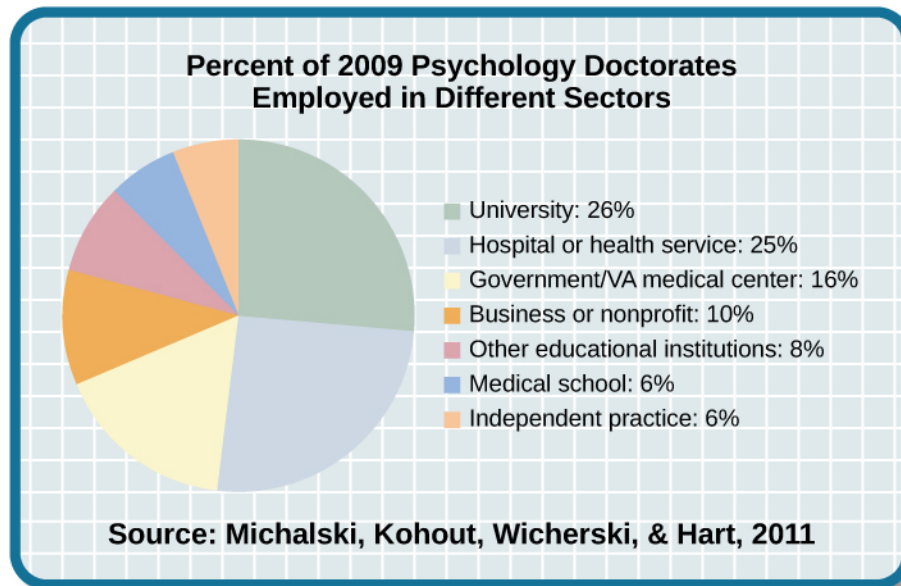
Psychologists can work in many different places doing many different things. In general, anyone wishing to continue a career in psychology at a 4-year institution of higher education will have to earn a doctoral degree in psychology for some specialties and at least a master's degree for others. In most areas of psychology, this means earning a PhD in a relevant area of psychology. Literally, **PhD** refers to a doctor of philosophy degree, but here, philosophy does not refer to the field of philosophy per se. Rather, philosophy in this context refers to many different disciplinary perspectives that would be housed in a traditional college of liberal arts and sciences.

The requirements to earn a PhD vary from country to country and even from school to school, but usually, individuals earning this degree must complete a dissertation. A **dissertation** is essentially a long research paper or bundled published articles describing research that was conducted as a part of the candidate's doctoral training. In the United States, a dissertation generally has to be defended before a committee of expert reviewers before the degree is conferred (**Figure 1.18**).



**Figure 1.18** Doctoral degrees are generally conferred in formal ceremonies involving special attire and rites. (credit: Public Affairs Office Fort Wainwright)

Once someone earns her PhD, she may seek a faculty appointment at a college or university. Being on the faculty of a college or university often involves dividing time between teaching, research, and service to the institution and profession. The amount of time spent on each of these primary responsibilities varies dramatically from school to school, and it is not uncommon for faculty to move from place to place in search of the best personal fit among various academic environments. The previous section detailed some of the major areas that are commonly represented in psychology departments around the country; thus, depending on the training received, an individual could be anything from a biological psychologist to a clinical psychologist in an academic setting (**Figure 1.19**).



**Figure 1.19** Individuals earning a PhD in psychology have a range of employment options.

### OTHER CAREERS IN ACADEMIC SETTINGS

Often times, schools offer more courses in psychology than their full-time faculty can teach. In these cases, it is not uncommon to bring in an adjunct faculty member or instructor. Adjunct faculty members and instructors usually have an advanced degree in psychology, but they often have primary careers outside of academia and serve in this role as a secondary job. Alternatively, they may not hold the doctoral degree required by most 4-year institutions and use these opportunities to gain experience in teaching. Furthermore, many 2-year colleges and schools need faculty to teach their courses in psychology. In general, many of the people who pursue careers at these institutions have master's degrees in psychology, although some PhDs make careers at these institutions as well.

Some people earning PhDs may enjoy research in an academic setting. However, they may not be interested in teaching. These individuals might take on faculty positions that are exclusively devoted to conducting research. This type of position would be more likely an option at large, research-focused universities.

In some areas in psychology, it is common for individuals who have recently earned their PhD to seek out positions in **postdoctoral training programs** that are available before going on to serve as faculty. In most cases, young scientists will complete one or two postdoctoral programs before applying for a full-time faculty position. Postdoctoral training programs allow young scientists to further develop their research programs and broaden their research skills under the supervision of other professionals in the field.

### CAREER OPTIONS OUTSIDE OF ACADEMIC SETTINGS

Individuals who wish to become practicing clinical psychologists have another option for earning a doctoral degree, which is known as a PsyD. A **PsyD** is a doctor of psychology degree that is increasingly popular among individuals interested in pursuing careers in clinical psychology. PsyD programs generally place less emphasis on research-oriented skills and focus more on application of psychological principles in the clinical context (Norcorss & Castle, 2002).

Regardless of whether earning a PhD or PsyD, in most states, an individual wishing to practice as a licensed clinical or counseling psychologist may complete postdoctoral work under the supervision of a licensed psychologist. Within the last few years, however, several states have begun to remove this requirement, which would allow someone to get an earlier start in his career (Munsey, 2009). After an

individual has met the state requirements, his credentials are evaluated to determine whether he can sit for the licensure exam. Only individuals that pass this exam can call themselves licensed clinical or counseling psychologists (Norcross, n.d.). Licensed clinical or counseling psychologists can then work in a number of settings, ranging from private clinical practice to hospital settings. It should be noted that clinical psychologists and psychiatrists do different things and receive different types of education. While both can conduct therapy and counseling, clinical psychologists have a PhD or a PsyD, whereas psychiatrists have a doctor of medicine degree (MD). As such, licensed clinical psychologists can administer and interpret psychological tests, while psychiatrists can prescribe medications.

Individuals earning a PhD can work in a variety of settings, depending on their areas of specialization. For example, someone trained as a biopsychologist might work in a pharmaceutical company to help test the efficacy of a new drug. Someone with a clinical background might become a forensic psychologist and work within the legal system to make recommendations during criminal trials and parole hearings, or serve as an expert in a court case.

While earning a doctoral degree in psychology is a lengthy process, usually taking between 5–6 years of graduate study (DeAngelis, 2010), there are a number of careers that can be attained with a master's degree in psychology. People who wish to provide psychotherapy can become licensed to serve as various types of professional counselors (Hoffman, 2012). Relevant master's degrees are also sufficient for individuals seeking careers as school psychologists (National Association of School Psychologists, n.d.), in some capacities related to sport psychology (American Psychological Association, 2014), or as consultants in various industrial settings (Landers, 2011, June 14). Undergraduate coursework in psychology may be applicable to other careers such as psychiatric social work or psychiatric nursing, where assessments and therapy may be a part of the job.

As mentioned in the opening section of this chapter, an undergraduate education in psychology is associated with a knowledge base and skill set that many employers find quite attractive. It should come as no surprise, then, that individuals earning bachelor's degrees in psychology find themselves in a number of different careers, as shown in **Table 1.1**. Examples of a few such careers can involve serving as case managers, working in sales, working in human resource departments, and teaching in high schools. The rapidly growing realm of healthcare professions is another field in which an education in psychology is helpful and sometimes required. For example, the Medical College Admission Test (MCAT) exam that people must take to be admitted to medical school now includes a section on the psychological foundations of behavior.

**Table 1.1 Top Occupations Employing Graduates with a BA in Psychology (Fogg, Harrington, Harrington, & Shatkin, 2012)**

Ranking	Occupation
1	Mid- and top-level management (executive, administrator)
2	Sales
3	Social work
4	Other management positions
5	Human resources (personnel, training)
6	Other administrative positions
7	Insurance, real estate, business
8	Marketing and sales

**Table 1.1 Top Occupations Employing Graduates with a BA in Psychology (Fogg, Harrington, Harrington, & Shatkin, 2012)**

Ranking	Occupation
9	Healthcare (nurse, pharmacist, therapist)
10	Finance (accountant, auditor)

### LINK TO LEARNING



Watch a **brief video** (<http://openstaxcollege.org//psyccareers>) describing some of the career options available to people earning bachelor's degrees in psychology.

## Key Terms

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**American Psychological Association** professional organization representing psychologists in the United States

**behaviorism** focus on observing and controlling behavior

**biopsychology** study of how biology influences behavior

**biopsychosocial model** perspective that asserts that biology, psychology, and social factors interact to determine an individual's health

**clinical psychology** area of psychology that focuses on the diagnosis and treatment of psychological disorders and other problematic patterns of behavior

**cognitive psychology** study of cognitions, or thoughts, and their relationship to experiences and actions

**counseling psychology** area of psychology that focuses on improving emotional, social, vocational, and other aspects of the lives of psychologically healthy individuals

**developmental psychology** scientific study of development across a lifespan

**dissertation** long research paper about research that was conducted as a part of the candidate's doctoral training

**empirical method** method for acquiring knowledge based on observation, including experimentation, rather than a method based only on forms of logical argument or previous authorities

**forensic psychology** area of psychology that applies the science and practice of psychology to issues within and related to the justice system

**functionalism** focused on how mental activities helped an organism adapt to its environment

**humanism** perspective within psychology that emphasizes the potential for good that is innate to all humans

**introspection** process by which someone examines their own conscious experience in an attempt to break it into its component parts

**ology** suffix that denotes "scientific study of"

**personality psychology** study of patterns of thoughts and behaviors that make each individual unique

**personality trait** consistent pattern of thought and behavior

**PhD** (doctor of philosophy) doctoral degree conferred in many disciplinary perspectives housed in a traditional college of liberal arts and sciences

**postdoctoral training program** allows young scientists to further develop their research programs and broaden their research skills under the supervision of other professionals in the field

**psyche** Greek word for soul

**psychoanalytic theory** focus on the role of the unconscious in affecting conscious behavior

**psychology** scientific study of the mind and behavior

**PsyD** (doctor of psychology) doctoral degree that places less emphasis on research-oriented skills and focuses more on application of psychological principles in the clinical context

**sport and exercise psychology** area of psychology that focuses on the interactions between mental and emotional factors and physical performance in sports, exercise, and other activities

**structuralism** understanding the conscious experience through introspection

## Summary

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### 1.1 What Is Psychology?

Psychology derives from the roots *psyche* (meaning soul) and *-ology* (meaning scientific study of). Thus, psychology is defined as the scientific study of mind and behavior. Students of psychology develop critical thinking skills, become familiar with the scientific method, and recognize the complexity of behavior.

### 1.2 History of Psychology

Before the time of Wundt and James, questions about the mind were considered by philosophers. However, both Wundt and James helped create psychology as a distinct scientific discipline. Wundt was a structuralist, which meant he believed that our cognitive experience was best understood by breaking that experience into its component parts. He thought this was best accomplished by introspection.

William James was the first American psychologist, and he was a proponent of functionalism. This particular perspective focused on how mental activities served as adaptive responses to an organism's environment. Like Wundt, James also relied on introspection; however, his research approach also incorporated more objective measures as well.

Sigmund Freud believed that understanding the unconscious mind was absolutely critical to understand conscious behavior. This was especially true for individuals that he saw who suffered from various hysterias and neuroses. Freud relied on dream analysis, slips of the tongue, and free association as means to access the unconscious. Psychoanalytic theory remained a dominant force in clinical psychology for several decades.

Gestalt psychology was very influential in Europe. Gestalt psychology takes a holistic view of an individual and his experiences. As the Nazis came to power in Germany, Wertheimer, Koffka, and Köhler immigrated to the United States. Although they left their laboratories and their research behind, they did introduce America to Gestalt ideas. Some of the principles of Gestalt psychology are still very influential in the study of sensation and perception.

One of the most influential schools of thought within psychology's history was behaviorism. Behaviorism focused on making psychology an objective science by studying overt behavior and deemphasizing the importance of unobservable mental processes. John Watson is often considered the father of behaviorism, and B. F. Skinner's contributions to our understanding of principles of operant conditioning cannot be underestimated.

