CHAPTER OUTLINE AND LEARNING OBJECTIVES

Presenting Psychology
LO 1 Define psychology and describe its scope.
LO 2 Summarize the goals of psychology.

Roots, Schools, and Perspectives of Psychology
LO 3 Identify the people who helped establish psychology as a discipline, and describe their contributions.
LO 4 List and summarize the major perspectives in psychology.

Science and Psychology
LO 5 Evaluate pseudopsychology and its relationship to critical thinking.

The Scientific Method
LO 6 Describe how psychologists use the scientific method.

Research Basics
LO 7 Distinguish between a random sample and a representative sample.

Descriptive Research
LO 8 Recognize the forms of descriptive research.
LO 9 Describe the correlational method and identify its limitations.

Experimental Research
LO 10 Explain how the experimental method can establish cause and effect.

Research Ethics
LO 11 Identify measures psychologists take to support ethical treatment of their research participants.
introduction to the science of psychology

Presenting Psychology

HALF OF ME MISSING  Sharon Poset had a happy childhood in Delanco, New Jersey. Her mother made perfect birthday cakes and sewed pretty dresses, and her father was kind, gentle, and made her feel safe. Sharon knew she was adopted, and she was comfortable with this truth. In fact, she considered her adoption an important part of who she was, and would often tell people about it. But even though Sharon felt secure in herself, something seemed missing. She was, in her own words, “pathologically lonely,” despite the fact that she had two younger siblings. “[It] felt like there was a half of you, or like your right side, your left side, just was missing all the time,” Sharon recalls. “And I just thought everybody felt that way, and I couldn’t understand why my brother and sister weren’t lonely that way too.”

If only Sharon had known that her “missing half” was just 20 miles away, growing up in another New Jersey town—an identical twin named Debbie. The girls had been separated a week after birth and adopted by different families. Debbie didn’t know she was adopted, but she too felt “pathologically lonely.” When she was a little girl, toy stores were selling a doll called Patti Playpal. The doll was life-size, and Debbie wished she had magical powers to bring it to life. She longed for a playmate her own age and size, a little girl just like herself.

Sharon and Debbie went through childhood and adolescence oblivious to the other’s existence. Both went away to college, and married shortly after graduation. They hoped that marrying wonderful men would cure them...
of their loneliness, but wedding bells did not fix the problem. Even after having children they loved and cherished—a son for Sharon and a daughter for Debbie—their loneliness persisted. They tried filling the void with pets; Sharon went for breeds like Dobermans and boxers, while Debbie opted for fluffy poodles, keeshonds, and sheepdogs. But none of these animals provided the type of companionship they craved.

What would happen if Sharon and Debbie met? Would finding her “missing half” make each woman feel complete? ●

Note: Quotations attributed to Sharon Poset, Debbie Mehlman, and Dr. Nancy L. Segal are personal communications.

Welcome to the Fascinating World of Psychology

Imagine you could observe the reunion of Sharon and Debbie. What kinds of characteristics would you notice? You may be struck by their physical similarities: ocean blue eyes, apple cheeks, fine reddish hair, and broad smiles. But perhaps you would be more intrigued by their common psychological characteristics, that is, those related to their behavior and mental processes: attitudes, beliefs, personality traits, sense of humor, the way they cross their eyes when exasperated.

Psychologists have long been fascinated by identical twins, particularly those raised in separate homes. At conception, identical twins share 100% of their genes (the units of heredity passed from parents to children), so they are equivalent in their nature, or inherited biological factors (Abdellaoui et al., 2015; McRae, Visscher, Montgomery, & Martin, 2015). But being raised in separate households means they differ in their nurture, subject to distinct sets of environmental forces that shape who we are. Thus, the similarities observed between these twins are likely to be influenced by their common nature, while differences are apt to be linked to their unique upbringing and life experiences, or nurture. For example, identical twins—even those raised apart—tend to be very close on measures of intelligence (Bouchard, Lykken, McGue, Segal, & Tellegen, 1990; Shakeshaft et al., 2015). This suggests that genes (nature) can play a major role in determining intellectual ability.

Twin research is not just important to twins; it has implications for all of us. Suppose one identical twin develops cancer but his twin does not. That means that something in the environment likely set off the disease process. If we can figure out what the trigger is, then we can all benefit from that knowledge (Segal, 1999; Winerman, 2015).

Studies of identical twins and fraternal twins (who, like non-twin siblings, share approximately 50% of their genes) have helped psychologists untangle the roles of nature and nurture for a variety of topics, including intelligence (Chapter 7), sexual orientation (Chapter 10), and aspects of personality (Chapter 11). We will continue this exploration of nature and nurture later in this chapter, and throughout the book, but first let’s establish a basic understanding of psychology, the science.

What Is Psychology?

LO 1 Define psychology and describe its scope.

Psychology is the scientific study of behavior and mental processes. Smiling, hugging, and laughing are observable behaviors you might expect Sharon and Debbie to display upon meeting; all of these activities are potential research topics in psychology. And
although the twins’ thoughts are not observable, they are valid topics of psychological research as well. 

Psychologists are scientists who work in a variety of subfields, all of which include the study of behavior and underlying mental processes. People often associate psychology with therapy, and many psychologists do provide therapy. These counseling and clinical psychologists might also conduct research on the causes and treatments of psychological disorders (TABLE 1.1; Chapters 13 and 14). Clinical practice is just one slice of the gigantic psychology pie. There are psychologists who spend their days observing rats in laboratories or assessing the capabilities of children in schools. Psychologists may also be found poring over brain scans in major medical centers, spying on monkeys in the Brazilian rainforest, and offering expert testimony in legal cases (FIGURE 1.1; see Appendix B for more on careers in psychology).

### TABLE 1.1 MENTAL HEALTHProfessionals

<table>
<thead>
<tr>
<th>Degree</th>
<th>Occupation</th>
<th>Training</th>
<th>Focus</th>
<th>Prescribes Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Doctor, MD</td>
<td>Psychiatrist</td>
<td>Medical school and residency training in psychiatry</td>
<td>Treatment of psychological disorders; may include research focus</td>
<td>Yes</td>
</tr>
<tr>
<td>Doctor of Philosophy, PhD</td>
<td>Clinical or Counseling Psychologist</td>
<td>Graduate school; includes dissertation and internship</td>
<td>Research-oriented and clinical practice</td>
<td>Varies by state</td>
</tr>
<tr>
<td>Doctor of Psychology, PsyD</td>
<td>Clinical or Counseling Psychologist</td>
<td>Graduate school; includes internship; may include dissertation</td>
<td>Focus on professional practice</td>
<td>Varies by state</td>
</tr>
<tr>
<td>Master’s Degree, MA or MS</td>
<td>Mental Health Counselor</td>
<td>Graduate school; includes internship</td>
<td>Focus on professional practice</td>
<td>No</td>
</tr>
</tbody>
</table>

Mental health professionals come from a variety of backgrounds. Here, we present a handful of these, including general information on training, focus, and whether the training includes licensing to prescribe medication for psychological disorders.

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**FIGURE 1.1**

### Fields of Psychology

The pie charts above show the primary place of work for full-time doctorate-level psychologists working in 2014 and their areas of specialty. As you can see, psychologists work in diverse contexts and specialize in many subfields. In the photo, a clinical psychologist counsels a displaced flood survivor in a Thai refugee camp. Photo: Boris Roessler/dpa/Landov.


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**nature** The inherited biological factors that shape behaviors, personality, and other characteristics.

**nurture** The environmental factors that shape behaviors, personality, and other characteristics.

**psychology** The scientific study of behavior and mental processes.

**psychologists** Scientists who study behavior and mental processes.
Psychology is a broad field that includes many perspectives and subfields. The American Psychological Association (APA), one of psychology’s major professional organizations, has over 50 divisions representing various subdisciplines and areas of interest (APA, n.d.). The Association for Psychological Science (APS), another major professional organization in the field, offers a list on its website of over 100 different societies, organizations, and agencies that are considered to have some affiliation with the discipline of psychology (APS, n.d.). In fact, each of the chapters in this textbook covers a broad subtopic that represents a subfield of psychology.

In Class: Collaborate and Report

Psychology is the scientific study of behavior and mental processes. In your group, A) generate a list of diverse behaviors; B) generate a list of subfields and careers in psychology; C) try to match the items in the two lists.

BASIC AND APPLIED RESEARCH Psychologists conduct two major types of research. Basic research, which often occurs in university laboratories, focuses on collecting data to support (or refute) theories. The goal of basic research is not to find solutions to specific problems, but rather to gather knowledge for the sake of knowledge. Suppose a researcher is curious about how cognitive abilities (thinking and other mental activities) develop from adolescence to young adulthood. She conducts a twin study, and her findings suggest a link between genetic similarity and some cognitive abilities (Friedman et al., 2016). This basic research may pave the way for applied research—for example, a study investigating how interventions such as after-school reading programs can influence cognitive ability, despite genetic predispositions. Applied research focuses on changing behaviors and outcomes, and often leads to real-world applications, such as specific behavioral interventions for children with autism, innovative keyboard layouts that improve typing performance, or methods for helping students study more successfully. This type of research is often conducted in natural settings outside the laboratory. Although applied research may incorporate findings from basic research, its goals are more practical.

MISCONCEPTIONS ABOUT PSYCHOLOGY Looking at Figure 1.1, you may have been surprised to learn about the variety of occupations available to psychologists. If so, you are not alone; many people assume that all psychologists provide therapy, when in fact they perform numerous roles in the workforce. There are also various misconceptions about psychology topics, even among students who have taken some psychology classes (Hughes et al., 2015). Most of what the average person knows about psychology comes from the popular media, which fail to present an accurate portrayal of the field, its practitioners, and its findings. Frequently, guests who are introduced as “psychologists” or “therapists” by television talk show hosts really aren’t psychologists as defined by the leading psychological organizations (Stanovich, 2013).

One common misconception is that psychology is simply common sense, or a collection of knowledge that any reasonably smart person can pick up through everyday experiences. A parent may assume that raising three children has taught him everything he needs to know about child development. He helps his kids with homework because common sense suggests it will increase their success in school. What he doesn’t know (and what psychology research will tell him) is that giving help isn’t successful for all parents: “Even when math-anxious parents have good intentions, their homework help may backfire, decreasing children’s math learning and increasing their math anxiety across the school year” (Maloney, Ramirez, Gunderson, Levine, & Beilock, 2015, p. 6).

As the above example illustrates, common sense and popular wisdom are not always correct (Lilienfeld, 2012). Common sense is an important ability that helps us survive
and adapt, but it should not take the place of scientific findings. As you learn more about how humans think and remember, you will start to see that we are prone to making errors (Chapters 6 and 7). Table 1.2 identifies some commonsense myths that have been dispelled through research. Have you fallen for any of them?