As behaviorism and psychoanalytic theory took hold of so many aspects of psychology, some began to become dissatisfied with psychology's picture of human nature. Thus, a humanistic movement within psychology began to take hold. Humanism focuses on the potential of all people for good. Both Maslow and Rogers were influential in shaping humanistic psychology.

During the 1950s, the landscape of psychology began to change. A science of behavior began to shift back to its roots of focus on mental processes. The emergence of neuroscience and computer science aided this transition. Ultimately, the cognitive revolution took hold, and people came to realize that cognition was crucial to a true appreciation and understanding of behavior.

### 1.3 Contemporary Psychology

Psychology is a diverse discipline that is made up of several major subdivisions with unique perspectives.

Biological psychology involves the study of the biological bases of behavior. Sensation and perception refer to the area of psychology that is focused on how information from our sensory modalities is received, and how this information is transformed into our perceptual experiences of the world around us. Cognitive psychology is concerned with the relationship that exists between thought and behavior, and developmental psychologists study the physical and cognitive changes that occur throughout one's lifespan. Personality psychology focuses on individuals' unique patterns of behavior, thought, and emotion. Industrial and organizational psychology, health psychology, sport and exercise psychology, forensic psychology, and clinical psychology are all considered applied areas of psychology. Industrial and organizational psychologists apply psychological concepts to I-O settings. Health psychologists look for ways to help people live healthier lives, and clinical psychology involves the diagnosis and treatment of psychological disorders and other problematic behavioral patterns. Sport and exercise psychologists study the interactions between thoughts, emotions, and physical performance in sports, exercise, and other activities. Forensic psychologists carry out activities related to psychology in association with the justice system.

### 1.4 Careers in Psychology

Generally, academic careers in psychology require doctoral degrees. However, there are a number of nonacademic career options for people who have master's degrees in psychology. While people with bachelor's degrees in psychology have more limited psychology-related career options, the skills acquired as a function of an undergraduate education in psychology are useful in a variety of work contexts.

## Review Questions

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- Which of the following was mentioned as a skill to which psychology students would be exposed?
  - critical thinking
  - use of the scientific method
  - critical evaluation of sources of information
  - all of the above
- Psyche* is a Greek word meaning \_\_\_\_\_.
  - essence
  - soul
  - behavior
  - love
- Before psychology became a recognized academic discipline, matters of the mind were undertaken by those in \_\_\_\_\_.
  - biology
  - chemistry
  - philosophy
  - physics
- In the scientific method, a hypothesis is a(n) \_\_\_\_\_.
  - observation
  - measurement
  - test
  - proposed explanation
- Based on your reading, which theorist would have been most likely to agree with this statement: Perceptual phenomena are best understood as a combination of their components.
  - William James
  - Max Wertheimer
  - Carl Rogers
  - Noam Chomsky
- \_\_\_\_\_ is most well-known for proposing his hierarchy of needs.
  - Noam Chomsky
  - Carl Rogers
  - Abraham Maslow
  - Sigmund Freud
- Rogers believed that providing genuineness, empathy, and \_\_\_\_\_ in the therapeutic environment for his clients was critical to their being able to deal with their problems.
  - structuralism
  - functionalism
  - Gestalt
  - unconditional positive regard

8. The operant conditioning chamber (aka \_\_\_\_\_ box) is a device used to study the principles of operant conditioning.
- Skinner
  - Watson
  - James
  - Koffka
9. A researcher interested in how changes in the cells of the hippocampus (a structure in the brain related to learning and memory) are related to memory formation would be most likely to identify as a(n) \_\_\_\_\_ psychologist.
- biological
  - health
  - clinical
  - social
10. An individual's consistent pattern of thought and behavior is known as a(n) \_\_\_\_\_.
- psychosexual stage
  - object permanence
  - personality
  - perception
11. In Milgram's controversial study on obedience, nearly \_\_\_\_\_ of the participants were willing to administer what appeared to be lethal electrical shocks to another person because they were told to do so by an authority figure.
- 1/3
  - 2/3
  - 3/4
  - 4/5
12. A researcher interested in what factors make an employee best suited for a given job would most likely identify as a(n) \_\_\_\_\_ psychologist.
- personality
  - clinical
  - social
  - I-O
13. If someone wanted to become a psychology professor at a 4-year college, then s/he would probably need a \_\_\_\_\_ degree in psychology.
- bachelor of science
  - bachelor of art
  - master's
  - PhD
14. The \_\_\_\_\_ places less emphasis on research and more emphasis on application of therapeutic skills.
- PhD
  - PsyD
  - postdoctoral training program
  - dissertation
15. Which of the following degrees would be the minimum required to teach psychology courses in high school?
- PhD
  - PsyD
  - master's degree
  - bachelor's degree
16. One would need at least a(n) \_\_\_\_\_ degree to serve as a school psychologist.
- associate's
  - bachelor's
  - master's
  - doctoral

### Critical Thinking Questions

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17. Why do you think psychology courses like this one are often requirements of so many different programs of study?
18. Why do you think many people might be skeptical about psychology being a science?
19. How did the object of study in psychology change over the history of the field since the 19th century?
20. In part, what aspect of psychology was the behaviorist approach to psychology a reaction to?

21. Given the incredible diversity among the various areas of psychology that were described in this section, how do they all fit together?
22. What are the potential ethical concerns associated with Milgram's research on obedience?
23. Why is an undergraduate education in psychology so helpful in a number of different lines of work?
24. Other than a potentially greater salary, what would be the reasons an individual would continue on to get a graduate degree in psychology?

### Personal Application Questions

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25. Why are you taking this course? What do you hope to learn about during this course?
26. Freud is probably one of the most well-known historical figures in psychology. Where have you encountered references to Freud or his ideas about the role that the unconscious mind plays in determining conscious behavior?
27. Now that you've been briefly introduced to some of the major areas within psychology, which are you most interested in learning more about? Why?
28. Which of the career options described in this section is most appealing to you?

## Chapter 2

# Psychological Research



**Figure 2.1** How does television content impact children's behavior? (credit: modification of work by "antisocialtory"/Flickr)

### Chapter Outline

- 2.1 Why Is Research Important?
- 2.2 Approaches to Research
- 2.3 Analyzing Findings
- 2.4 Ethics

### Introduction

Have you ever wondered whether the violence you see on television affects your behavior? Are you more likely to behave aggressively in real life after watching people behave violently in dramatic situations on the screen? Or, could seeing fictional violence actually get aggression out of your system, causing you to be more peaceful? How are children influenced by the media they are exposed to? A psychologist interested in the relationship between behavior and exposure to violent images might ask these very questions.

The topic of violence in the media today is contentious. Since ancient times, humans have been concerned about the effects of new technologies on our behaviors and thinking processes. The Greek philosopher Socrates, for example, worried that writing—a new technology at that time—would diminish people's ability to remember because they could rely on written records rather than committing information to memory. In our world of quickly changing technologies, questions about the effects of media continue to emerge. Many of us find ourselves with a strong opinion on these issues, only to find the person next to us bristling with the opposite view.

How can we go about finding answers that are supported not by mere opinion, but by evidence that we can all agree on? The findings of psychological research can help us navigate issues like this.

## 2.1 Why Is Research Important?

### Learning Objectives

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

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

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



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

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

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

## USE OF RESEARCH INFORMATION

Trying to determine which theories are and are not accepted by the scientific community can be difficult, especially in an area of research as broad as psychology. More than ever before, we have an incredible amount of information at our fingertips, and a simple internet search on any given research topic might result in a number of contradictory studies. In these cases, we are witnessing the scientific community going through the process of reaching a consensus, and it could be quite some time before a consensus emerges. For example, the hypothesized link between exposure to media violence and subsequent aggression has been debated in the scientific community for roughly 60 years. Even today, we will find detractors, but a consensus is building. Several professional organizations view media violence exposure as a risk factor for actual violence, including the American Medical Association, the American Psychiatric Association, and the American Psychological Association (American Academy of Pediatrics, American Academy of Child & Adolescent Psychiatry, American Psychological Association, American Medical Association, American Academy of Family Physicians, American Psychiatric Association, 2000).

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

We should be informed consumers of the information made available to us because decisions based on this information have significant consequences. One such consequence can be seen in politics and public policy. Imagine that you have been elected as the governor of your state. One of your responsibilities is to manage the state budget and determine how to best spend your constituents’ tax dollars. As the new governor, you need to decide whether to continue funding the D.A.R.E. (Drug Abuse Resistance Education) program in public schools (**Figure 2.3**). This program typically involves police officers coming into the classroom to educate students about the dangers of becoming involved with alcohol and other drugs. According to the D.A.R.E. website ([www.dare.org](http://www.dare.org)), this program has been very popular since its inception in 1983, and it is currently operating in 75% of school districts in the United States and in more than 40 countries worldwide. Sounds like an easy decision, right? However, on closer review, you discover that the vast majority of research into this program consistently suggests that participation has little, if any, effect on whether or not someone uses alcohol or other drugs (Clayton, Cattarello, & Johnstone, 1996; Ennett, Tobler, Ringwalt, & Flewelling, 1994; Lynam et al., 1999; Ringwalt, Ennett, & Holt, 1991). If you are committed to being a good steward of taxpayer money, will you fund this particular program, or will you try to find other programs that research has consistently demonstrated to be effective?



**Figure 2.3** The D.A.R.E. program continues to be popular in schools around the world despite research suggesting that it is ineffective.

## LINK TO LEARNING



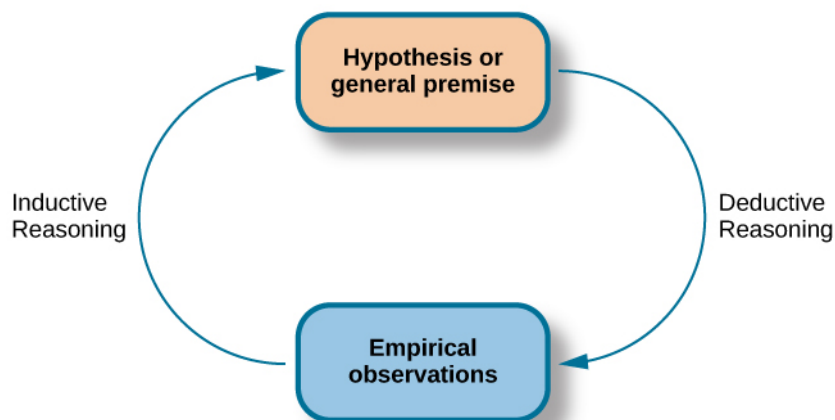
Watch this **news report** ([https://youtu.be/07w\\_C1Lh-To](https://youtu.be/07w_C1Lh-To)) to learn more about some of the controversial issues surrounding the D.A.R.E. program.

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

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

## THE PROCESS OF SCIENTIFIC RESEARCH

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



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

In the scientific context, deductive reasoning begins with a generalization—one hypothesis—that is then used to reach logical conclusions about the real world. If the hypothesis is correct, then the logical conclusions reached through deductive reasoning should also be correct. A deductive reasoning argument might go something like this: All living things require energy to survive (this would be your hypothesis). Ducks are living things. Therefore, ducks require energy to survive (logical conclusion). In this example,

the hypothesis is correct; therefore, the conclusion is correct as well. Sometimes, however, an incorrect hypothesis may lead to a logical but incorrect conclusion. Consider this argument: all ducks are born with the ability to see. Quackers is a duck. Therefore, Quackers was born with the ability to see. Scientists use deductive reasoning to empirically test their hypotheses. Returning to the example of the ducks, researchers might design a study to test the hypothesis that if all living things require energy to survive, then ducks will be found to require energy to survive.

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

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

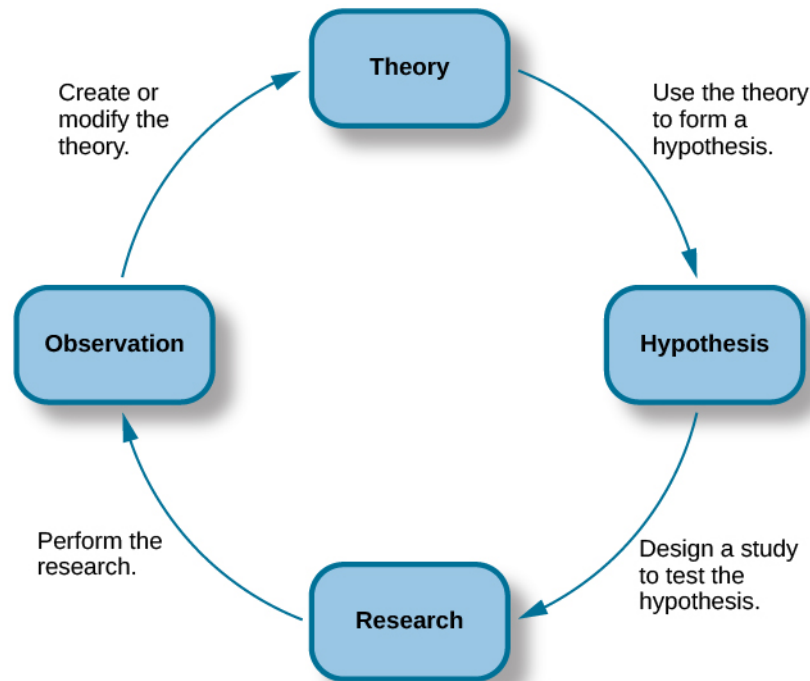
### LINK TO LEARNING



Play this “**Deal Me In**” interactive card game (<http://openstaxcollege.org//dealmein>) to practice using inductive reasoning.

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

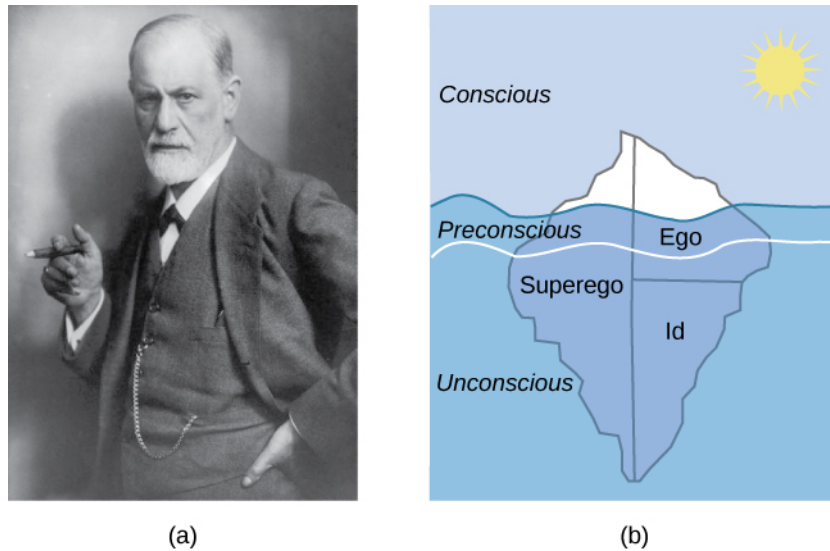
A **hypothesis** is a testable prediction about how the world will behave if our idea is correct, and it is often worded as an if-then statement (e.g., if I study all night, I will get a passing grade on the test). The hypothesis is extremely important because it bridges the gap between the realm of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



**Figure 2.5** The scientific method of research includes proposing hypotheses, conducting research, and creating or modifying theories based on results.

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

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



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

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

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

### LINK TO LEARNING



Visit this [website \(http://openstaxcollege.org//mmystery\)](http://openstaxcollege.org//mmystery) to apply the scientific method and practice its steps by using them to solve a murder mystery, determine why a student is in trouble, and design an experiment to test house paint.

## 2.2 Approaches to Research

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### Learning Objectives

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

- Describe the different research methods used by psychologists
  - Discuss the strengths and weaknesses of case studies, naturalistic observation, surveys, and archival research
  - Compare longitudinal and cross-sectional approaches to research
- 

There are many research methods available to psychologists in their efforts to understand, describe, and explain behavior and the cognitive and biological processes that underlie it. Some methods rely on observational techniques. Other approaches involve interactions between the researcher and the individuals who are being studied—ranging from a series of simple questions to extensive, in-depth interviews—to well-controlled experiments.

Each of these research methods has unique strengths and weaknesses, and each method may only be appropriate for certain types of research questions. For example, studies that rely primarily on observation produce incredible amounts of information, but the ability to apply this information to the larger population is somewhat limited because of small sample sizes. Survey research, on the other hand, allows researchers to easily collect data from relatively large samples. While this allows for results to be generalized to the larger population more easily, the information that can be collected on any given survey is somewhat limited and subject to problems associated with any type of self-reported data. Some researchers conduct archival research by using existing records. While this can be a fairly inexpensive way to collect data that can provide insight into a number of research questions, researchers using this approach have no control on how or what kind of data was collected. All of the methods described thus far are correlational in nature. This means that researchers can speak to important relationships that might exist between two or more variables of interest. However, correlational data cannot be used to make claims about cause-and-effect relationships.

Correlational research can find a relationship between two variables, but the only way a researcher can claim that the relationship between the variables is cause and effect is to perform an experiment. In experimental research, which will be discussed later in this chapter, there is a tremendous amount of control over variables of interest. While this is a powerful approach, experiments are often conducted in very artificial settings. This calls into question the validity of experimental findings with regard to how they would apply in real-world settings. In addition, many of the questions that psychologists would like to answer cannot be pursued through experimental research because of ethical concerns.

### CLINICAL OR CASE STUDIES

In 2011, the *New York Times* published a feature story on Krista and Tatiana Hogan, Canadian twin girls. These particular twins are unique because Krista and Tatiana are conjoined twins, connected at the head. There is evidence that the two girls are connected in a part of the brain called the thalamus, which is a major sensory relay center. Most incoming sensory information is sent through the thalamus before reaching higher regions of the cerebral cortex for processing.

## LINK TO LEARNING



To learn more about Krista and Tatiana, watch this **New York Times video** (<http://openstaxcollege.org//hogans>) about their lives.

The implications of this potential connection mean that it might be possible for one twin to experience the sensations of the other twin. For instance, if Krista is watching a particularly funny television program, Tatiana might smile or laugh even if she is not watching the program. This particular possibility has piqued the interest of many neuroscientists who seek to understand how the brain uses sensory information.

These twins represent an enormous resource in the study of the brain, and since their condition is very rare, it is likely that as long as their family agrees, scientists will follow these girls very closely throughout their lives to gain as much information as possible (Dominus, 2011).

In observational research, scientists are conducting a **clinical** or **case study** when they focus on one person or just a few individuals. Indeed, some scientists spend their entire careers studying just 10–20 individuals. Why would they do this? Obviously, when they focus their attention on a very small number of people, they can gain a tremendous amount of insight into those cases. The richness of information that is collected in clinical or case studies is unmatched by any other single research method. This allows the researcher to have a very deep understanding of the individuals and the particular phenomenon being studied.

If clinical or case studies provide so much information, why are they not more frequent among researchers? As it turns out, the major benefit of this particular approach is also a weakness. As mentioned earlier, this approach is often used when studying individuals who are interesting to researchers because they have a rare characteristic. Therefore, the individuals who serve as the focus of case studies are not like most other people. If scientists ultimately want to explain all behavior, focusing attention on such a special group of people can make it difficult to generalize any observations to the larger population as a whole. **Generalizing** refers to the ability to apply the findings of a particular research project to larger segments of society. Again, case studies provide enormous amounts of information, but since the cases are so specific, the potential to apply what's learned to the average person may be very limited.

## NATURALISTIC OBSERVATION

If you want to understand how behavior occurs, one of the best ways to gain information is to simply observe the behavior in its natural context. However, people might change their behavior in unexpected ways if they know they are being observed. How do researchers obtain accurate information when people tend to hide their natural behavior? As an example, imagine that your professor asks everyone in your class to raise their hand if they always wash their hands after using the restroom. Chances are that almost everyone in the classroom will raise their hand, but do you think hand washing after every trip to the restroom is really that universal?

This is very similar to the phenomenon mentioned earlier in this chapter: many individuals do not feel comfortable answering a question honestly. But if we are committed to finding out the facts about hand washing, we have other options available to us.

Suppose we send a classmate into the restroom to actually watch whether everyone washes their hands after using the restroom. Will our observer blend into the restroom environment by wearing a white lab coat, sitting with a clipboard, and staring at the sinks? We want our researcher to be inconspicuous—perhaps standing at one of the sinks pretending to put in contact lenses while secretly

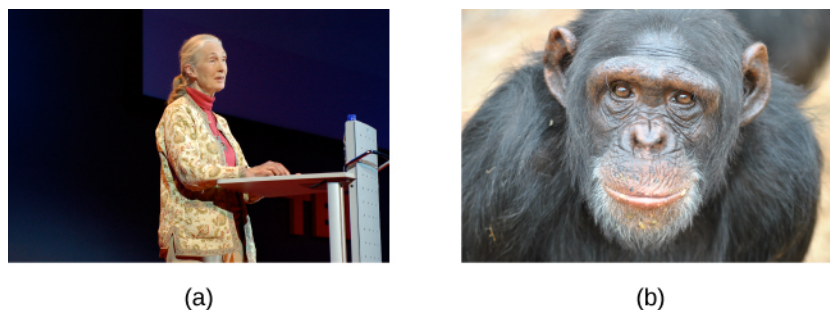
recording the relevant information. This type of observational study is called **naturalistic observation**: observing behavior in its natural setting. To better understand peer exclusion, Suzanne Fanger collaborated with colleagues at the University of Texas to observe the behavior of preschool children on a playground. How did the observers remain inconspicuous over the duration of the study? They equipped a few of the children with wireless microphones (which the children quickly forgot about) and observed while taking notes from a distance. Also, the children in that particular preschool (a “laboratory preschool”) were accustomed to having observers on the playground (Fanger, Frankel, & Hazen, 2012).

It is critical that the observer be as unobtrusive and as inconspicuous as possible: when people know they are being watched, they are less likely to behave naturally. If you have any doubt about this, ask yourself how your driving behavior might differ in two situations: In the first situation, you are driving down a deserted highway during the middle of the day; in the second situation, you are being followed by a police car down the same deserted highway (**Figure 2.7**).



**Figure 2.7** Seeing a police car behind you would probably affect your driving behavior. (credit: Michael Gil)

It should be pointed out that naturalistic observation is not limited to research involving humans. Indeed, some of the best-known examples of naturalistic observation involve researchers going into the field to observe various kinds of animals in their own environments. As with human studies, the researchers maintain their distance and avoid interfering with the animal subjects so as not to influence their natural behaviors. Scientists have used this technique to study social hierarchies and interactions among animals ranging from ground squirrels to gorillas. The information provided by these studies is invaluable in understanding how those animals organize socially and communicate with one another. The anthropologist Jane Goodall, for example, spent nearly five decades observing the behavior of chimpanzees in Africa (**Figure 2.8**). As an illustration of the types of concerns that a researcher might encounter in naturalistic observation, some scientists criticized Goodall for giving the chimps names instead of referring to them by numbers—using names was thought to undermine the emotional detachment required for the objectivity of the study (McKie, 2010).



**Figure 2.8** (a) Jane Goodall made a career of conducting naturalistic observations of (b) chimpanzee behavior. (credit “Jane Goodall”: modification of work by Erik Hersman; “chimpanzee”: modification of work by “Afrika Force”/Flickr.com)

The greatest benefit of naturalistic observation is the validity, or accuracy, of information collected

unobtrusively in a natural setting. Having individuals behave as they normally would in a given situation means that we have a higher degree of ecological validity, or realism, than we might achieve with other research approaches. Therefore, our ability to generalize the findings of the research to real-world situations is enhanced. If done correctly, we need not worry about people or animals modifying their behavior simply because they are being observed. Sometimes, people may assume that reality programs give us a glimpse into authentic human behavior. However, the principle of inconspicuous observation is violated as reality stars are followed by camera crews and are interviewed on camera for personal confessionals. Given that environment, we must doubt how natural and realistic their behaviors are.