The false notion that psychology is common sense, and that psychological findings are obvious and predictable, may stem partly from hindsight bias, or the feeling that “I knew it all along.” Many people shrug their shoulders and say, “I could have told you that,” when they learn about psychology research findings. Although the outcome of a study may seem obvious in retrospect, that doesn’t mean they could have predicted it beforehand. Examples of hindsight bias abound in everyday life. Suppose your instructor returns an exam, and you are surprised at one of the questions you got wrong. Now that you’re staring at the correct answer, it seems so obvious (“I knew the answer was ‘evolution’!”). But if you really knew it all along, why did you choose the wrong answer (Tauer, 2009)? You may be expressing hindsight bias when you make this assertion. If so, you’re in good company. Even practicing physicians fall victim to hindsight bias. When doctors hear about the details of an autopsy and then learn of the deceased person’s diagnosis, for example, they often believe they could have easily predicted it (Arkes, 2013). In both of these situations, hindsight bias can get in the way of learning. How do you learn from your mistakes if you can’t correctly identify the gaps in your knowledge (Arkes, 2013; Tauer, 2009)?

### Table 1.2 Dispelled: Six “Commonsense” Myths

<table>
<thead>
<tr>
<th>Myth</th>
<th>Reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>People only use 10% of their brains.</td>
<td>Neuroscientists consider this claim to be absurd; the reality is that we use essentially all of our brains (Boyd, 2008, February 7; Howard-Jones, 2014).</td>
</tr>
<tr>
<td>Most older people live sad and solitary lives.</td>
<td>Many people become happier with age (Lilienfeld, Lynn, Ruscio, &amp; Beyerstein, 2010). In fact, one study suggests that the average 83-year-old is just as content as the average 26-year-old (Fischer, 2009).</td>
</tr>
<tr>
<td>Once you’re married and have kids, your sex life goes down the tubes.</td>
<td>According to the National Survey of Sexual Health and Behavior (2010), men and women in their late twenties and early thirties are having more sex than people in other age groups.</td>
</tr>
<tr>
<td>After birth, your brain no longer generates new neurons.</td>
<td>Neurons in certain areas of the brain are replenished during adulthood (Eriksson et al., 1998; Ernst &amp; Frisén, 2015).</td>
</tr>
<tr>
<td>Sugar makes kids hyper and inattentive.</td>
<td>This is a common belief among educators across the world, but not one supported by solid scientific data (Howard-Jones, 2014; Vreeman &amp; Carroll, 2008).</td>
</tr>
<tr>
<td>People have distinct “learning styles.” For example, “visual learners” absorb information better when it is presented in ways they can see (graphs, animations, etc.).</td>
<td>Although we all have different skill sets and areas of interest, there is no compelling evidence that we possess specific learning styles (Riener, 2010/2011).</td>
</tr>
</tbody>
</table>
PSYCHOLOGY IS A SCIENCE Unlike common sense, psychology is a rigorous discipline based on meticulous and methodical observation, as well as data analysis. Like chemistry and biology, psychology is a science, a systematic approach to gathering knowledge through careful observation and experimentation. It requires sharing results (see INFOGRAPHIC “HOW TO READ A SCIENTIFIC ARTICLE” on the inside front cover) and doing so in a manner that permits others to duplicate and therefore verify work. This chapter is dedicated to helping you understand the science of psychology.

The Goals of Psychology

What exactly do those who study behavior and mental processes hope to accomplish? The answer to this question varies according to subfield, but there are four main goals: to describe, explain, predict, and control behavior. These goals lay the foundation for the scientific approach used in psychology. Let’s take a closer look at each one, keeping in mind that the order presented doesn’t necessarily indicate their importance.

DESCRIBE One goal is simply to describe or report what is observed. Imagine a psychologist who wants to describe differences in children’s food preferences. What kind of study would she conduct? First, she would need access to a group of parents and caregivers who are willing to keep track of their children’s food intake. Once the participants have been assembled, she might request permission to perform tests evaluating the children’s moods, social adjustment, and physical health. She would likely want to monitor the children over time, conducting more assessments at a later date. Eventually, she would present her observations in a scientific article published in a respected journal, and use her findings to help plan future research.

EXPLAIN Another goal is to organize and make sense of what researchers have observed. If the psychologist noticed an interesting pattern of food preferences among the children, she might develop a preliminary explanation for this finding. Suppose the children enjoyed the same kinds of food as their siblings; then the psychologist might look for factors that could influence their likes and dislikes. Searching the scientific literature for clues, she might come across studies suggesting that food preferences are established early in life (Shutts, Kinzler, & DeJesus, 2013). If she learned that food preferences were associated with shared home environments, this could help explain why siblings had similar tastes, although she still would have to conduct a controlled experiment to identify a causal relationship between these two variables.

PREDICT Yet another goal is to predict behaviors or outcomes on the basis of observed patterns. If the researcher noted a link between the children’s food choices and those of their siblings, then she could predict that the preferences of other close family members (such as first cousins) might lead to the same outcome: similar eating patterns. Jeremiah loves green beans, and so do his cousins. However, she would still have to untangle the effects of nature and nurture, so she might decide to study pairs of identical and fraternal twins. If there was greater similarity between the identical twins than the fraternal twins, she could assume that the greater degree of shared genetics (in the identical twins) played a role in determining food preferences (Pallister et al., 2015).

CONTROL One more goal of psychology is to use research findings to shape, modify, and control behavior. Here, we are referring to how we can apply the findings of psychological research to change and direct (control) behaviors in a beneficial way. Perhaps the researcher could use her findings to help public health experts design programs to
encourage healthier eating choices among kids (Pallister et al., 2015). Psychological research can be applied to your life, too. See Table 1.3 for some evidence-based tips on remembering information for your classes.

The distinction among the four goals is not always clear, and researchers may not address all of them in the same study. What’s more, their order is not universal—sometimes researchers make predictions before trying to explain a behavior.

You have now learned the definition, scope, and goals of psychology. You will soon explore the ins and outs of psychological research: how psychologists use a scientific approach, the many types of studies they carry out, and the ethical standards for acceptable conduct that guide them through the process. But let’s start with some history, meeting the people whose philosophies, insights, and research findings molded psychology into the vibrant science it is today.

**TABLE 1.3 STUDY SMART**

<table>
<thead>
<tr>
<th>Technique</th>
<th>What to Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey</td>
<td>Skim the material to determine what may be useful to you: review questions, learning objectives, chapter summaries. Identify main ideas and concepts.</td>
</tr>
<tr>
<td>Question</td>
<td>Note any questions that arise after your survey. Create an outline to help organize your study based on the questions you generate.</td>
</tr>
<tr>
<td>Read</td>
<td>Read through your chapter and take notes on its content.</td>
</tr>
<tr>
<td>Recall</td>
<td>Go over the material you have read in your mind. Identify key points and crucial processes. Discuss how other material supports the key points and processes.</td>
</tr>
<tr>
<td>Review</td>
<td>Reread the material, and include additional material to enhance your notes. “Teach” the material to someone else.</td>
</tr>
<tr>
<td>Individualize the process</td>
<td>Break down the reading into small sections you can read, recall, and review effectively.</td>
</tr>
<tr>
<td>Space your study</td>
<td>Build in breaks and spread the study sessions over time.</td>
</tr>
<tr>
<td>Minimize distractions</td>
<td>Focus on the task at hand; multitasking while studying diverts attention, resulting in more time spent learning the material.</td>
</tr>
<tr>
<td>Test frequently</td>
<td>Test yourself frequently. Low-stakes feedback provides an opportunity to learn the material and retain it longer.</td>
</tr>
<tr>
<td>Sleep</td>
<td>Get enough rest. Good sleep helps us learn new material and retain it.</td>
</tr>
</tbody>
</table>

Listed here are some practical tips for remembering information you learn in your classes. This advice is largely based on research presented in Chapter 6. Source: Information from Al Firdaus (2012); Roediger, Putnam, & Smith (2011); Rohrer & Taylor (2006).

1. Psychology is the scientific study of _________ and _________.
2. A researcher is asked to devise a plan to help improve food choices of elementary schoolchildren. Based on his research findings, he creates posters for the school cafeterias that he believes will modify the children’s food selections. This attempt to change behaviors falls under which of the main goals of psychology?
   a. describe  
   b. explain  
   c. predict  
   d. control
3. How is common sense different from the findings of psychology? If one of your friends says, “I could have told you that!” when you describe the results of various studies on food preferences, how would you respond?

CHECK YOUR ANSWERS IN APPENDIX C.
Roots, Schools, and Perspectives of Psychology

The field of psychology is almost 140 years old, very young compared to other scientific disciplines, but its core questions are as old as humanity itself. Read the works of the ancient Greeks, and you will see that they asked some of the same questions as modern psychologists—What is the connection between the body and mind? How do we obtain knowledge? Where does knowledge reside? Making your way through this book, you will discover that many of these questions are still under investigation.

Philosophy and Physiology

LO 3 Identify the people who helped establish psychology as a discipline, and describe their contributions.

The roots of psychology lie in disciplines as diverse as philosophy and physiology. In ancient Greece, the great philosopher Plato (427–347 BCE) believed that truth and knowledge exist in the soul before birth; that is, humans are born with some degree of innate or inborn knowledge. Plato raised an important issue psychologists still contemplate: the contribution of nature in the human capacity for cognition.

Aristotle (384–322 BCE) was one of Plato’s renowned students. Unlike his mentor, Aristotle believed that we know reality through our perceptions, and we learn through our sensory experiences. This approach is now commonly referred to as empiricism, and it is how scientists acquire knowledge through their observations and experiments (Schultz & Schultz, 2016). Aristotle has been credited with laying the foundation for a scientific approach to answering questions, including those pertaining to psychological concepts such as emotion, sensation, and perception (Slife, 1990; Thorne & Henley, 2005). He believed knowledge is the result of experience, and thus paved the way for scientists to study the world through their observations.

This notion that experience, or nurture, plays an all-important role in how we acquire knowledge contradicts Plato’s belief that it is inborn. Aristotle therefore provided

Nature and Nurture

Both nature and nurture influence the development of living things. Would you believe that these trees belong to the same species? Both are Jeffrey pines (Pinus jeffreyi), but they have been exposed to dramatically different environmental pressures. Jeffrey pines typically reach 80 to 130 feet. The tree on the left appears to be growing in fertile soil in a thriving forest, whereas the one on the right has virtually sprung from a slab of rock on an 8,122-foot peak in Yosemite National Park (St. John, 2003, August 19). A testament to the power of nurture.

the opposing position in the discussion of nature and nurture, a central theme in the field of psychology. Today, psychologists agree that nature and nurture are both important, and current research explores the relative contributions of each through studies of heredity and environmental factors.