The major downside of naturalistic observation is that they are often difficult to set up and control. In our restroom study, what if you stood in the restroom all day prepared to record people's hand washing behavior and no one came in? Or, what if you have been closely observing a troop of gorillas for weeks only to find that they migrated to a new place while you were sleeping in your tent? The benefit of realistic data comes at a cost. As a researcher you have no control of when (or if) you have behavior to observe. In addition, this type of observational research often requires significant investments of time, money, and a good dose of luck.

Sometimes studies involve structured observation. In these cases, people are observed while engaging in set, specific tasks. An excellent example of structured observation comes from *Strange Situation* by Mary Ainsworth (you will read more about this in the chapter on lifespan development). The *Strange Situation* is a procedure used to evaluate attachment styles that exist between an infant and caregiver. In this scenario, caregivers bring their infants into a room filled with toys. The *Strange Situation* involves a number of phases, including a stranger coming into the room, the caregiver leaving the room, and the caregiver's return to the room. The infant's behavior is closely monitored at each phase, but it is the behavior of the infant upon being reunited with the caregiver that is most telling in terms of characterizing the infant's attachment style with the caregiver.

Another potential problem in observational research is **observer bias**. Generally, people who act as observers are closely involved in the research project and may unconsciously skew their observations to fit their research goals or expectations. To protect against this type of bias, researchers should have clear criteria established for the types of behaviors recorded and how those behaviors should be classified. In addition, researchers often compare observations of the same event by multiple observers, in order to test **inter-rater reliability**: a measure of reliability that assesses the consistency of observations by different observers.

## SURVEYS

Often, psychologists develop surveys as a means of gathering data. **Surveys** are lists of questions to be answered by research participants, and can be delivered as paper-and-pencil questionnaires, administered electronically, or conducted verbally (**Figure 2.9**). Generally, the survey itself can be completed in a short time, and the ease of administering a survey makes it easy to collect data from a large number of people.

Surveys allow researchers to gather data from larger samples than may be afforded by other research methods. A **sample** is a subset of individuals selected from a **population**, which is the overall group of individuals that the researchers are interested in. Researchers study the sample and seek to generalize their findings to the population.

**Dear Visitor,**

**Your opinion is important to us.**

We would like to invite you to participate in a short survey to gather your opinions and feedback on your news consumption habits.

The survey will take approximately 10-15 minutes.  
Simply click the "Yes" button below to launch the survey.

**Would you like to participate?**

**YES** **NO**

**Figure 2.9** Surveys can be administered in a number of ways, including electronically administered research, like the survey shown here. (credit: Robert Nyman)

There is both strength and weakness of the survey in comparison to case studies. By using surveys, we can collect information from a larger sample of people. A larger sample is better able to reflect the actual diversity of the population, thus allowing better generalizability. Therefore, if our sample is sufficiently large and diverse, we can assume that the data we collect from the survey can be generalized to the larger population with more certainty than the information collected through a case study. However, given the greater number of people involved, we are not able to collect the same depth of information on each person that would be collected in a case study.

Another potential weakness of surveys is something we touched on earlier in this chapter: People don't always give accurate responses. They may lie, misremember, or answer questions in a way that they think makes them look good. For example, people may report drinking less alcohol than is actually the case.

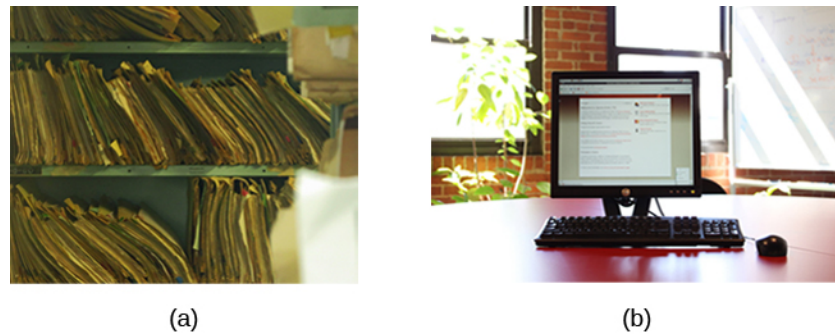
Any number of research questions can be answered through the use of surveys. One real-world example is the research conducted by Jenkins, Ruppel, Kizer, Yehl, and Griffin (2012) about the backlash against the US Arab-American community following the terrorist attacks of September 11, 2001. Jenkins and colleagues wanted to determine to what extent these negative attitudes toward Arab-Americans still existed nearly a decade after the attacks occurred. In one study, 140 research participants filled out a survey with 10 questions, including questions asking directly about the participant's overt prejudicial attitudes toward people of various ethnicities. The survey also asked indirect questions about how likely the participant would be to interact with a person of a given ethnicity in a variety of settings (such as, "How likely do you think it is that you would introduce yourself to a person of Arab-American descent?"). The results of the research suggested that participants were unwilling to report prejudicial attitudes toward any ethnic group. However, there were significant differences between their pattern of responses to questions about social interaction with Arab-Americans compared to other ethnic groups: they indicated less willingness for social interaction with Arab-Americans compared to the other ethnic groups. This suggested that the participants harbored subtle forms of prejudice against Arab-Americans, despite their assertions that this was not the case (Jenkins et al., 2012).

## ARCHIVAL RESEARCH

Some researchers gain access to large amounts of data without interacting with a single research participant. Instead, they use existing records to answer various research questions. This type of research approach is known as **archival research**. Archival research relies on looking at past records or data sets to look for interesting patterns or relationships.

For example, a researcher might access the academic records of all individuals who enrolled in college within the past ten years and calculate how long it took them to complete their degrees, as well as course loads, grades, and extracurricular involvement. Archival research could provide important information

about who is most likely to complete their education, and it could help identify important risk factors for struggling students (**Figure 2.10**).



**Figure 2.10** A researcher doing archival research examines records, whether archived as a (a) hardcopy or (b) electronically. (credit “paper files”: modification of work by “Newtown graffiti”/Flickr; “computer”: modification of work by INPIVID Family/Flickr)

In comparing archival research to other research methods, there are several important distinctions. For one, the researcher employing archival research never directly interacts with research participants. Therefore, the investment of time and money to collect data is considerably less with archival research. Additionally, researchers have no control over what information was originally collected. Therefore, research questions have to be tailored so they can be answered within the structure of the existing data sets. There is also no guarantee of consistency between the records from one source to another, which might make comparing and contrasting different data sets problematic.

## LONGITUDINAL AND CROSS-SECTIONAL RESEARCH

Sometimes we want to see how people change over time, as in studies of human development and lifespan. When we test the same group of individuals repeatedly over an extended period of time, we are conducting longitudinal research. **Longitudinal research** is a research design in which data-gathering is administered repeatedly over an extended period of time. For example, we may survey a group of individuals about their dietary habits at age 20, retest them a decade later at age 30, and then again at age 40.

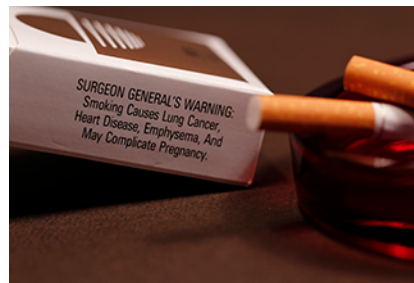
Another approach is cross-sectional research. In **cross-sectional research**, a researcher compares multiple segments of the population at the same time. Using the dietary habits example above, the researcher might directly compare different groups of people by age. Instead a group of people for 20 years to see how their dietary habits changed from decade to decade, the researcher would study a group of 20-year-old individuals and compare them to a group of 30-year-old individuals and a group of 40-year-old individuals. While cross-sectional research requires a shorter-term investment, it is also limited by differences that exist between the different generations (or cohorts) that have nothing to do with age per se, but rather reflect the social and cultural experiences of different generations of individuals make them different from one another.

To illustrate this concept, consider the following survey findings. In recent years there has been significant growth in the popular support of same-sex marriage. Many studies on this topic break down survey participants into different age groups. In general, younger people are more supportive of same-sex marriage than are those who are older (Jones, 2013). Does this mean that as we age we become less open to the idea of same-sex marriage, or does this mean that older individuals have different perspectives because of the social climates in which they grew up? Longitudinal research is a powerful approach because the same individuals are involved in the research project over time, which means that the researchers need to be less concerned with differences among cohorts affecting the results of their study.

Often longitudinal studies are employed when researching various diseases in an effort to understand

particular risk factors. Such studies often involve tens of thousands of individuals who are followed for several decades. Given the enormous number of people involved in these studies, researchers can feel confident that their findings can be generalized to the larger population. The Cancer Prevention Study-3 (CPS-3) is one of a series of longitudinal studies sponsored by the American Cancer Society aimed at determining predictive risk factors associated with cancer. When participants enter the study, they complete a survey about their lives and family histories, providing information on factors that might cause or prevent the development of cancer. Then every few years the participants receive additional surveys to complete. In the end, hundreds of thousands of participants will be tracked over 20 years to determine which of them develop cancer and which do not.

Clearly, this type of research is important and potentially very informative. For instance, earlier longitudinal studies sponsored by the American Cancer Society provided some of the first scientific demonstrations of the now well-established links between increased rates of cancer and smoking (American Cancer Society, n.d.) (**Figure 2.11**).



**Figure 2.11** Longitudinal research like the CPS-3 help us to better understand how smoking is associated with cancer and other diseases. (credit: CDC/Debra Cartagena)

As with any research strategy, longitudinal research is not without limitations. For one, these studies require an incredible time investment by the researcher and research participants. Given that some longitudinal studies take years, if not decades, to complete, the results will not be known for a considerable period of time. In addition to the time demands, these studies also require a substantial financial investment. Many researchers are unable to commit the resources necessary to see a longitudinal project through to the end.

Research participants must also be willing to continue their participation for an extended period of time, and this can be problematic. People move, get married and take new names, get ill, and eventually die. Even without significant life changes, some people may simply choose to discontinue their participation in the project. As a result, the **attrition** rates, or reduction in the number of research participants due to dropouts, in longitudinal studies are quite high and increases over the course of a project. For this reason, researchers using this approach typically recruit many participants fully expecting that a substantial number will drop out before the end. As the study progresses, they continually check whether the sample still represents the larger population, and make adjustments as necessary.

## 2.3 Analyzing Findings

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### Learning Objectives

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

- Explain what a correlation coefficient tells us about the relationship between variables
  - Recognize that correlation does not indicate a cause-and-effect relationship between variables
  - Discuss our tendency to look for relationships between variables that do not really exist
  - Explain random sampling and assignment of participants into experimental and control groups
  - Discuss how experimenter or participant bias could affect the results of an experiment
  - Identify independent and dependent variables
- 

Did you know that as sales in ice cream increase, so does the overall rate of crime? Is it possible that indulging in your favorite flavor of ice cream could send you on a crime spree? Or, after committing crime do you think you might decide to treat yourself to a cone? There is no question that a relationship exists between ice cream and crime (e.g., Harper, 2013), but it would be pretty foolish to decide that one thing actually caused the other to occur.

It is much more likely that both ice cream sales and crime rates are related to the temperature outside. When the temperature is warm, there are lots of people out of their houses, interacting with each other, getting annoyed with one another, and sometimes committing crimes. Also, when it is warm outside, we are more likely to seek a cool treat like ice cream. How do we determine if there is indeed a relationship between two things? And when there is a relationship, how can we discern whether it is attributable to coincidence or causation?

### CORRELATIONAL RESEARCH

**Correlation** means that there is a relationship between two or more variables (such as ice cream consumption and crime), but this relationship does not necessarily imply cause and effect. When two variables are correlated, it simply means that as one variable changes, so does the other. We can measure correlation by calculating a statistic known as a correlation coefficient. A **correlation coefficient** is a number from -1 to +1 that indicates the strength and direction of the relationship between variables. The correlation coefficient is usually represented by the letter  $r$ .