If Aristotle placed great confidence in human perception, French philosopher René Descartes (day-KART; 1596–1650) practically discounted it. Famous for saying, “I think, therefore, I am,” Descartes believed that most everything else was uncertain, including what he saw with his own eyes. He proposed that the body is like a tangible machine, whereas the mind has no physical substance. The body and mind interact as two separate entities, a view known as dualism, and Descartes (and many others) wondered how they were connected. How can the mind direct our hand to answer a phone call, or how can the touch of a loved one create a sensation our mind can interpret? The nature of our mind and our body are quite different, separate according to Descartes; however, they are connected. Descartes’ work allowed for a more scientific approach to examining thoughts, emotions, and other topics previously considered beyond the scope of study.

About 200 years later, another scientist experienced a “flash of insight” about the mind–body connection. It was October 22, 1850, when German physicist Gustav Theodor Fechner (1801–1887) suddenly realized that he could “solve” the mind–body conundrum, that is, figure out how they connect. Fechner reasoned that by studying the physical ability to sense stimuli, we are simultaneously conducting experiments on the mind. In other words, we can understand how the mind and body work together by studying sensation. Fechner’s efforts laid the groundwork for research on sensation and perception (Benjamin, 2007; Robinson, 2010).

### Psychology Is Born

Thus far, the only people in our presentation of psychology’s history have been philosophers and a physicist. You might ask where all the psychologists were during the time of Descartes and Fechner. The answer is simple: It wasn’t until the 19th century that psychology emerged as a scientific discipline. In 1879 Wilhelm Wundt (VILL-helm Vundt) (1832–1920) founded the first psychology laboratory, at the University of Leipzig in Germany, and for this he generally is considered the “father of psychology.” Equipped with its own laboratory, research team, and meticulous accounts of experiments, psychology finally became a discipline in its own right.

The overall aim of Wundt’s early experiments was to measure psychological processes through introspection, a method used to examine one’s own conscious activities. For Wundt, introspection involved effortful reflection on the sensations, feelings, and images experienced in response to a stimulus, followed by reports that were objective, meaning free of opinions, beliefs, expectations, and values. In order to ensure reliable data, Wundt required all his participants to complete 10,000 “introspective observations” prior to starting data collection. His participants were asked to make quantitative judgments about physical stimuli—how strong they were, how long they
The next time your cell phone vibrates, take the opportunity to engage in some introspection. Grab the cell phone and hold it in your hands (try to resist answering the call). Pay attention to what you experience as you wait for the vibrations to stop. Then put down the phone and consider your experience. Report on your sensations (the color, shape, and texture of the phone) and feelings (anxiety, excitement, frustration), but make your observations objective.

### Structuralism
Edward Titchener (TITCH-e-ner) (1867–1927), who was a student of Wundt, developed the school of psychology known as **structuralism**. In 1893 Titchener set up a laboratory at Cornell University in Ithaca, New York, where he conducted introspection experiments aimed at determining the structure and “atoms” (or most basic elements) of the mind. Titchener’s participants, also very well-trained, were asked to describe the elements of their current consciousness. In contrast to Wundt’s focus on objective, quantitative, or measurable, reports of conscious experiences, Titchener’s participants provided detailed reports of their subjective (unique or personal) experiences (Hothersall, 2004). So instead of providing labels for objects, participants would describe them; an egg would be referred to as a “white orb with a textured outer layer,” but not an “egg.” The school of structuralism did not last past Titchener’s lifetime, and even most of his contemporaries regarded structuralism as outdated. Nevertheless, Titchener helped to demonstrate that psychological studies could be conducted through observation and measurement.

### Functionalism
In the late 1870s, William James (1842–1910) offered the first psychology classes in the United States, at Harvard University, where he was granted $300 for laboratory and classroom demonstration equipment (Croce, 2010). James had little interest in pursuing the experimental psychology practiced by Wundt and other Europeans; instead, he was inspired by the work of English naturalist Charles Darwin (1809–1882), as it supported the notion that human consciousness serves a purpose (Schultz & Schultz, 2016). Studying the elements of introspection was not a worthwhile endeavor, James believed, because consciousness is an ever-changing “stream” of thoughts that helps us adapt. Consciousness cannot be studied by looking for fixed or static elements (like the “atoms” of the mind), because they don’t exist, or so he reasoned. But James believed consciousness does serve a function, and it is important to study the purpose of thought processes, feelings, and behaviors, and how they help us adapt to the environment. This focus on purpose and adaptation in psychological research is the overarching theme of the school of **functionalism**.

Students often confuse “functionalism” with “structuralism,” perhaps because the terms sound similar, but they are very different. The focus of structuralism was to uncover the **structure** of the mind, whereas functionalism aimed to identify the **function** of thoughts, feelings, and behaviors. Although it didn’t endure as a separate field of psychology, functionalism has continued to influence educational psychology, research on emotion, comparative studies of animal behavior, and other areas of psychology (Benjamin, 2007).

### Here Come the Women
Like most sciences, psychology began as a “boys’ club,” with men earning the degrees, teaching the classes, and running the labs. There were, however, women as competent and inquiring as their male counterparts who beat down the club doors long before women were formally invited. One of William James’ students, Mary Whiton Calkins (1863–1930), completed all the requirements for a PhD at Harvard, but was not allowed to graduate from the then all-male college because she was a woman. Nonetheless, she persevered with her work and established her own laboratory at Wellesley College, eventually becoming the first female president of the APA. If you are wondering, the first woman to earn a PhD in psychology was Margaret Floy Washburn (1871–1939), a student of Titchener’s. Her degree, which was granted in 1894, came from Cornell University, which—unlike Harvard—allowed women to earn doctorates at the time.
Mamie Phipps Clark (1917–1983) was the first Black woman to be awarded a PhD in psychology from Columbia University. Her work, which she conducted with her husband Kenneth Bancroft Clark, examined the impact of prejudice and discrimination on child development. In particular, she explored how race recognition impacts a child’s self-esteem (Pickren & Burchett, 2014). Her husband held a faculty position at City University of New York, but she was never allowed to teach there. Instead, she found a job analyzing research data and eventually became executive director of the Northside Center for Child Development in upper Manhattan (Pickren & Burchett, 2014).

Thanks to trailblazers such as Calkins, Washburn, and Clark, the field of psychology is no longer dominated by men. In fact, about three quarters of students earning master’s degrees and PhDs in psychology are women, a statistic that suggests more men are needed in various subfields (Cynkar, 2007; Willyard, 2011). The situation remains lopsided in the job market as well; between 2012 and 2013, the psychology workforce showed an increase of almost 9% for women and a decrease of around 10% for men (APA, 2015a).

**Psychology’s Perspectives**

LO 4 List and summarize the major perspectives in psychology.

Some of the early schools of psychology had a lasting impact and others seemed to fade. Nevertheless, they all contributed to the growth of the young science. **Infographic 1.2** illustrates how these schools developed into perspectives that continue to shed light on the complex nature of human behavior.

**PSYCHOANALYTIC** Toward the end of the 19th century, while many early psychologists were investigating the “normal” functioning of the mind (in experimental psychology), Sigmund Freud (1856–1939), an Austrian neurologist, focused much of his attention on the “abnormal” aspects. Freud believed that behavior and personality are influenced by conflicts between one’s inner desires (such as sexual and aggressive impulses) and the expectations of society—clashes primarily occurring unconsciously or outside of awareness (Gay, 1988). This **psychoanalytic perspective** suggests that personality development is heavily influenced by processes of which we are unaware, and these processes become apparent early in life, and result from interactions with caregivers (Chapter 11). Freud also pioneered psychoanalysis, a new approach to psychotherapy, or “talk therapy” (Chapter 14). The psychoanalytic perspective is used as an explanatory tool in many of psychology’s subfields.

**BEHAVIORAL** As Freud worked on his new theories of the unconscious mind, a Russian physiologist named Ivan Pavlov (1849–1936) was busy studying canine digestion. During the course of his research, Pavlov got sidetracked by an intriguing phenomenon. The dogs he was studying were salivating in response to sights and sounds associated with food, such as the footsteps of a lab assistant coming to feed them. The type of learning that led to this response eventually became known as **classical conditioning** (Chapter 5). Building on Pavlov’s conditioning experiments, American psychologist John B. Watson (1878–1958) established **behaviorism**, which viewed psychology as the scientific study of behaviors that could be seen and/or measured. Consciousness, sensations, feelings, and the unconscious were not suitable topics of study, according to Watson.
Carrying on the behaviorist approach to psychology, American psychologist B. F. Skinner (1904–1990) studied the relationship between behaviors and their consequences. Skinner’s research focused on operant conditioning, a type of learning that occurs when behaviors are rewarded or punished (Chapter 5). Skinner acknowledged that mental processes such as memory and emotion might exist, but he did not believe such topics should be studied in psychology. To ensure that psychology was a science, he insisted on studying behaviors that could be observed and documented.

The behavioral perspective promoted by Watson and Skinner suggests that behaviors and personality are primarily determined by learning. People tend to repeat behaviors that lead to desirable consequences, and discontinue behaviors with undesirable consequences. According to this view, personalities are largely shaped by forces in the environment—that is, nurture. But twin studies suggest that nature also plays a pivotal role; the genes we inherit from our parents can have an important influence on the people we become (Polderman et al., 2015). You will witness the power of nature in the story of Sharon and Debbie.

**HUMANISTIC** American psychologists Carl Rogers (1902–1987) and Abraham Maslow (1908–1970) took psychology in yet another direction. These founders of humanistic psychology were critical of psychoanalysis and behaviorism, and the presumed lack of control people have over their lives. The humanistic perspective suggests that human nature is essentially positive, and that people are naturally inclined to grow and change for the better (Chapter 11) (Maslow, 1943; Rogers, 1961). Humanism challenged the thinking and practice of researchers and clinicians who had been “raised” on Watson and Skinner. Reflecting on the history of psychology, we cannot help but notice that new developments are often reactions to what came before. The rise of the humanistic perspective was, in some ways, a rebellion against the rigidity of psychoanalysis and behaviorism.

**COGNITIVE** During the two-decade prime of behaviorism (1930–1950), many psychologists only studied observable behavior. Yet prior to behaviorism, psychologists had emphasized the study of thoughts and emotions. The situation eventually came full-circle in the 1950s, when a new force in psychology brought these unobservable elements back into focus. This renewed interest in examining mental processes played an important role in the development of cognitive psychology (Wertheimer, 2012), and the work of another American, memory researcher George Miller (1920–2012), was an important catalyst for this cognitive revolution (Chapter 6). The cognitive perspective examines mental activities that direct behavior, focusing on processes such as thinking, memory, and language. The cognitive neuroscience perspective, in particular, explores the physiological underpinnings of mental processes, searching for connections between behavior and the human nervous system, especially the brain. With the development of brain-scanning technologies, cognitive neuroscience has flourished, interfacing with fields such as medicine, computer science, and psychology.

**EVOLUTIONARY** According to the evolutionary perspective, behaviors and mental processes are shaped by the forces of evolution. This perspective is based on Charles Darwin’s theory of evolution by natural selection. Darwin observed great variability in the characteristics of humans and other organisms. He believed these traits were shaped by natural selection, the process through which inherited traits in a given population either increase in frequency because they are adaptive or decrease in frequency because they are maladaptive. Humans have many adaptive traits and behaviors that appear to have evolved through natural selection. David Buss, currently a professor of psychology at the University of Texas at Austin, is one of the founders of evolutionary biology and the leading proponent of evolutionary psychology.
psychology. He and others have used the evolutionary perspective to explain a variety of personality traits, intelligence, and characteristics like risk-taking (Buss & Penke, 2015; Schultz & Schultz, 2016).

**BIOLOGICAL** The **biological perspective** uses knowledge about underlying physiology to explain behavior and mental processes. Psychologists who take this approach explore how biological factors, such as hormones, genes, and brain activities, are involved in behavior and cognition. Researchers study a diverse array of biological factors in relation to twins—everything from the genetic basis of physical fitness to the influence of hormones on the structure of children’s brains (Brouwer et al., 2015; Schutte, Nederend, Hudziak, de Geus, & Bartels, 2016). Chapter 2 provides a foundation for understanding this perspective as well as the field of neuroscience, which refers to the study of the brain and nervous system.

**SOCIOCULTURAL** The **sociocultural perspective** emphasizes the importance of social interactions and culture, including the roles we play. Russian psychologist Lev Vygotsky (1896–1934) proposed that we must examine how social and cultural factors influence the cognitive development of children (Chapter 8). With this realization, researchers such as Mamie Phipps Clark have studied how prejudice, segregation, and discrimination impact the development of the self (Pickren & Burchett, 2014).

In the past, researchers often assumed that the findings of their studies were applicable to people of all ethnic and cultural backgrounds. Then in the 1980s, cross-cultural research began to uncover differences that called into question the presumed universal nature of these findings. New studies revealed that Western research participants are not always representative of people from other cultures. Even being a part of a group within a culture can influence behavior and mental processes; thus, we need to take into account these various settings and subcultures.

**BIOPSYCHOSOCIAL** Many psychologists use the **biopsychosocial perspective**; in other words, they examine the biological, psychological, and sociocultural factors influencing behavior (Beauchamp & Anderson, 2010). The biopsychosocial perspective suggests that these factors are highly interactive: It’s not just the convergence of factors that matters, but the way they interact. This perspective is used by scientists in many fields, from psychologists studying the mental health of men (McDermott, Schwartz, & Rislin, 2016) to physicians treating patients with sickle-cell disease (Crosby, Quinn, & Kalinyak, 2015).

### In Class: Collaborate and Report

A) Identify a movie or television show that is familiar to all members of your group.  
B) Pick a scene that shows a character exhibiting inappropriate or risky behavior.  
C) Try to explain the behavior using at least two of the perspectives of psychology.

### COMBINING THE PERSPECTIVES

You can see that the field of psychology abounds with diversity. With so many perspectives (**Table 1.4**), how do we know which one is the most accurate and effective in achieving psychology’s goals? Human behavior is complex and requires an integrated or eclectic approach—using the findings of multiple perspectives—to explain its origins. In some cases, creating a theoretical **model** helps clarify a complex set of observations. Models
often enable us to form mental pictures of what we seek to understand. Many psychologists pick and choose among the various models and perspectives to explain and understand a given phenomenon. Remember this integrated approach as you learn more about Sharon and Debbie. What biological, psychological, social, and cultural factors could be used to explain their behaviors? How did these factors and others combine to form their overall experience?

**WHAT? I HAVE A TWIN?!** Sharon and Debbie went through 45 years of life with no knowledge of each other. Then one day in 1997, Debbie’s mother phoned with an important message: She was coming to visit, and she wanted to talk to Debbie alone, without her husband and daughter present. *What could this be about?* Debbie wondered. *Maybe she wants to talk with me about the family finances.* When her mother dropped the news about the adoption, Debbie was floored. So was her younger sister, who learned that weekend that she too was adopted. Debbie’s sister ended up hiring a private investigator who found Debbie’s birth mother and ultimately tracked down Sharon. It didn’t take long for Sharon to pick up the phone and call Debbie.

“Mom, your sister is on the phone,” Debbie’s daughter said in a soft, sweet tone. “I couldn’t understand why she was saying it like that,” recalls Debbie, who assumed it was her other (non-biological) sister calling. Debbie picked up the phone and heard a familiar voice on the line; it sounded exactly like her own, only with a Southern accent. “It was like Scarlett O’Hara was calling!” she laughs. The phone

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### TABLE 1.4 CURRENT PERSPECTIVES IN PSYCHOLOGY

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Main Idea</th>
<th>Questions Psychologists Ask</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychoanalytic</td>
<td>Underlying conflicts influence behavior.</td>
<td>How do unconscious conflicts affect behavior?</td>
</tr>
<tr>
<td>Behavioral</td>
<td>Behavior is learned primarily through associations, reinforcers, and observation.</td>
<td>How does learning shape behavior?</td>
</tr>
<tr>
<td>Humanistic</td>
<td>Humans are naturally inclined to grow in a positive direction.</td>
<td>How do choice and self-determination influence behavior?</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Behavior is driven by cognitive processes.</td>
<td>How do thinking, memory, and language direct behavior?</td>
</tr>
<tr>
<td>Evolutionary</td>
<td>Humans have evolved characteristics that promote survival and adaptation to the environment.</td>
<td>How does natural selection advance our behavioral predispositions?</td>
</tr>
<tr>
<td>Biological</td>
<td>Behavior and mental processes arise from physiological activity.</td>
<td>How do biological factors, such as hormones, genes, anatomy, and brain structures, influence behavior and mental processes?</td>
</tr>
<tr>
<td>Sociocultural</td>
<td>Other people, as well as the broader cultural context, influence behavior and mental processes.</td>
<td>How do culture and environment shape our behavior and attitudes?</td>
</tr>
<tr>
<td>Biopsychosocial</td>
<td>Behavior and mental processes are shaped by an interaction of biological, psychological, and sociocultural factors.</td>
<td>How do the interactions of biology, psychology, and culture influence behavior and mental processes?</td>
</tr>
</tbody>
</table>
conversation lasted 2 hours, and it would have gone on longer if Debbie hadn’t had a class to attend that evening.

Four days later, Sharon was on an airplane, traveling through an ice storm to meet Debbie in Harford, Connecticut. When Sharon stepped off the plane, the first thing Debbie noticed was her outfit: *Why didn’t she wear nicer clothes?* she wondered. Sharon saw that Debbie was all “duded up” with matching clothes and perfectly coiffed hair, and thought, *what a stick in the mud!* As Debbie puts it, “We were like so under-impressed with one another!”

But first impressions soon dissipated when the twins began talking. It was as if they were looking in the mirror, because they sounded and looked alike, swirling their hands around their faces just the same way. One of the twins made a joke about having “unibrows” (eyebrows that join in the middle) and they erupted in cackles. Their laughter even sounded identical. Studying Debbie’s face, Sharon saw her own eyes, cheekbones, laugh lines. “That’s my face, but on somebody else,” she recalls saying. “Don’t look at me. I can’t take it anymore!” And they just kept laughing.

### show what you know

1. Wilhelm Wundt’s research efforts all involved ______, which is the examination of one’s own conscious activities.
   a. functionalism  
   b. structuralism  
   c. reaction time  
   d. introspection

2. Your psychology instructor is adamant that psychologists should only study observable behaviors. She acknowledges consciousness exists, but insists it cannot be observed or documented, and therefore should not be a topic for psychological research. Which of the following perspectives is she using?
   a. psychoanalytic  
   b. behavioral  
   c. humanistic  
   d. cognitive

3. We have presented eight perspectives in this section. Describe how two of them are similar. Pick two other perspectives and explain how they differ.

### Science and Psychology

**PEAS IN A POD** Sharon stayed at Debbie’s house for the whole weekend. Before the visit, both twins worried they would have nothing more to discuss. *What more could we have in common?* they wondered. Once together, the twins could not get enough of each other. They visited Debbie’s synagogue, met her friends at work, and chattered late into the night, waking up Debbie’s husband with their laughter. It was the beginning of the relationship that would finally make each twin feel complete.

As Sharon and Debbie got to know each other, they discovered all sorts of common interests, habits, and traits. Both suffer from migraines, enjoy Motown music, and prefer hot tea over coffee. They are always running late, and set their watches 7 or 8 minutes ahead of time as a corrective measure. In terms of intellectual ability, both are avid readers but they struggle with math (in fact, their IQ scores are just 3 points apart). Sharon and Debbie married similar men, had one child, and spent much of their careers helping people with disabilities. It drives them crazy to hear people coughing, chewing, or blowing air out their noses, and they *hate* the feeling of bumping their heads on cabinet doors and other objects. Sharon was raised as a Christian, Debbie was brought up Jewish, and they are both passionate about their faith. Neither understood why their siblings, who grew up in the same household and attended the same church/synagogue, never took to religion in the same way. At one point, Sharon and Debbie entertained the idea of one
of them converting (Sharon to Judaism or Debbie to Christianity), but they decided against it. Ultimately, each twin respected the other for abiding by her conviction. And, thanks to their “weird sense of humor,” they were able to get over “the whole religion thing.”

Now that Sharon and Debbie have known each other for 19 years, they are extremely close—more than best friends. “We’re always thinking of each other,” says Debbie, who wishes she had a “mini me” of Sharon to carry around in her pocket all day. “We could be locked in a closet for the weekend, and we would have the best time ever,” Sharon says. Although Sharon lives in Birmingham, Alabama, and Debbie lives in West Hartford, Connecticut, they talk and text frequently, and visit as often as possible. When the twins are together, all they need to do is make eye contact and they know what the other is thinking. It’s as if they have some sort of “twin telepathy,” or ability to communicate without words or body language.