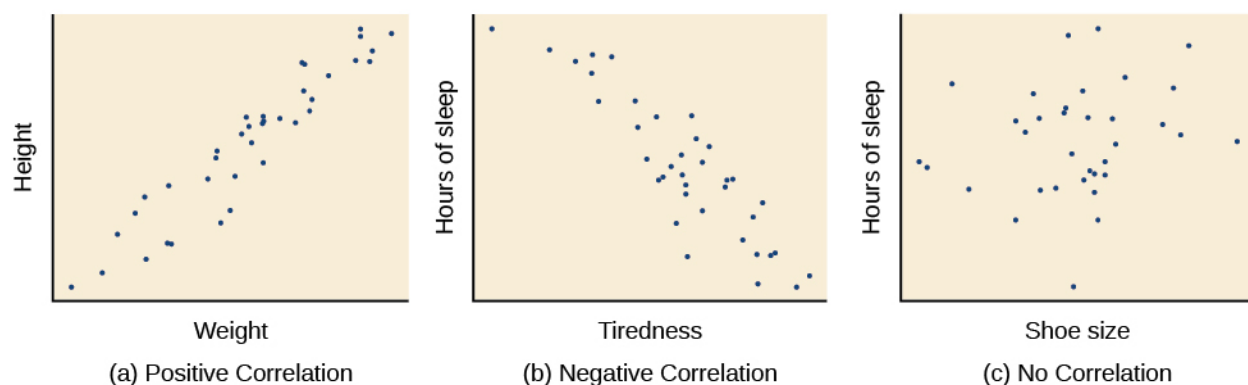
The number portion of the correlation coefficient indicates the strength of the relationship. The closer the number is to 1 (be it negative or positive), the more strongly related the variables are, and the more predictable changes in one variable will be as the other variable changes. The closer the number is to zero, the weaker the relationship, and the less predictable the relationships between the variables becomes. For instance, a correlation coefficient of 0.9 indicates a far stronger relationship than a correlation coefficient of 0.3. If the variables are not related to one another at all, the correlation coefficient is 0. The example above about ice cream and crime is an example of two variables that we might expect to have no relationship to each other.

The sign—positive or negative—of the correlation coefficient indicates the direction of the relationship (**Figure 2.12**). A **positive correlation** means that the variables move in the same direction. Put another way, it means that as one variable increases so does the other, and conversely, when one variable decreases so does the other. A **negative correlation** means that the variables move in opposite directions. If two variables are negatively correlated, a decrease in one variable is associated with an increase in the other and vice versa.

The example of ice cream and crime rates is a positive correlation because both variables increase when

temperatures are warmer. Other examples of positive correlations are the relationship between an individual's height and weight or the relationship between a person's age and number of wrinkles. One might expect a negative correlation to exist between someone's tiredness during the day and the number of hours they slept the previous night: the amount of sleep decreases as the feelings of tiredness increase. In a real-world example of negative correlation, student researchers at the University of Minnesota found a weak negative correlation ( $r = -0.29$ ) between the average number of days per week that students got fewer than 5 hours of sleep and their GPA (Lowry, Dean, & Manders, 2010). Keep in mind that a negative correlation is not the same as no correlation. For example, we would probably find no correlation between hours of sleep and shoe size.

As mentioned earlier, correlations have predictive value. Imagine that you are on the admissions committee of a major university. You are faced with a huge number of applications, but you are able to accommodate only a small percentage of the applicant pool. How might you decide who should be admitted? You might try to correlate your current students' college GPA with their scores on standardized tests like the SAT or ACT. By observing which correlations were strongest for your current students, you could use this information to predict relative success of those students who have applied for admission into the university.



**Figure 2.12** Scatterplots are a graphical view of the strength and direction of correlations. The stronger the correlation, the closer the data points are to a straight line. In these examples, we see that there is (a) a positive correlation between weight and height, (b) a negative correlation between tiredness and hours of sleep, and (c) no correlation between shoe size and hours of sleep.

### LINK TO LEARNING



Manipulate this **interactive scatterplot** (<http://openstaxcollege.org//scatplot>) to practice your understanding of positive and negative correlation.

### Correlation Does Not Indicate Causation

Correlational research is useful because it allows us to discover the strength and direction of relationships that exist between two variables. However, correlation is limited because establishing the existence of a relationship tells us little about **cause and effect**. While variables are sometimes correlated because one does cause the other, it could also be that some other factor, a **confounding variable**, is actually causing the systematic movement in our variables of interest. In the ice cream/crime rate example mentioned earlier, temperature is a confounding variable that could account for the relationship between the two variables.

Even when we cannot point to clear confounding variables, we should not assume that a correlation

between two variables implies that one variable causes changes in another. This can be frustrating when a cause-and-effect relationship seems clear and intuitive. Think back to our discussion of the research done by the American Cancer Society and how their research projects were some of the first demonstrations of the link between smoking and cancer. It seems reasonable to assume that smoking causes cancer, but if we were limited to correlational research, we would be overstepping our bounds by making this assumption.

Unfortunately, people mistakenly make claims of causation as a function of correlations all the time. Such claims are especially common in advertisements and news stories. For example, recent research found that people who eat cereal on a regular basis achieve healthier weights than those who rarely eat cereal (Frantzen, Treviño, Echon, Garcia-Dominic, & DiMarco, 2013; Barton et al., 2005). Guess how the cereal companies report this finding. Does eating cereal really cause an individual to maintain a healthy weight, or are there other possible explanations, such as, someone at a healthy weight is more likely to regularly eat a healthy breakfast than someone who is obese or someone who avoids meals in an attempt to diet (**Figure 2.13**)? While correlational research is invaluable in identifying relationships among variables, a major limitation is the inability to establish causality. Psychologists want to make statements about cause and effect, but the only way to do that is to conduct an experiment to answer a research question. The next section describes how scientific experiments incorporate methods that eliminate, or control for, alternative explanations, which allow researchers to explore how changes in one variable cause changes in another variable.



**Figure 2.13** Does eating cereal really cause someone to be a healthy weight? (credit: Tim Skillern)

### **Illusory Correlations**

The temptation to make erroneous cause-and-effect statements based on correlational research is not the only way we tend to misinterpret data. We also tend to make the mistake of illusory correlations, especially with unsystematic observations. **Illusory correlations**, or false correlations, occur when people believe that relationships exist between two things when no such relationship exists. One well-known illusory correlation is the supposed effect that the moon's phases have on human behavior. Many people passionately assert that human behavior is affected by the phase of the moon, and specifically, that people act strangely when the moon is full (**Figure 2.14**).



**Figure 2.14** Many people believe that a full moon makes people behave oddly. (credit: Cory Zanker)

There is no denying that the moon exerts a powerful influence on our planet. The ebb and flow of the

ocean's tides are tightly tied to the gravitational forces of the moon. Many people believe, therefore, that it is logical that we are affected by the moon as well. After all, our bodies are largely made up of water. A meta-analysis of nearly 40 studies consistently demonstrated, however, that the relationship between the moon and our behavior does not exist (Rotton & Kelly, 1985). While we may pay more attention to odd behavior during the full phase of the moon, the rates of odd behavior remain constant throughout the lunar cycle.

Why are we so apt to believe in illusory correlations like this? Often we read or hear about them and simply accept the information as valid. Or, we have a hunch about how something works and then look for evidence to support that hunch, ignoring evidence that would tell us our hunch is false; this is known as **confirmation bias**. Other times, we find illusory correlations based on the information that comes most easily to mind, even if that information is severely limited. And while we may feel confident that we can use these relationships to better understand and predict the world around us, illusory correlations can have significant drawbacks. For example, research suggests that illusory correlations—in which certain behaviors are inaccurately attributed to certain groups—are involved in the formation of prejudicial attitudes that can ultimately lead to discriminatory behavior (Fiedler, 2004).

## CAUSALITY: CONDUCTING EXPERIMENTS AND USING THE DATA

As you've learned, the only way to establish that there is a cause-and-effect relationship between two variables is to conduct a scientific experiment. Experiment has a different meaning in the scientific context than in everyday life. In everyday conversation, we often use it to describe trying something for the first time, such as experimenting with a new hair style or a new food. However, in the scientific context, an experiment has precise requirements for design and implementation.

### The Experimental Hypothesis

In order to conduct an experiment, a researcher must have a specific hypothesis to be tested. As you've learned, hypotheses can be formulated either through direct observation of the real world or after careful review of previous research. For example, if you think that children should not be allowed to watch violent programming on television because doing so would cause them to behave more violently, then you have basically formulated a hypothesis—namely, that watching violent television programs causes children to behave more violently. How might you have arrived at this particular hypothesis? You may have younger relatives who watch cartoons featuring characters using martial arts to save the world from evildoers, with an impressive array of punching, kicking, and defensive postures. You notice that after watching these programs for a while, your young relatives mimic the fighting behavior of the characters portrayed in the cartoon (**Figure 2.15**).



**Figure 2.15** Seeing behavior like this right after a child watches violent television programming might lead you to hypothesize that viewing violent television programming leads to an increase in the display of violent behaviors. (credit: Emran Kassim)

These sorts of personal observations are what often lead us to formulate a specific hypothesis, but we cannot use limited personal observations and anecdotal evidence to rigorously test our hypothesis. Instead, to find out if real-world data supports our hypothesis, we have to conduct an experiment.

## Designing an Experiment

The most basic experimental design involves two groups: the experimental group and the control group. The two groups are designed to be the same except for one difference— experimental manipulation. The **experimental group** gets the experimental manipulation—that is, the treatment or variable being tested (in this case, violent TV images)—and the **control group** does not. Since experimental manipulation is the only difference between the experimental and control groups, we can be sure that any differences between the two are due to experimental manipulation rather than chance.

In our example of how violent television programming might affect violent behavior in children, we have the experimental group view violent television programming for a specified time and then measure their violent behavior. We measure the violent behavior in our control group after they watch nonviolent television programming for the same amount of time. It is important for the control group to be treated similarly to the experimental group, with the exception that the control group does not receive the experimental manipulation. Therefore, we have the control group watch non-violent television programming for the same amount of time as the experimental group.

We also need to precisely define, or operationalize, what is considered violent and nonviolent. An **operational definition** is a description of how we will measure our variables, and it is important in allowing others understand exactly how and what a researcher measures in a particular experiment. In operationalizing violent behavior, we might choose to count only physical acts like kicking or punching as instances of this behavior, or we also may choose to include angry verbal exchanges. Whatever we determine, it is important that we operationalize violent behavior in such a way that anyone who hears about our study for the first time knows exactly what we mean by violence. This aids peoples' ability to interpret our data as well as their capacity to repeat our experiment should they choose to do so.

Once we have operationalized what is considered violent television programming and what is considered violent behavior from our experiment participants, we need to establish how we will run our experiment. In this case, we might have participants watch a 30-minute television program (either violent or

nonviolent, depending on their group membership) before sending them out to a playground for an hour where their behavior is observed and the number and type of violent acts is recorded.

Ideally, the people who observe and record the children's behavior are unaware of who was assigned to the experimental or control group, in order to control for experimenter bias. **Experimenter bias** refers to the possibility that a researcher's expectations might skew the results of the study. Remember, conducting an experiment requires a lot of planning, and the people involved in the research project have a vested interest in supporting their hypotheses. If the observers knew which child was in which group, it might influence how much attention they paid to each child's behavior as well as how they interpreted that behavior. By being blind to which child is in which group, we protect against those biases. This situation is a **single-blind study**, meaning that one of the groups (participants) are unaware as to which group they are in (experiment or control group) while the researcher who developed the experiment knows which participants are in each group.

In a **double-blind study**, both the researchers and the participants are blind to group assignments. Why would a researcher want to run a study where no one knows who is in which group? Because by doing so, we can control for both experimenter and participant expectations. If you are familiar with the phrase **placebo effect**, you already have some idea as to why this is an important consideration. The placebo effect occurs when people's expectations or beliefs influence or determine their experience in a given situation. In other words, simply expecting something to happen can actually make it happen.

The placebo effect is commonly described in terms of testing the effectiveness of a new medication. Imagine that you work in a pharmaceutical company, and you think you have a new drug that is effective in treating depression. To demonstrate that your medication is effective, you run an experiment with two groups: The experimental group receives the medication, and the control group does not. But you don't want participants to know whether they received the drug or not.