**THINK IT THROUGH**

**Does Twin Telepathy Exist?**

Some people believe that identical twins can communicate on a supernatural level, reading each other’s thoughts and emotions. They attempt to support their conviction with gripping anecdotal evidence: “Daisy and Denise finish each other’s sentences; they feel the same emotions; one time, Daisy broke her leg at soccer practice, and Denise had this eerie feeling her twin was in trouble even before she heard about the incident.” Many twins believe they have communicated with each other through telepathy, reporting they were able to know what was happening to their twin, without any form of “normal” communication occurring. Twins recall suffering from an injury or illness, and their twin responding in kind (for example, one twin fainted when the other twin was getting anesthetized for an operation). Twins also report remarkable coincidences such as giving birth on the same day or buying the same presents for each other (Brusewitz, Cherkas, Harris, & Parker, 2013).

Sounds like these twins are really in tune with each other, but does that mean they have telepathic powers? Call it what you will, but there is no compelling objective support for the existence of these types of psychic powers (Farha, 2007; Rouder & Morey, 2011). And Dr. Nancy L. Segal, professor of psychology at California State University, Fullerton, says there is no scientific evidence to suggest that twin telepathy exists. One of the world’s leading twin researchers, Dr. Segal has studied hundreds of identical twins, triplets, and quadruplets (including Sharon and Debbie), and witnessed the remarkable communication that can occur between them. How does Dr. Segal explain it?

“Identical twins have the same genes, and they respond to the world in many of the same ways,” Dr. Segal explains. “They process information in many similar ways, and they think a lot alike about most topics.” So when twins finish each other’s sentences, they are probably just thinking along parallel lines. Likewise, when twins select similar outfits or choose the same types of friends, they are expressing “tastes and preferences [that are] grounded in their similar biological makeup.”

If twin telepathy doesn’t exist, then why do some twins report that they can “sense” when their twin is in trouble? Like Sharon and Debbie, many twins spend a lot of time thinking about each other. “If you call your twin 10 times a day and think about your twin constantly, one of those times your twin will be in trouble,” Dr. Segal says. “We only hear about the hits; we never hear about the misses.”
What does Dr. Segal mean by “hits” and “misses”? “Hits” refer to the isolated events that support the notion of twin telepathy (the one time Twin #1 correctly guessed Twin #2 was in trouble). “Misses” are the many occasions that Twin #1 suspects Twin #2 was in danger, when in fact Twin #2 is perfectly fine. We don’t tend to hear about those “misses,” because they aren’t very interesting, and they don’t support the titillating idea that twins are telepathic. Paying attention to pieces of evidence that validate our beliefs, and ignoring those that contradict them, demonstrate a lack of critical thinking.

Critical Thinking

Critical thinking is the process of weighing various pieces of evidence, synthesizing them (putting them together), and determining how each contributes to the bigger picture. Critical thinking requires one to consider the source of information and the quality of evidence before deciding if it is valid. But critical thinking goes far beyond verifying the facts (Davies, 2015; Yancher, Slife, & Warne, 2008). The process involves thinking beyond definitions, focusing on underlying concepts and applications, and being open-minded and skeptical at the same time. Psychology is driven by critical thinking—disciplined thinking that is clear, rational, and accepting of new ideas. INFographic 1.1 shows how critical thinking is useful for tackling problems that may seem unrelated to psychology.

In your everyday life, you will encounter many examples of belief systems that present themselves as “psychological science” but lack critical thinking. They fall into the category of pseudopsychology, an approach to explaining and predicting behavior and events that appears to be psychology but is not supported by objective evidence. One familiar example is astrology, which uses a chart of the heavens called a horoscope to “predict” everything from the weather to romantic relationships. These predictions, however, have no scientific basis. Surprisingly, many people have difficulty distinguishing between pseudosciences, like astrology, and true sciences, even after earning a college degree (Impey, Buxner, & Antonellis, 2012; Schmaltz & Lilienfeld, 2014).

How then does astrology often seem to be accurate in its descriptions and predictions? Consider this excerpt from a monthly Gemini horoscope: “You could meet a lot of fascinating people and make many new friends as autumn begins. You could also take up a creative new interest or hobby” (Horoscope.com, 2014). If you really think about it, this statement could apply to just about any human being on the planet. We all are capable of starting new activities and meeting “fascinating” people or her own way?). How could you possibly prove such a statement wrong? You couldn’t. That’s why astrology is not science. A telltale feature of a pseudopsychology, like any pseudoscience, is its tendency to make assertions so broad and vague that they cannot be refuted (Stanovich, 2013).

Why can’t we use pseudopsychology to help predict and explain behaviors? Because there is no solid evidence for its effectiveness, no scientific support for its findings. Critical thinking is absent from the “pseudotheories” used to explain the pseudosciences (Rasmussen, 2007; Stemwedel, 2011, October 4).

The American Psychological Association (APA) views critical thinking as an essential skill for all undergraduate psychology majors. To achieve APA’s goal of Scientific Inquiry and Critical Thinking, students must be able to think critically about psychological claims, determine whether a source is objective and credible, and distinguish between real science and pseudoscience (APA, 2013a).
INFOGRAPHIC 1.1

Critical Thinking

What is critical thinking and why is it important? Being a critical thinker means carefully evaluating pieces of evidence, synthesizing them, and determining how they fit into the “big picture.” Critical thinkers maintain a healthy dose of skepticism, but they are also able to adjust their thinking if presented with contradictory evidence. Consider the issue of global warming: Do you think it’s real, and are human beings causing it?

Yet many people are not too worried about global warming, perhaps because they don’t grasp the severity of the problem:

(American Psychological Association, 2015).

Government officials consider human-caused climate change an “urgent and growing threat to our national security,” and warn of higher temperatures, rising sea levels, floods, droughts, and other natural disasters—events that could threaten agricultural productivity, set the stage for new disease outbreaks, and trigger conflicts (U.S. Department of Defense, 2015, July 23, p. 3).

97% of world’s leading climate scientists believe that greenhouse gas emissions generated by human activities, such as burning gasoline and coal, are driving the warming trend (Benestal et al., 2015).

Although you will develop your critical thinking skills in psychology class, they can be used in other contexts, from resolving everyday dilemmas, such as, “Why did I get such a mediocre grade after studying so hard?” to understanding global crises such as climate change.
Critical thinking is an invaluable skill, whether you are a psychologist planning an experiment or a student trying to earn a good grade in psychology class. Has anyone ever told you that choosing “C” on a multiple-choice question is your best bet when you don’t know the answer? There is little research showing this is the best strategy (Skinner, 2009). Accepting this type of advice without thinking critically can be a barrier to developing better strategies. Next time you’re offered a tempting bit of folk wisdom, think before you bite: Does objective evidence exist to support this claim? Can it be used to predict future events?

The Scientific Method

**LO 6** Describe how psychologists use the scientific method.

Critical thinking is an important component of the scientific method, the process scientists use to conduct research (see Infographic 1.2). The goal of the scientific method is to provide empirical evidence, or data from systematic observations or experiments. This evidence is often used to support or refute a hypothesis (hi-POTh-uh-sis), which is a statement that tests a prediction about the outcome of a study. An experiment is a controlled procedure involving scientific observations and/or manipulations by the researcher to influence participants’ thinking, emotions, or behaviors. In the scientific method, an observation must be objective, or outside the influence of personal opinion and preconceived notions. Humans are prone to errors in thinking, but the scientific method helps to minimize their impact.

Suppose a researcher is studying the core characteristics of how identical twins like Sharon and Debbie think, act, and feel. He could get a good sense of this by talking with them for several hours, but his impressions may differ from that of another researcher doing the same thing. A more objective approach would be to administer an objective personality test with a standard set of questions (true/false, multiple choice, circle the number) and an automated scoring system. The results of such a test do not depend on the researchers’ biases or expectations, and will be the same no matter who administers it.

Now let’s take a look at the five basic steps of the scientific method.

**STEP 1: DEVELOP A QUESTION** The scientific method typically begins when a researcher observes something interesting in the environment and comes up with a research question. Twin researcher Dr. Nancy L. Segal got the idea for her first twin study at a child’s birthday party. She noticed a pair of fraternal twins working on a puzzle together, fighting over it like mad, and wondered, *would identical twins cooperate better?* Her curiosity also stemmed from years of studying behavioral genetics and evolutionary theory—the work of scientists who had come before her. Reading books and articles written by scientists is an excellent way to generate ideas for new studies. (Refer to Infographic “How to Read a Scientific Article” on the inside front cover to

- **scientific method** The process scientists use to conduct research, which includes a continuing cycle of exploration, critical thinking, and systematic observation.
- **hypothesis** A statement that can be used to test a prediction.
- **experiment** A controlled procedure that involves careful examination through the use of scientific observation and/or manipulation of variables (measurable characteristics).
review how best to find and read an article; learning these skills will help you in psychology and many other classes.

**In Class: Collaborate and Report**

In your group, **A)** brainstorm areas of research that might involve twins. **B)** Connect to an online database through your college, public library, or Google Scholar. **C)** Search for journal articles, refining your search with appropriate key terms. **D)** Using APA style, create a reference list including at least two of the articles your team found.

### STEP 2: DEVELOP A HYPOTHESIS

Once a research question has been developed, the next step in the scientific method is to formulate a hypothesis, the statement used to test predictions about a study’s outcome. The data collected by the experimenter will either support or refute the hypothesis. Dr. Segal’s hypothesis was essentially the following: *When given a joint task, identical twins will cooperate more and compete less than fraternal twins.* Hypotheses can be difficult to generate for studies on new and unexplored topics, because researchers may not have fully developed expectations for the outcome; in these situations, a general prediction may take the place of a formal hypothesis. Researchers often turn to their favorite perspective(s) to guide the development of their hypotheses. What perspective do you think influenced Dr. Segal’s hypothesis?

While developing research questions and hypotheses, researchers should always be on the lookout for information that could offer explanations for the phenomenon they are studying. Dr. Segal based her hypothesis on behavioral genetics and evolutionary theory. **Theories** synthesize observations in order to explain phenomena, and they can be used to make predictions that can then be tested through research. Many people believe scientific theories are nothing more than unverified guesses or hunches, but they are mistaken (Stanovich, 2013). A theory is a well-established body of principles that often rests on a sturdy foundation of scientific evidence. Evolution is a prime example of a theory that has been mistaken for an ongoing scientific controversy. Thanks to inaccurate portrayals in the media, many people have come to believe that evolution is an active area of “debate,” when in reality it is a theory embraced by the overwhelming majority of scientists, including psychologists.

### STEP 3: DESIGN STUDY AND COLLECT DATA

Once a hypothesis has been developed, the researcher designs an experiment to test it and then collects the data. Dr. Segal’s study involved videotaping sets of identical and fraternal twin children working on a puzzle together. She included only those twins who had very similar IQs. As she explains, “I wanted the kids to be more or less matched in ability, because I didn’t want the smarter kid taking over the whole activity.” Once the instructions were given (“Complete the puzzle together”), the children were free to solve the puzzle as they wished (Segal, 1984, p. 94). Later, looking at the videos, Dr. Segal and her colleagues rated the children using all sorts of “indices of cooperative behavior.” For example, the researchers looked to see if the twins were equally involved, how often they handed each other pieces, whether they physically leaned on one another, pushed or hit. They even tallied up the number of facial expressions each twin displayed (for example, sadness, surprise, and pride).

Researchers must establish **operational definitions** that specify the precise manner in which the characteristics of interest are defined and measured. A good operational definition helps others understand how to perform an observation or take a measurement. In the example above, Dr. Segal may have operationally defined *cooperative behavior* based on how often twins handed each other puzzle pieces, how long they spent leaning on one another, or the number of times they smiled.

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**theory** Synthesizes observations in order to explain phenomena and guide predictions to be tested through research.

**operational definition** The precise manner in which a variable of interest is defined and measured.

*It’s in the Data*

Neurologist Richard D. King uses neuroimaging technologies to study brain changes associated with neurodegenerative diseases, such as Alzheimer’s. His research involves complex data analysis (King et al., 2009). Cheryl Diaz Meyer/Newscom/Tribune News Service/DALLAS/TX/USA.
Gathering data must be done in a very controlled fashion to ensure there are no errors, which could arise from recording problems or from unknown environmental factors. We will address the basics of data collection later in the chapter.

**STEP 4: ANALYZE THE DATA**  The researcher now has data that need to be analyzed, or organized in a meaningful way. As you can see from Figure 1.3, rows and columns of numbers are just that, numbers. In order to make sense of the “raw” data, one must use statistical methods. *Descriptive statistics* are used to organize and present data, often through tables, graphs, and charts. *Inferential statistics*, on the other hand, go beyond simply describing the data set, allowing researchers to make inferences and determine the probability of events occurring in the future (for a more in-depth look at statistics, see Appendix A).

Once the data have been analyzed, the researcher must ask several questions: Did the results support the hypothesis? Were the predictions met? In Dr. Segal’s case, the results supported her hypothesis: “The identicals were more cooperative on almost every index that I used,” she says. “My conclusion was that yes, identical genes do underlie greater cooperation between partners.”

Next, the researcher evaluates her hypothesis, rethinks her theories, and possibly designs a new study. This procedure is an important part of the scientific method because it enables us to think critically about our findings. If these ideas are worth pursuing, the researcher could develop a new hypothesis and embark on a study to test it. You can see the cyclical nature of the scientific method illustrated in Infographic 1.2.

**STEP 5: PUBLISH THE FINDINGS**  Once the data have been analyzed and the hypothesis tested, it’s time to share findings with other researchers who might be able to build on the work. This typically involves writing a scientific article and submitting it to a scholarly, peer-reviewed journal. Journal editors send these submitted manuscripts to subject-matter experts, or peer reviewers, who carefully read them and make recommendations for publishing, revising, or rejecting the articles altogether.

The peer-review process is notoriously meticulous, and it helps provide us with more certainty that findings from research can be trusted. This approach is not foolproof, of course. There have been cases of fabricated data slipping past the scrutiny of peer reviewers. In some cases, these oversights have had serious consequences for the general public. Case in point: the widespread confusion over the safety of routine childhood vaccines.

In the late 1990s, researchers published a study suggesting that vaccination against infectious diseases caused autism (Wakefield et al., 1998). The findings sparked panic among parents, some of whom shunned the shots, putting their children at risk for life-threatening infections such as the measles. The study turned out to be fraudulent and the reported findings were deceptive, but it took 12 years for journal editors to retract the article (Editors of The Lancet, 2010). One reason for this long delay was that researchers had to investigate all the accusations of wrongdoing and data fabrication (Godlee, Smith, & Marcovitch, 2011). The investigation included interviews with the parents of the children discussed in the study, which ultimately led to the conclusion that the information in the published account was inaccurate (Deer, 2011).

Since the publication of that flawed research, several high-quality studies have found no credible support for the autism-vaccine hypothesis (Honda, Shimizu, & Rutter, 2005; Jain et al., 2015; Madsen et al., 2002). Still, the publicity given to the original article continues to cast a shadow: Many parents continue to refuse vaccines for their children, with serious consequences. Measles outbreaks involving unvaccinated children have occurred in various parts of the United States in recent years (Chen, 2014, June 26; Palmer, 2015, January 26).

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**FIGURE 1.3**

**Raw Data**

The information in this figure comes from a data file. Until the researcher analyzes the data, these numbers will have little meaning.
The Scientific Method

Psychologists use the scientific method to conduct research. The scientific method allows researchers to collect empirical (objective) evidence by following a sequence of carefully executed steps. In this infographic, you can trace the steps taken in an actual research project performed by two psychologists who were interested in the effect of “counting your blessings” (Emmons & McCullough, 2003). Notice that the process is cyclical in nature. Answering one research question often leads researchers to develop additional questions, and the process begins again.

To develop a question, a researcher will:
- observe the world around him;
- identify a personally interesting topic;
- review scientific literature on this topic.

The researchers see an article suggesting happiness is related to greater overall health. The researchers think about their own study and wonder:

- Does counting your blessings also lead to better overall health?

A researcher organizes and analyzes the data and determines whether the hypothesis is supported.

A researcher plans a well-controlled study. Data are collected when the study is performed.
- A design can be experimental or descriptive.
- Data are collected using controlled measurement techniques.

To develop a hypothesis (a testable prediction), a researcher will:
- look for existing theories about the topic;
- establish operational definitions to specify variables being studied.

Group 1 participants reported significantly greater well-being than other groups. Researchers conclude that people who count their blessings feel better about their lives as a whole.

The researchers write an article titled, “Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life.” It is published in the Journal of Personality and Social Psychology.

People who think about positive events in their lives will report greater psychological well-being than people who think about negative events.

The peer-review process serves as a safeguard against fraud and inaccuracies, but it is not always successful, and problematic findings make their way into peer-reviewed journals. About once a day an article is retracted, the result of plagiarism, data meddling, and other forms of inappropriate behavior, and retractions occur more often in top journals than in lower-profile ones (Marcus & Oransky, 2015, May 22).

Publishing an article is a crucial step in the scientific process because it allows other researchers to replicate an experiment, which might mean repeating it with other participants or altering some of the procedures. This repetition is necessary to ensure that the initial findings were not just a fluke or the result of a poorly designed experiment. The more a study is replicated and produces similar findings, the more confidence we can have in those findings.

In the case of Wakefield's fraudulent autism study, other researchers tried to replicate the research for over 10 years, but could never establish a relationship between autism and vaccines (Godlee et al., 2011). This fact alone made the Wakefield findings highly suspect.

**ASK NEW QUESTIONS** Most studies generate more questions than they answer, and here lies the beauty of the scientific process. The results of one scientific study raise a host of new questions, and those questions lead to new hypotheses, new studies, and yet another collection of questions. This continuing cycle of exploration uses critical thinking at every step.

1. We all hold opinions about various issues and events in our environments, but how are those opinions different from theories?

2. A researcher identifies affection between partners by counting the number of times they gaze into each other's eyes while in the laboratory waiting room. The cutoff for those who would be considered very affectionate partners is gazing more than 10 times in 1 hour. The researcher has created a(n) ________ of affection.
   a. theory
   b. hypothesis
   c. replication
   d. operational definition

3. A ________ synthesizes observations to try to explain phenomena, and we can use it to help make predictions.
   a. theory
   b. hypothesis
   c. descriptive statistic
   d. peer-reviewed journal

**Research Basics**

**SHARON AND DEBBIE’S RESEARCH ADVENTURE**

Three months after meeting, Sharon and Debbie became participants in the monumental Minnesota Study of Twins Reared Apart (MISTRA). The study, led by Dr. Thomas J. Bouchard, Jr., spanned two decades and included 137 sets of twins (identical and fraternal) that had been separated at a young age and raised in different families (Segal, 2012). This unique population provided researchers with what they referred to as the “simplest and most powerful method for disentangling the influence of environmental and genetic factors on human characteristics” (Bouchard et al., 1990, p. 223)—that is, an excellent way to study how nature and nurture interact to produce the people we are. The MISTRA produced a wealth of data about many physical and psychological characteristics. For example, the researchers reported that the genes we inherit from our parents have a strong influence on our intelligence (Bouchard et al., 1990). But personality, they concluded, results from a more balanced interplay of nature and nurture: “Our analyses indicate that, on average, about 50% of measured personality diversity can be attributed to genetic diversity” (Tellegen et al., 1988, p. 1035). As you will read in later chapters, some of these early findings have been supported, while others have been called into question by more recent studies.

**You Asked, Sharon and Debbie Answer**

http://qrs.ly/di3m66y

Did differences in your upbringing account for differences in your personalities?

**replicate** To repeat an experiment, generally with a new sample and/or other changes to the procedures, the goal of which is to provide further support for the findings of the first study.

Scan this

Participating in the Minnesota twin study was an eye-opening experience for Sharon and Debbie. Not only did they learn what it means to participate in research; they realized the extent to which they think alike and respond to situations in the same way. During their one-week stay in Minnesota, the twins were submitted to a battery of medical and psychological tests—dental exams, lung function tests, questionnaires about job satisfaction, sleeping patterns, sexual behaviors, and many other assessments. In all, each twin answered approximately 15,000 questions (Segal, 2012). As Sharon and Debbie filled in bubbles and checked boxes, they began to wonder if all the surveys and inventories were really just a front for studying something else. Maybe the researchers were administering tests they never intended to evaluate, and their real goal was to observe how the twins responded to the test situation—through their facial expressions, body language, and comments. Both twins developed this suspicion independently, before mentioning anything to the other. Then one night, they got back to their motel room, turned on the water so no one could hear them talking, and began checking the room for cameras, bugs, and one-way mirrors (the twins agree that a life of espionage would have suited them quite well!). Their detective work produced no evidence that someone was spying on them. As it turns out, the researchers were simply investigating the factors, or variables, they claimed to be studying.

Research on twins has provided psychologists with a wealth of information on psychological traits. Let’s see how one expert uses twin research to explain the origins of selfishness.