Why is that? Imagine that you are a participant in this study, and you have just taken a pill that you think will improve your mood. Because you expect the pill to have an effect, you might feel better simply because you took the pill and not because of any drug actually contained in the pill—this is the placebo effect.

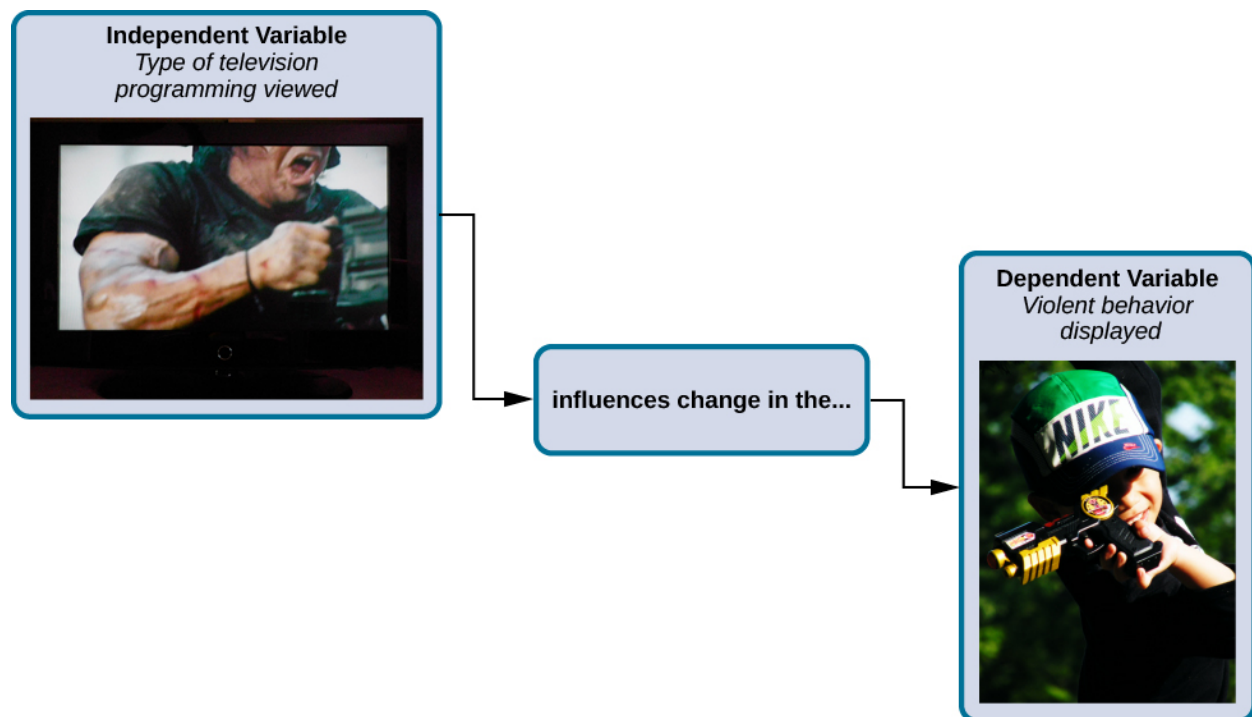
To make sure that any effects on mood are due to the drug and not due to expectations, the control group receives a placebo (in this case a sugar pill). Now everyone gets a pill, and once again neither the researcher nor the experimental participants know who got the drug and who got the sugar pill. Any differences in mood between the experimental and control groups can now be attributed to the drug itself rather than to experimenter bias or participant expectations (**Figure 2.16**).



**Figure 2.16** Providing the control group with a placebo treatment protects against bias caused by expectancy. (credit: Elaine and Arthur Shapiro)

## Independent and Dependent Variables

In a research experiment, we strive to study whether changes in one thing cause changes in another. To achieve this, we must pay attention to two important variables, or things that can be changed, in any experimental study: the independent variable and the dependent variable. An **independent variable** is manipulated or controlled by the experimenter. In a well-designed experimental study, the independent variable is the only important difference between the experimental and control groups. In our example of how violent television programs affect children's display of violent behavior, the independent variable is the type of program—violent or nonviolent—viewed by participants in the study (**Figure 2.17**). A **dependent variable** is what the researcher measures to see how much effect the independent variable had. In our example, the dependent variable is the number of violent acts displayed by the experimental participants.



**Figure 2.17** In an experiment, manipulations of the independent variable are expected to result in changes in the dependent variable. (credit “automatic weapon”: modification of work by Daniel Oines; credit “toy gun”: modification of work by Emran Kassim)

We expect that the dependent variable will change as a function of the independent variable. In other words, the dependent variable *depends* on the independent variable. A good way to think about the relationship between the independent and dependent variables is with this question: What effect does the independent variable have on the dependent variable? Returning to our example, what effect does watching a half hour of violent television programming or nonviolent television programming have on the number of incidents of physical aggression displayed on the playground?

## Selecting and Assigning Experimental Participants

Now that our study is designed, we need to obtain a sample of individuals to include in our experiment. Our study involves human participants so we need to determine who to include. **Participants** are the subjects of psychological research, and as the name implies, individuals who are involved in psychological research actively participate in the process. Often, psychological research projects rely on college students to serve as participants. In fact, the vast majority of research in psychology subfields has historically involved students as research participants (Sears, 1986; Arnett, 2008). But are college students truly

representative of the general population? College students tend to be younger, more educated, more liberal, and less diverse than the general population. Although using students as test subjects is an accepted practice, relying on such a limited pool of research participants can be problematic because it is difficult to generalize findings to the larger population.

Our hypothetical experiment involves children, and we must first generate a sample of child participants. Samples are used because populations are usually too large to reasonably involve every member in our particular experiment (**Figure 2.18**). If possible, we should use a random sample (there are other types of samples, but for the purposes of this chapter, we will focus on random samples). A **random sample** is a subset of a larger population in which every member of the population has an equal chance of being selected. Random samples are preferred because if the sample is large enough we can be reasonably sure that the participating individuals are representative of the larger population. This means that the percentages of characteristics in the sample—sex, ethnicity, socioeconomic level, and any other characteristics that might affect the results—are close to those percentages in the larger population.

In our example, let's say we decide our population of interest is fourth graders. But all fourth graders is a very large population, so we need to be more specific; instead we might say our population of interest is all fourth graders in a particular city. We should include students from various income brackets, family situations, races, ethnicities, religions, and geographic areas of town. With this more manageable population, we can work with the local schools in selecting a random sample of around 200 fourth graders who we want to participate in our experiment.

In summary, because we cannot test all of the fourth graders in a city, we want to find a group of about 200 that reflects the composition of that city. With a representative group, we can generalize our findings to the larger population without fear of our sample being biased in some way.



**Figure 2.18** Researchers may work with (a) a large population or (b) a sample group that is a subset of the larger population. (credit “crowd”: modification of work by James Cridland; credit “students”: modification of work by Laurie Sullivan)

Now that we have a sample, the next step of the experimental process is to split the participants into experimental and control groups through random assignment. With **random assignment**, all participants have an equal chance of being assigned to either group. There is statistical software that will randomly assign each of the fourth graders in the sample to either the experimental or the control group.

Random assignment is critical for sound experimental design. With sufficiently large samples, random assignment makes it unlikely that there are systematic differences between the groups. So, for instance, it would be very unlikely that we would get one group composed entirely of males, a given ethnic identity, or a given religious ideology. This is important because if the groups were systematically different before the experiment began, we would not know the origin of any differences we find between the groups: Were the differences preexisting, or were they caused by manipulation of the independent variable? Random assignment allows us to assume that any differences observed between experimental and control groups result from the manipulation of the independent variable.

## LINK TO LEARNING



Use this **online tool** (<https://www.randomizer.org/>) to instantly generate randomized numbers and to learn more about random sampling and assignments.

### Issues to Consider

While experiments allow scientists to make cause-and-effect claims, they are not without problems. True experiments require the experimenter to manipulate an independent variable, and that can complicate many questions that psychologists might want to address. For instance, imagine that you want to know what effect sex (the independent variable) has on spatial memory (the dependent variable). Although you can certainly look for differences between males and females on a task that taps into spatial memory, you cannot directly control a person's sex. We categorize this type of research approach as quasi-experimental and recognize that we cannot make cause-and-effect claims in these circumstances.

Experimenters are also limited by ethical constraints. For instance, you would not be able to conduct an experiment designed to determine if experiencing abuse as a child leads to lower levels of self-esteem among adults. To conduct such an experiment, you would need to randomly assign some experimental participants to a group that receives abuse, and that experiment would be unethical.

### Interpreting Experimental Findings

Once data is collected from both the experimental and the control groups, a **statistical analysis** is conducted to find out if there are meaningful differences between the two groups. A statistical analysis determines how likely any difference found is due to chance (and thus not meaningful). In psychology, group differences are considered meaningful, or significant, if the odds that these differences occurred by chance alone are 5 percent or less. Stated another way, if we repeated this experiment 100 times, we would expect to find the same results at least 95 times out of 100.

The greatest strength of experiments is the ability to assert that any significant differences in the findings are caused by the independent variable. This occurs because random selection, random assignment, and a design that limits the effects of both experimenter bias and participant expectancy should create groups that are similar in composition and treatment. Therefore, any difference between the groups is attributable to the independent variable, and now we can finally make a causal statement. If we find that watching a violent television program results in more violent behavior than watching a nonviolent program, we can safely say that watching violent television programs causes an increase in the display of violent behavior.

### Reporting Research

When psychologists complete a research project, they generally want to share their findings with other scientists. The American Psychological Association (APA) publishes a manual detailing how to write a paper for submission to scientific journals. Unlike an article that might be published in a magazine like *Psychology Today*, which targets a general audience with an interest in psychology, scientific journals generally publish **peer-reviewed journal articles** aimed at an audience of professionals and scholars who are actively involved in research themselves.

## LINK TO LEARNING



The **Online Writing Lab (OWL)** (<http://openstaxcollege.org//owl>) at Purdue University can walk you through the APA writing guidelines.

A peer-reviewed journal article is read by several other scientists (generally anonymously) with expertise in the subject matter. These peer reviewers provide feedback—to both the author and the journal editor—regarding the quality of the draft. Peer reviewers look for a strong rationale for the research being described, a clear description of how the research was conducted, and evidence that the research was conducted in an ethical manner. They also look for flaws in the study's design, methods, and statistical analyses. They check that the conclusions drawn by the authors seem reasonable given the observations made during the research. Peer reviewers also comment on how valuable the research is in advancing the discipline's knowledge. This helps prevent unnecessary duplication of research findings in the scientific literature and, to some extent, ensures that each research article provides new information. Ultimately, the journal editor will compile all of the peer reviewer feedback and determine whether the article will be published in its current state (a rare occurrence), published with revisions, or not accepted for publication.

Peer review provides some degree of quality control for psychological research. Poorly conceived or executed studies can be weeded out, and even well-designed research can be improved by the revisions suggested. Peer review also ensures that the research is described clearly enough to allow other scientists to **replicate** it, meaning they can repeat the experiment using different samples to determine reliability. Sometimes replications involve additional measures that expand on the original finding. In any case, each replication serves to provide more evidence to support the original research findings. Successful replications of published research make scientists more apt to adopt those findings, while repeated failures tend to cast doubt on the legitimacy of the original article and lead scientists to look elsewhere. For example, it would be a major advancement in the medical field if a published study indicated that taking a new drug helped individuals achieve a healthy weight without changing their diet. But if other scientists could not replicate the results, the original study's claims would be questioned.

## DIG DEEPER

### The Vaccine-Autism Myth and Retraction of Published Studies

Some scientists have claimed that routine childhood vaccines cause some children to develop autism, and, in fact, several peer-reviewed publications published research making these claims. Since the initial reports, large-scale epidemiological research has suggested that vaccinations are not responsible for causing autism and that it is much safer to have your child vaccinated than not. Furthermore, several of the original studies making this claim have since been retracted.