Variables

Virtually every psychology study includes variables, which are measurable characteristics that vary, or change, over time or across people. In chemistry, a variable might be temperature, mass, or volume. In psychological experiments, researchers study a variety of characteristics relating to humans and other organisms. Examples of variables include personality characteristics (shyness or friendliness), cognitive characteristics (memory), number of siblings in a family, gender, and socioeconomic status. The Minnesota twin study examined a vast quantity of variables, among them cholesterol. Sharon and Debbie expected their cholesterol levels to be quite different because Sharon, a self-proclaimed couch potato, contends that Debbie is an “exercise-aholic.” At the time of the test, Debbie was also on a macrobiotic diet, so she seemed to be “the healthier twin.” When the results of the blood test came back, the twins were shocked: Their cholesterol levels were the same!

Often researchers are interested in exploring relationships between variables. In many experiments, the goal is to see how changing one variable affects another. A researcher might be interested in finding out how changes in cholesterol levels are linked to cognitive performance: Do people with high cholesterol face a greater risk of developing dementia? Researchers have studied this very topic, and there does seem to be a link (Wendell, Waldstein, & Zonderman, 2014). Once the variables for a study are chosen, the researcher must create operational definitions with precise descriptions and manners of measurement.

Population and Sample

How do researchers decide who should participate in their studies? It depends on the population, or overall group, the researcher wants to examine. If the population is large (all college students in the United States, for example), then the researcher selects a subset of that population called a sample.
Are People Inclined to Act Cooperatively or Selfishly? Is Such Behavior Genetic?

The jury is still out on whether we are fundamentally generous or greedy and whether these tendencies are shaped by our genes or environment.

Some evidence points to humans being innately cooperative. Studies show that in the first year of life, infants exhibit empathy toward others in distress. At later stages in life, we routinely work together to reach goals and help out in times of need.

Yet instances of selfish behavior also abound in society. One recent study used a version of the classic Prisoner’s Dilemma, which can test people’s willingness to set aside selfish interests to reach a greater good. After modeling different strategies and outcomes, the researchers found that being selfish was more advantageous than cooperating. The benefit may be short-lived, however. Another study showed that players who cooperated did better in the long run.

It seems that human nature supports both prosocial and selfish traits. Genetic studies have made some progress toward identifying their biological roots. By comparing identical twins, who share nearly 100 percent of their genes, and fraternal twins, who share about half, researchers have found overwhelming evidence for genetic effects on behaviors such as sharing and empathy. In these twin studies, identical and fraternal twins are placed in hypothetical scenarios and asked, for example, to split a sum of money with a peer. Such studies often also rely on careful psychological assessments and DNA analysis.

Other work highlights specific genes as key players. My colleagues and I recently identified a gene linked to altruistic behavior and found that a particular variant of it was associated with more selfish behavior in preschoolers.

As for how we might have acquired a genetic blueprint for collaboration, evolutionary scientists offer several explanations. Cooperative behavior may have evolved first among relatives to promote the continuation of their genetic line. As communities diversified, such mutual support could have broadened to include individuals not linked by blood. Another possibility is that humans cooperate to gain some advantage, such as a boost in reputation. Finally, a hotly debated idea is that evolutionary processes take place at the group level. Groups of highly cooperative individuals have higher chances of survival because they can work together to reach goals that are unattainable to less cooperative groups.

Yet almost no behavior is entirely genetic, even among identical twins. Culture, school, and parenting are important determinants of cooperation. Thus, the degree to which we act cooperatively or selfishly is unique to each individual and hinges on a variety of genetic and environmental influences. Ariel Knafo.

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There are many methods for choosing a sample. One way is to pick a random sample, that is, theoretically any member of the designated population has an equal chance of being selected to participate in the study. A researcher forming a random sample of high school seniors might try to gain access to SAT or ACT databases and then randomly select students from lists compiled by those test companies. Or if your doctor orders a blood test, the lab doesn’t remove all of your blood to run these tests; rather, it takes a small sample. What is true within a representative sample will likely be true of the whole.

Think about the problems that may occur if a sample is not random. Suppose a researcher is trying to assess attitudes about undocumented workers living in the United States, but the only place she recruits participants is Nevada, the state with the highest population percentage of undocumented immigrants (Pew Research Center, 2014, November 18). How might this bias her findings? Nevada residents do not constitute a representative sample, or group of people with characteristics similar to those of the population of interest (in this case, the entire U.S. population).

It is important for researchers to choose representative samples, because this allows them to generalize their findings, or apply information from a sample to the population of interest.
the population at large. Let’s say that 44% of the respondents in the study on attitudes toward undocumented workers believe current immigration laws are acceptable. If the sample was similar enough to the overall U.S. population, then the researcher may be able to infer that this finding from the sample is representative: “Approximately 44% of people in the United States believe that current immigration laws are acceptable.”

**Representative Sample?**
People gather on the National Mall in Washington, D.C., to advocate for immigration reform. If a researcher aims to understand American attitudes about immigration, she would be foolish to limit her study to a single state, because immigrant populations vary significantly across the country (Pew Research Center, 2014, November 18). Douglas Graham/Roll Call/Getty Images.

The topics we have touched on thus far—variables, operational definitions, and samples—apply to psychology research in general. You will see how these concepts are relevant to studies presented in the upcoming sections when we explore the two major categories of research design: descriptive and experimental.

**In Class: Collaborate and Report**
A) Compare representative samples to random samples. B) In your group, discuss why it is so important to have a representative sample, and C) what can happen when a sample is not representative of the population. D) Generate a list of characteristics that a researcher should consider when designing a study on the attitudes of monozygotic and dizygotic twins. In other words, pinpoint the variables that should be measured to ensure the sample is representative.

**show what you know**
1. A researcher is interested in studying college students' attitudes about banning supersized sodas. She randomly selects a group of students from across the nation, trying to pick a _______ that will closely reflect the characteristics of college students in the United States.
   a. variable  
   b. debriefing  
   c. representative sample  
   d. representative population

2. Psychology studies focus on ________, which are characteristics that vary or change over time or across people.

3. If a researcher was interested in studying the relationship between GPA and hours of study, how might he pick a random sample from your college?

**Descriptive Research**

**LO 8** Recognize the forms of descriptive research.

Talking on the phone with both Sharon and Debbie can be a bit confusing. Because their voices sound so much alike, you find yourself falling behind in the conversation and wondering *who just said that?* When you try to catch up, Sharon and Debbie are already 10 steps ahead, laughing about a new topic. Their communication is so effortless, their chemistry so perfect, it’s easy for an outsider to get lost. But after a while, you start getting a sense of each twin, as each has a slightly different style of conveying information. Both women are open and direct, but Sharon tends to “spill it out”; she says what’s on her mind. Debbie seems slightly more reserved, a bit more deliberate about choosing her words.

Given that these women started life as genetically identical, you begin to wonder about the sources of their differences. When did these disparities emerge, and what environmental factors shaped them? It would be fascinating to travel back in time and observe Sharon and Debbie as little girls playing with friends, interacting with family, and studying at school. If only time travel were possible, there would be endless opportunities for a psychologist to use **descriptive research methods** to study their differing childhoods. **Descriptive research** is a type of investigation psychologists use to explore a phenomenon. It is primarily concerned with describing, and is useful for studying new or unexplored topics when researchers might not have specific
expectations about outcomes. But there are some things descriptive research cannot achieve. This method provides clues about the causes of behaviors, but it cannot reveal cause-and-effect relationships, a point we will revisit later in the chapter. But first, let’s explore four descriptive research methods.

**Naturalistic Observation**

One form of descriptive research is **naturalistic observation**, which involves studying participants in their natural environments using systematic observation. And when we say “natural environments,” we don’t necessarily mean the “wild.” It could be an office, a home, or even a preschool. In one naturalistic study, researchers explored the interactions that occurred when parents dropped off their children at preschool. One variable of interest was the length of time it took parents to leave the children at school. The researchers found that the longer parents or caregivers took to leave, the less time the children played with their peers and the more likely they were to stand by and watch other kids playing. The researchers also noted that women were somewhat more likely than men to hold the children and physically pick them up during drop-off. These drop-off interactions seemed to get in the way of children “settling into” the classroom (Grady, Ale, & Morris, 2012).

The most important feature of naturalistic observation is that researchers do not disturb the participants or their environment. Why? Imagine you were a participant in the naturalistic observation of families dropping off preschoolers. Researchers have been deployed throughout your child’s preschool, and every time you walk through the doors, you feel as if you’re under surveillance. Parking your car, you spot a researcher peeping at you from behind a tree; at the front office, you catch another one videotaping you. It would be extremely difficult for most people to behave naturally under these circumstances. It is important for researchers to be unobtrusive so participants don’t change their normal behaviors.

**NATURALLY, IT’S A CHALLENGE** As with any type of research, naturalistic observation centers around variables, and those variables must be pinned down with operational definitions. Let’s say a researcher wants to study aggression in identical twins reared apart—an intriguing topic given that both genes and environment seem to set the stage for aggressive behavior in children (Lacourse et al., 2014). The researcher might try to find pairs of identical twin children who have been adopted by different families (an unlikely opportunity, we should note). These twins are therefore equivalent in nature, but differ in nurture. At the beginning of the study, the researcher would need to operationally define aggression, including detailed descriptions of specific behaviors that illustrate it. Then the researcher might create a checklist of aggressive behaviors like shouting and pushing, and a coding system to help keep track of them.

Naturalistic observation allows psychologists to observe participants going about their business in their normal environments, without the disruptions of artificial laboratory settings. Some problems arise with this arrangement, however. Natural environments are cluttered with a variety of unwanted variables, and removing them can alter the natural state of affairs the researchers are striving to maintain. And because the variables in natural environments are so hard to control, researchers may have trouble replicating findings. Suppose the researcher opted to study the behavior of the identical twin children playing at the park. In this natural setting, she would not be able to control how many children are at the playground, the ages of the kids present, or the type of adult supervision occurring.

**OBSERVER BIAS** How can we be sure observers will do a good job recording behaviors? A researcher who is a mother to four boisterous children (and thus might
be familiar with typical displays of childhood aggression) may not rate behaviors in the same way as someone who has no experience with kids. One way to avoid such problems is to include multiple observers and then determine how similarly they record the behaviors. If the observers don’t execute this task in the same way, there may be **observer bias**, which refers to errors introduced as a result of an observer’s value system, expectations, and attitudes.

**Case Study**

Another type of descriptive research method is the **case study**, a detailed examination of an individual or small group. Case studies typically involve collecting a vast amount of data on one person or group, often using multiple avenues to gather information. The process might include in-depth interviews with the person being studied and her friends, family, and coworkers, and questionnaires about medical history, career, and mental health.