A published piece of work can be rescinded when data is called into question because of falsification, fabrication, or serious research design problems. Once rescinded, the scientific community is informed that there are serious problems with the original publication. Retractions can be initiated by the researcher who led the study, by research collaborators, by the institution that employed the researcher, or by the editorial board of the journal in which the article was originally published. In the vaccine-autism case, the retraction was made because of a significant conflict of interest in which the leading researcher had a financial interest in establishing a link between childhood vaccines and autism (Offit, 2008). Unfortunately, the initial studies received so much media attention that many parents around the world became hesitant to have their children vaccinated (**Figure 2.19**). For more information about how the vaccine/autism story unfolded, as well as the

repercussions of this story, take a look at Paul Offit's book, *Autism's False Prophets: Bad Science, Risky Medicine, and the Search for a Cure*.



**Figure 2.19** Some people still think vaccinations cause autism. (credit: modification of work by UNICEF Sverige)

## RELIABILITY AND VALIDITY

Reliability and validity are two important considerations that must be made with any type of data collection. **Reliability** refers to the ability to consistently produce a given result. In the context of psychological research, this would mean that any instruments or tools used to collect data do so in consistent, reproducible ways.

Unfortunately, being consistent in measurement does not necessarily mean that you have measured something correctly. To illustrate this concept, consider a kitchen scale that would be used to measure the weight of cereal that you eat in the morning. If the scale is not properly calibrated, it may consistently under- or overestimate the amount of cereal that's being measured. While the scale is highly reliable in producing consistent results (e.g., the same amount of cereal poured onto the scale produces the same reading each time), those results are incorrect. This is where validity comes into play. **Validity** refers to the extent to which a given instrument or tool accurately measures what it's supposed to measure. While any valid measure is by necessity reliable, the reverse is not necessarily true. Researchers strive to use instruments that are both highly reliable and valid.

### EVERYDAY CONNECTION

#### How Valid Is the SAT?

Standardized tests like the SAT are supposed to measure an individual's aptitude for a college education, but how reliable and valid are such tests? Research conducted by the College Board suggests that scores on the SAT have high predictive validity for first-year college students' GPA (Kobrin, Patterson, Shaw, Mattern,

& Barbuti, 2008). In this context, predictive validity refers to the test's ability to effectively predict the GPA of college freshmen. Given that many institutions of higher education require the SAT for admission, this high degree of predictive validity might be comforting.

However, the emphasis placed on SAT scores in college admissions has generated some controversy on a number of fronts. For one, some researchers assert that the SAT is a biased test that places minority students at a disadvantage and unfairly reduces the likelihood of being admitted into a college (Santelices & Wilson, 2010). Additionally, some research has suggested that the predictive validity of the SAT is grossly exaggerated in how well it is able to predict the GPA of first-year college students. In fact, it has been suggested that the SAT's predictive validity may be overestimated by as much as 150% (Rothstein, 2004). Many institutions of higher education are beginning to consider de-emphasizing the significance of SAT scores in making admission decisions (Rimer, 2008).

In 2014, College Board president David Coleman expressed his awareness of these problems, recognizing that college success is more accurately predicted by high school grades than by SAT scores. To address these concerns, he has called for significant changes to the SAT exam (Lewin, 2014).

## 2.4 Ethics

### Learning Objectives

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

- Discuss how research involving human subjects is regulated
- Summarize the processes of informed consent and debriefing
- Explain how research involving animal subjects is regulated

Today, scientists agree that good research is ethical in nature and is guided by a basic respect for human dignity and safety. However, as you will read in the feature box, this has not always been the case. Modern researchers must demonstrate that the research they perform is ethically sound. This section presents how ethical considerations affect the design and implementation of research conducted today.

### RESEARCH INVOLVING HUMAN PARTICIPANTS

Any experiment involving the participation of human subjects is governed by extensive, strict guidelines designed to ensure that the experiment does not result in harm. Any research institution that receives federal support for research involving human participants must have access to an **institutional review board (IRB)**. The IRB is a committee of individuals often made up of members of the institution's administration, scientists, and community members (**Figure 2.20**). The purpose of the IRB is to review proposals for research that involves human participants. The IRB reviews these proposals with the principles mentioned above in mind, and generally, approval from the IRB is required in order for the experiment to proceed.



**Figure 2.20** An institution's IRB meets regularly to review experimental proposals that involve human participants. (credit: modification of work by Lowndes Area Knowledge Exchange (LAKE)/Flickr)

An institution's IRB requires several components in any experiment it approves. For one, each participant must sign an informed consent form before they can participate in the experiment. An **informed consent** form provides a written description of what participants can expect during the experiment, including potential risks and implications of the research. It also lets participants know that their involvement is completely voluntary and can be discontinued without penalty at any time. Furthermore, the informed consent guarantees that any data collected in the experiment will remain completely confidential. In cases where research participants are under the age of 18, the parents or legal guardians are required to sign the informed consent form.

### LINK TO LEARNING



Visit this **website** (<http://openstaxcollege.org//consentform>) to see an example of a consent form.

While the informed consent form should be as honest as possible in describing exactly what participants will be doing, sometimes deception is necessary to prevent participants' knowledge of the exact research question from affecting the results of the study. **Deception** involves purposely misleading experiment participants in order to maintain the integrity of the experiment, but not to the point where the deception could be considered harmful. For example, if we are interested in how our opinion of someone is affected by their attire, we might use deception in describing the experiment to prevent that knowledge from affecting participants' responses. In cases where deception is involved, participants must receive a full **debriefing** upon conclusion of the study—complete, honest information about the purpose of the experiment, how the data collected will be used, the reasons why deception was necessary, and information about how to obtain additional information about the study.

### DIG DEEPER

#### Ethics and the Tuskegee Syphilis Study

Unfortunately, the ethical guidelines that exist for research today were not always applied in the past. In 1932, poor, rural, black, male sharecroppers from Tuskegee, Alabama, were recruited to participate in an experiment conducted by the U.S. Public Health Service, with the aim of studying syphilis in black men (**Figure 2.21**). In

exchange for free medical care, meals, and burial insurance, 600 men agreed to participate in the study. A little more than half of the men tested positive for syphilis, and they served as the experimental group (given that the researchers could not randomly assign participants to groups, this represents a quasi-experiment). The remaining syphilis-free individuals served as the control group. However, those individuals that tested positive for syphilis were never informed that they had the disease.

While there was no treatment for syphilis when the study began, by 1947 penicillin was recognized as an effective treatment for the disease. Despite this, no penicillin was administered to the participants in this study, and the participants were not allowed to seek treatment at any other facilities if they continued in the study. Over the course of 40 years, many of the participants unknowingly spread syphilis to their wives (and subsequently their children born from their wives) and eventually died because they never received treatment for the disease. This study was discontinued in 1972 when the experiment was discovered by the national press (Tuskegee University, n.d.). The resulting outrage over the experiment led directly to the National Research Act of 1974 and the strict ethical guidelines for research on humans described in this chapter. Why is this study unethical? How were the men who participated and their families harmed as a function of this research?



**Figure 2.21** A participant in the Tuskegee Syphilis Study receives an injection.

### LINK TO LEARNING



Visit this [website \(http://openstaxcollege.org//tuskegee\)](http://openstaxcollege.org//tuskegee) to learn more about the Tuskegee Syphilis Study.

## RESEARCH INVOLVING ANIMAL SUBJECTS

Many psychologists conduct research involving animal subjects. Often, these researchers use rodents (**Figure 2.22**) or birds as the subjects of their experiments—the APA estimates that 90% of all animal research in psychology uses these species (American Psychological Association, n.d.). Because many basic processes in animals are sufficiently similar to those in humans, these animals are acceptable substitutes for research that would be considered unethical in human participants.



**Figure 2.22** Rats, like the one shown here, often serve as the subjects of animal research.

This does not mean that animal researchers are immune to ethical concerns. Indeed, the humane and ethical treatment of animal research subjects is a critical aspect of this type of research. Researchers must design their experiments to minimize any pain or distress experienced by animals serving as research subjects.

Whereas IRBs review research proposals that involve human participants, animal experimental proposals are reviewed by an **Institutional Animal Care and Use Committee (IACUC)**. An IACUC consists of institutional administrators, scientists, veterinarians, and community members. This committee is charged with ensuring that all experimental proposals require the humane treatment of animal research subjects. It also conducts semi-annual inspections of all animal facilities to ensure that the research protocols are being followed. No animal research project can proceed without the committee's approval.

## Key Terms

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**archival research** method of research using past records or data sets to answer various research questions, or to search for interesting patterns or relationships

**attrition** reduction in number of research participants as some drop out of the study over time

**cause-and-effect relationship** changes in one variable cause the changes in the other variable; can be determined only through an experimental research design

**clinical or case study** observational research study focusing on one or a few people

**confirmation bias** tendency to ignore evidence that disproves ideas or beliefs

**confounding variable** unanticipated outside factor that affects both variables of interest, often giving the false impression that changes in one variable causes changes in the other variable, when, in actuality, the outside factor causes changes in both variables

**control group** serves as a basis for comparison and controls for chance factors that might influence the results of the study—by holding such factors constant across groups so that the experimental manipulation is the only difference between groups

**correlation** relationship between two or more variables; when two variables are correlated, one variable changes as the other does

**correlation coefficient** number from -1 to +1, indicating the strength and direction of the relationship between variables, and usually represented by  $r$

**cross-sectional research** compares multiple segments of a population at a single time

**debriefing** when an experiment involved deception, participants are told complete and truthful information about the experiment at its conclusion

**deception** purposely misleading experiment participants in order to maintain the integrity of the experiment

**deductive reasoning** results are predicted based on a general premise

**dependent variable** variable that the researcher measures to see how much effect the independent variable had

**double-blind study** experiment in which both the researchers and the participants are blind to group assignments

**empirical** grounded in objective, tangible evidence that can be observed time and time again, regardless of who is observing

**experimental group** group designed to answer the research question; experimental manipulation is the only difference between the experimental and control groups, so any differences between the two are due to experimental manipulation rather than chance

**experimenter bias** researcher expectations skew the results of the study

**fact** objective and verifiable observation, established using evidence collected through empirical research

**falsifiable** able to be disproven by experimental results

**generalize** inferring that the results for a sample apply to the larger population

**hypothesis** (plural: hypotheses) tentative and testable statement about the relationship between two or more variables

**illusory correlation** seeing relationships between two things when in reality no such relationship exists

**independent variable** variable that is influenced or controlled by the experimenter; in a sound experimental study, the independent variable is the only important difference between the experimental and control group

**inductive reasoning** conclusions are drawn from observations

**informed consent** process of informing a research participant about what to expect during an experiment, any risks involved, and the implications of the research, and then obtaining the person's consent to participate

**Institutional Animal Care and Use Committee (IACUC)** committee of administrators, scientists, veterinarians, and community members that reviews proposals for research involving non-human animals

**Institutional Review Board (IRB)** committee of administrators, scientists, and community members that reviews proposals for research involving human participants

**inter-rater reliability** measure of agreement among observers on how they record and classify a particular event

**longitudinal research** studies in which the same group of individuals is surveyed or measured repeatedly over an extended period of time

**naturalistic observation** observation of behavior in its natural setting

**negative correlation** two variables change in different directions, with one becoming larger as the other becomes smaller; a negative correlation is not the same thing as no correlation

**observer bias** when observations may be skewed to align with observer expectations

**operational definition** description of what actions and operations will be used to measure the dependent variables and manipulate the independent variables

**opinion** personal judgments, conclusions, or attitudes that may or may not be accurate

**participants** subjects of psychological research

**peer-reviewed journal article** article read by several other scientists (usually anonymously) with expertise in the subject matter, who provide feedback regarding the quality of the manuscript before it is accepted for publication

**placebo effect** people's expectations or beliefs influencing or determining their experience in a given situation

**population** overall group of individuals that the researchers are interested in

**positive correlation** two variables change in the same direction, both becoming either larger or smaller

**random assignment** method of experimental group assignment in which all participants have an equal chance of being assigned to either group

**random sample** subset of a larger population in which every member of the population has an equal chance of being selected

**reliability** consistency and reproducibility of a given result

**replicate** repeating an experiment using different samples to determine the research's reliability

**sample** subset of individuals selected from the larger population

**single-blind study** experiment in which the researcher knows which participants are in the experimental group and which are in the control group

**statistical analysis** determines how likely any difference between experimental groups is due to chance

**survey** list of questions to be answered by research participants—given as paper-and-pencil questionnaires, administered electronically, or conducted verbally—allowing researchers to collect data from a large number of people

**theory** well-developed set of ideas that propose an explanation for observed phenomena

**validity** accuracy of a given result in measuring what it is designed to measure

## Summary

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### 2.1 Why Is Research Important?

Scientists are engaged in explaining and understanding how the world around them works, and they are able to do so by coming up with theories that generate hypotheses that are testable and falsifiable. Theories that stand up to their tests are retained and refined, while those that do not are discarded or modified. In this way, research enables scientists to separate fact from simple opinion. Having good information generated from research aids in making wise decisions both in public policy and in our personal lives.

### 2.2 Approaches to Research

The clinical or case study involves studying just a few individuals for an extended period of time. While this approach provides an incredible depth of information, the ability to generalize these observations to the larger population is problematic. Naturalistic observation involves observing behavior in a natural setting and allows for the collection of valid, true-to-life information from realistic situations. However, naturalistic observation does not allow for much control and often requires quite a bit of time and money to perform. Researchers strive to ensure that their tools for collecting data are both reliable (consistent and replicable) and valid (accurate).

Surveys can be administered in a number of ways and make it possible to collect large amounts of data quickly. However, the depth of information that can be collected through surveys is somewhat limited compared to a clinical or case study.

Archival research involves studying existing data sets to answer research questions.

Longitudinal research has been incredibly helpful to researchers who need to collect data on how people change over time. Cross-sectional research compares multiple segments of a population at a single time.

### 2.3 Analyzing Findings

A correlation is described with a correlation coefficient,  $r$ , which ranges from -1 to 1. The correlation coefficient tells us about the nature (positive or negative) and the strength of the relationship between two or more variables. Correlations do not tell us anything about causation—regardless of how strong the relationship is between variables. In fact, the only way to demonstrate causation is by conducting an experiment. People often make the mistake of claiming that correlations exist when they really do not.

Researchers can test cause-and-effect hypotheses by conducting experiments. Ideally, experimental participants are randomly selected from the population of interest. Then, the participants are randomly assigned to their respective groups. Sometimes, the researcher and the participants are blind to group membership to prevent their expectations from influencing the results.

In ideal experimental design, the only difference between the experimental and control groups is whether participants are exposed to the experimental manipulation. Each group goes through all phases of the experiment, but each group will experience a different level of the independent variable: the experimental group is exposed to the experimental manipulation, and the control group is not exposed to the experimental manipulation. The researcher then measures the changes that are produced in the dependent variable in each group. Once data is collected from both groups, it is analyzed statistically to determine if there are meaningful differences between the groups.

Psychologists report their research findings in peer-reviewed journal articles. Research published in this format is checked by several other psychologists who serve as a filter separating ideas that are supported by evidence from ideas that are not. Replication has an important role in ensuring the legitimacy of published research. In the long run, only those findings that are capable of being replicated consistently will achieve consensus in the scientific community.

## 2.4 Ethics

Ethics in research is an evolving field, and some practices that were accepted or tolerated in the past would be considered unethical today. Researchers are expected to adhere to basic ethical guidelines when conducting experiments that involve human participants. Any experiment involving human participants must be approved by an IRB. Participation in experiments is voluntary and requires informed consent of the participants. If any deception is involved in the experiment, each participant must be fully debriefed upon the conclusion of the study.

Animal research is also held to a high ethical standard. Researchers who use animals as experimental subjects must design their projects so that pain and distress are minimized. Animal research requires the approval of an IACUC, and all animal facilities are subject to regular inspections to ensure that animals are being treated humanely.

## Review Questions

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1. Scientific hypotheses are \_\_\_\_\_ and falsifiable.
  - a. observable
  - b. original
  - c. provable
  - d. testable
2. \_\_\_\_\_ are defined as observable realities.
  - a. behaviors
  - b. facts
  - c. opinions
  - d. theories
3. Scientific knowledge is \_\_\_\_\_.
  - a. intuitive
  - b. empirical
  - c. permanent
  - d. subjective
4. A major criticism of Freud's early theories involves the fact that his theories \_\_\_\_\_.
  - a. were too limited in scope
  - b. were too outrageous
  - c. were too broad
  - d. were not testable
5. Sigmund Freud developed his theory of human personality by conducting in-depth interviews over an extended period of time with a few clients. This type of research approach is known as a(n): \_\_\_\_\_.
  - a. archival research
  - b. case study
  - c. naturalistic observation
  - d. survey

6. \_\_\_\_\_ involves observing behavior in individuals in their natural environments.
- archival research
  - case study
  - naturalistic observation
  - survey
7. The major limitation of case studies is \_\_\_\_\_.
- the superficial nature of the information collected in this approach
  - the lack of control that the researcher has in this approach
  - the inability to generalize the findings from this approach to the larger population
  - the absence of inter-rater reliability
8. The benefit of naturalistic observation studies is \_\_\_\_\_.
- the honesty of the data that is collected in a realistic setting
  - how quick and easy these studies are to perform
  - the researcher's capacity to make sure that data is collected as efficiently as possible
  - the ability to determine cause and effect in this particular approach
9. Using existing records to try to answer a research question is known as \_\_\_\_\_.
- naturalistic observation
  - survey research
  - longitudinal research
  - archival research
10. \_\_\_\_\_ involves following a group of research participants for an extended period of time.
- archival research
  - longitudinal research
  - naturalistic observation
  - cross-sectional research
11. A(n) \_\_\_\_\_ is a list of questions developed by a researcher that can be administered in paper form.
- archive
  - case Study
  - naturalistic observation
  - survey
12. Longitudinal research is complicated by high rates of \_\_\_\_\_.
- deception
  - observation
  - attrition
  - generalization
13. Height and weight are positively correlated. This means that:
- There is no relationship between height and weight.
  - Usually, the taller someone is, the thinner they are.
  - Usually, the shorter someone is, the heavier they are.
  - As height increases, typically weight increases.
14. Which of the following correlation coefficients indicates the strongest relationship between two variables?
- .90
  - .50
  - +.80
  - +.25
15. Which statement best illustrates a negative correlation between the number of hours spent watching TV the week before an exam and the grade on that exam?
- Watching too much television leads to poor exam performance.
  - Smart students watch less television.
  - Viewing television interferes with a student's ability to prepare for the upcoming exam.
  - Students who watch more television perform more poorly on their exams.
16. The correlation coefficient indicates the weakest relationship when \_\_\_\_\_.
- it is closest to 0
  - it is closest to -1
  - it is positive
  - it is negative

17. \_\_\_\_\_ means that everyone in the population has the same likelihood of being asked to participate in the study.
- operationalizing
  - placebo effect
  - random assignment
  - random sampling
18. The \_\_\_\_\_ is controlled by the experimenter, while the \_\_\_\_\_ represents the information collected and statistically analyzed by the experimenter.
- dependent variable; independent variable
  - independent variable; dependent variable
  - placebo effect; experimenter bias
  - experiment bias; placebo effect
19. Researchers must \_\_\_\_\_ important concepts in their studies so others would have a clear understanding of exactly how those concepts were defined.
- randomly assign
  - randomly select
  - operationalize
  - generalize
20. Sometimes, researchers will administer a(n) \_\_\_\_\_ to participants in the control group to control for the effects that participant expectation might have on the experiment.
- dependent variable
  - independent variable
  - statistical analysis
  - placebo
21. \_\_\_\_\_ is to animal research as \_\_\_\_\_ is to human research.
- informed consent; deception
  - IACUC; IRB
  - IRB; IACUC
  - deception; debriefing
22. Researchers might use \_\_\_\_\_ when providing participants with the full details of the experiment could skew their responses.
- informed consent
  - deception
  - ethics
  - debriefing
23. A person's participation in a research project must be \_\_\_\_\_.
- confidential
  - rewarded
  - voluntary
  - public
24. Before participating in an experiment, individuals should read and sign the \_\_\_\_\_ form.
- informed consent
  - debriefing
  - IRB
  - ethics

## Critical Thinking Questions

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25. In this section, the D.A.R.E. program was described as an incredibly popular program in schools across the United States despite the fact that research consistently suggests that this program is largely ineffective. How might one explain this discrepancy?
26. The scientific method is often described as self-correcting and cyclical. Briefly describe your understanding of the scientific method with regard to these concepts.
27. In this section, conjoined twins, Krista and Tatiana, were described as being potential participants in a case study. In what other circumstances would you think that this particular research approach would be especially helpful and why?

28. Presumably, reality television programs aim to provide a realistic portrayal of the behavior displayed by the characters featured in such programs. This section pointed out why this is not really the case. What changes could be made in the way that these programs are produced that would result in more honest portrayals of realistic behavior?
29. Which of the research methods discussed in this section would be best suited to research the effectiveness of the D.A.R.E. program in preventing the use of alcohol and other drugs? Why?
30. Aside from biomedical research, what other areas of research could greatly benefit by both longitudinal and archival research?
31. Earlier in this section, we read about research suggesting that there is a correlation between eating cereal and weight. Cereal companies that present this information in their advertisements could lead someone to believe that eating more cereal causes healthy weight. Why would they make such a claim and what arguments could you make to counter this cause-and-effect claim?
32. Recently a study was published in the journal, *Nutrition and Cancer*, which established a negative correlation between coffee consumption and breast cancer. Specifically, it was found that women consuming more than 5 cups of coffee a day were less likely to develop breast cancer than women who never consumed coffee (Lowcock, Cotterchio, Anderson, Boucher, & El-Sohemy, 2013). Imagine you see a newspaper story about this research that says, “Coffee Protects Against Cancer.” Why is this headline misleading and why would a more accurate headline draw less interest?
33. Sometimes, true random sampling can be very difficult to obtain. Many researchers make use of convenience samples as an alternative. For example, one popular convenience sample would involve students enrolled in Introduction to Psychology courses. What are the implications of using this sampling technique?
34. Peer review is an important part of publishing research findings in many scientific disciplines. This process is normally conducted anonymously; in other words, the author of the article being reviewed does not know who is reviewing the article, and the reviewers are unaware of the author’s identity. Why would this be an important part of this process?
35. Some argue that animal research is inherently flawed in terms of being ethical because unlike human participants, animals do not consent to be involved in research. Do you agree with this perspective? Given that animals do not consent to be involved in research projects, what sorts of extra precautions should be taken to ensure that they receive the most humane treatment possible?
36. At the end of the last section, you were asked to design a basic experiment to answer some question of interest. What ethical considerations should be made with the study you proposed to ensure that your experiment would conform to the scientific community’s expectations of ethical research?

### Personal Application Questions

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37. Healthcare professionals cite an enormous number of health problems related to obesity, and many people have an understandable desire to attain a healthy weight. There are many diet programs, services, and products on the market to aid those who wish to lose weight. If a close friend was considering purchasing or participating in one of these products, programs, or services, how would you make sure your friend was fully aware of the potential consequences of this decision? What sort of information would you want to review before making such an investment or lifestyle change yourself?

- 38.** A friend of yours is working part-time in a local pet store. Your friend has become increasingly interested in how dogs normally communicate and interact with each other, and is thinking of visiting a local veterinary clinic to see how dogs interact in the waiting room. After reading this section, do you think this is the best way to better understand such interactions? Do you have any suggestions that might result in more valid data?
- 39.** As a college student, you are no doubt concerned about the grades that you earn while completing your coursework. If you wanted to know how overall GPA is related to success in life after college, how would you choose to approach this question and what kind of resources would you need to conduct this research?
- 40.** We all have a tendency to make illusory correlations from time to time. Try to think of an illusory correlation that is held by you, a family member, or a close friend. How do you think this illusory correlation came about and what can be done in the future to combat them?
- 41.** Are there any questions about human or animal behavior that you would really like to answer? Generate a hypothesis and briefly describe how you would conduct an experiment to answer your question.
- 42.** Take a few minutes to think about all of the advancements that our society has achieved as a function of research involving animal subjects. How have you, a friend, or a family member benefited directly from this kind of research?