The goal of a case study is to provide a wealth of information from a variety of resources. Unlike naturalistic observation, where the researcher assumes the role of detached spectator, the case study may require complete immersion in the participant’s environment. How do you think this might impact the researcher’s observations and the conclusions of the study?

One of the most fascinating case studies in the history of twin research is that of the “Jim Twins.” Identical twins Jim Springer and Jim Lewis were separated shortly after birth and reunited at age 39. When the Jims finally met, they discovered some jaw-dropping similarities: Both were named “James” by their adoptive parents and gravitated toward math and carpentry as kids. Each man had a dog named “Toy,” a first wife named “Linda,” and a second wife named “Betty.” They even smoked the same cigarettes (Salems), drove the same blue Chevy, and traveled to the same vacation spot in Florida (Leo, 1987, January 12; Rawson, 1979, May 7; Segal, 2012). The Jim Twins captivated the interest of Dr. Bouchard, lead researcher of the Minnesota twin study. According to Dr. Segal, who worked with Dr. Bouchard for many years, the reunion of the Jims “was ultimately responsible for the launch of MISTRA” (Segal, 2012, p. 10). See **Table 1.5** on page 29 for other examples of classic case studies, many of which we will examine in later chapters.

No matter how colorful or thought-provoking a case study may be, it cannot be used to support or refute a hypothesis (Stanovich, 2013). Hypothesis testing involves drawing comparisons between different conditions (Stanovich, 2013), and this is not possible with a case study. Like naturalistic observation, this method is useful for furthering the development of theories, but it cannot identify the causes of behaviors and events. Case studies can help guide the design of studies on relatively underexplored topics (Stanovich, 2013), such as the health and behavior of an astronaut on a space mission compared to his identical twin back on Earth (Gushanas, 2015, October 7). But as knowledge advances and researchers become more concerned with testing hypotheses, the case study grows increasingly irrelevant.

Case studies are isolated examples, so be wary of using them to make generalizations. Suppose you are trying to examine how parent–child interactions at home might relate to preschoolers’ transitions during morning drop-off. What would happen if you limited your research to a case study of a family with two working parents and 10 children? The dynamics of this family may not be representative of those in other families. We should not make sweeping or definitive statements based on our observations of a single person or group.

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**Observer Bias**

Errors in the recording of observations, the result of a researcher’s value system, expectations, or attitudes.

**Case Study**

A type of descriptive research that closely examines an individual or small group.

**Survey Method**

A type of descriptive research that uses questionnaires or interviews to gather data.

---

[Image: Twinsters] The film **Twinsters** tells the story of Samantha Futerman and Anais Bordier, identical twins who were separated at birth and reunited with the help of YouTube and Facebook. The twins were born in South Korea and adopted by families from different cultures (Anais was raised in France, Samantha in the United States). The rare circumstances of their situation make them wonderful candidates for a case study. Dr. Nancy L. Segal and her colleague Franchesca Cortez studied Anais and Samantha and found both “striking similarities and intriguing differences” between them (Segal & Cortez, 2014, p. 97). Rex Features via AP Images.
Summarized here are some of the most colorful case studies in the history of psychology. These classic case studies have provided psychologists with valuable insights into human behaviors, and you will read about many of them in the chapters to come.

**Survey Method**

One of the fastest ways to collect descriptive data is the **survey method**, which relies on questionnaires or interviews. A survey is basically a series of questions that can be administered on paper, in face-to-face interviews, via telephone, or through a few mouse clicks. Your college might send out surveys to gauge student attitudes about new online classes and e-books (possible questions on a college survey might include, “How often do you encounter technical difficulties with your online courses?” or “How would you rate your overall satisfaction with an assigned e-book?”). The benefit of the survey method is that one can gather data from numerous people in a short period of time. Surveys can be used alone or in conjunction with other research methods.

**WORDBING AND HONESTY** Like any research design, the survey method has its limitations. The wording of surveys can lead to biases in responses. A question with a positive or negative spin may sway a participant’s response one way or the other: Do you prefer a half-full glass of soda or a half-empty glass of soda? Figure 1.4 shows how the wording of a survey can influence participant responses.

More importantly, participants in studies using the survey method are not always forthright in their responses, particularly when they have to admit to things they are uncomfortable discussing face-to-face. In short, people lie. In one study, psychologists asked thousands of American women if they had ever cheated on their husbands. When a researcher questioned them in person, 1% of the wives admitted cheating; but when asked through a computer-based questionnaire, 6% confessed their infidelity (Whisman & Snyder, 2007). Gender and the threat of getting caught may influence one’s tendency to lie. In another study, male and female college students were

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**TABLE 1.5 CLASSIC CASE STUDIES IN PSYCHOLOGY**

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Description</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phineas Gage</td>
<td>A railroad worker who survived after an iron rod blasted through his skull</td>
<td>Suggested the role that frontal lobes play in personality</td>
</tr>
<tr>
<td>H.M.</td>
<td>A man who suffered from profound memory loss following brain surgery</td>
<td>Showed how brain damage can be linked to memory loss</td>
</tr>
<tr>
<td>Little Albert</td>
<td>An 11-month-old who was conditioned to fear rats</td>
<td>Revealed the ability to classically condition fear in humans</td>
</tr>
<tr>
<td>The Genain Quadruplets</td>
<td>Identical quadruplet sisters who all developed schizophrenia</td>
<td>Demonstrated that a genetic factor is involved in schizophrenia</td>
</tr>
<tr>
<td>“Rat Man”</td>
<td>A man with obsessive thoughts, including a punishment involving rats</td>
<td>Exemplified a case study on which Sigmund Freud based his theories</td>
</tr>
<tr>
<td>Lorenz’s Geese</td>
<td>Goslings that became attached to Konrad Lorenz</td>
<td>Documented the imprinting phenomenon</td>
</tr>
</tbody>
</table>

---

"87% of the 56% who completed more than 23% of the survey thought it was a waste of time."
FIGURE 1.4 It Depends How You Ask

In a classic study, researchers asked two versions of the same question:

(A) Do you think the United States should allow public speeches against democracy?

(B) Do you think the United States should forbid public speeches against democracy?

Answering “no” to Question A should be the same as answering “yes” to Question B. However, far more respondents answered “no” to Question A than answered “yes” to Question B. According to the researchers, “the ‘forbid’ phrasing makes the implied threat to civil liberties more apparent” than the “not allow” phrasing does (Rugg, 1941, p. 91). And that’s something fewer people were willing to support.

SKIMMING THE SURFACE Another disadvantage of the survey method is that it tends to skim the surface of people’s beliefs or attitudes, failing to tap into the complex issues underlying responses. Ask 1,000 people if they intend to exercise regularly, and you might get more than a few affirmative responses. But yes might mean something quite different from one person to the next (“Yes, it crosses my mind, but I can never go through with it”) versus “Yes, I have a specific plan, and I have been able to follow through”). To obtain more precise responses, researchers often ask people to respond to statements using a scale that indicates the degree to which they agree or disagree (for example, a 5-point scale ranging from strongly agree to strongly disagree), or the degree to which they have had an experience (for example, a 5-point scale ranging from never to almost always).

REPRESENTATIVE SAMPLES AND SURVEYS The representativeness of survey samples can also be called into question. Some surveys fail to achieve representative samples because their response rates fall short of ideal. If a researcher sends out 100 surveys to potential participants and only 20 people return them, how can we be sure that the answers of those 20 responders reflect those of the entire group? Without a representative sample, we cannot generalize the survey findings.

Correlational Method

The final form of descriptive research we will cover is the correlational method, which examines relationships among variables and assists researchers in making predictions. When researchers collect data on many variables, it can be useful to determine if these variables are related to each other in some way. A correlation is a relationship or link between variables. For example, there is probably a correlation between the amount of time Sharon and Debbie spend interacting, and the amount of knowledge they possess about one another. The more they talk on the phone and visit, the more they learn about each other’s lives. This is an example of a positive correlation. As one variable increases, so does the other. A negative correlation, on the other hand, means that as one variable goes up, the other goes down (this is an inverse or negative relationship). A good example would be the number of hours Sharon and Debbie talk and text on their cell phones during the day, and the amount of battery power remaining on their phones. As phone usage increases, battery power goes down. You have probably noticed correlations between variables in your own life. Increase the hours you devote to studying, and you will likely see your grades go up (a positive correlation). The more you hold a baby, the less she cries (a negative correlation).

Synonyms

**correlation coefficient**  Pearson’s correlation coefficient

**correlational method** A type of descriptive research examining the relationships among variables.

**correlation** An association or relationship between two (or more) variables.

**correlation coefficient** The statistical measure (symbolized as $r$) that indicates the strength and direction of the relationship between two variables.
INFOGRAPHIC 1.3

The Correlation Coefficient: What’s in a Number?

A correlation indicates a relationship between two variables, such as the amount of time you spend studying and the grade you get on a test. This relationship is often indicated using a correlation coefficient, symbolized as \( r \). To interpret the relationship using a correlation coefficient (\( r \)), ask yourself two questions:

1. What is the direction of the relationship?
2. What is the strength of the relationship?

A scatterplot helps us see what the relationship looks like.

And remember, a correlation between two variables does not necessarily mean that one variable caused the change in the other variable.

\[ r = +.73 \]

What does the Correlation look like?

Using a scatterplot, we can express the relationship between two variables. One variable is labeled on the horizontal axis, and the second variable is labeled on the vertical axis. Each dot represents one participant’s scores on the two variables. Notice how the shape of the graph changes depending on the direction and strength of the relationship between the variables.

What Is the Direction of the Correlation?

- **positive (\(+\)**) correlation: as one variable increases, the other also increases
- **negative (\(-\)**) correlation: as one variable increases, the other decreases (an inverse relationship)

Example: +.73 is a positive number, showing a positive correlation. As hours spent studying increase, test grades also increase.

What Is the Strength of the Correlation?

- strength ranges from +1.00 to -1.00
  - a value close to +1.00 or -1.00 is a strong correlation
  - a value close to 0.00 is a weak correlation

Example: +.73 is close to 1.00. This shows a strong correlation between hours spent studying and test grades.

BEWARE of the potential Third Variable

Correlation does not indicate that one variable causes a change in the other. A third variable may have influenced the results.

Example: Although time spent studying and exam grades are strongly and positively correlated, attendance is another variable. Students who attend classes regularly tend to spend more hours studying. Likewise, students who attend classes regularly know what to expect on the test and are therefore likely to get better grades.

Credits: Push Pin Note, PicsFive/Veer; Push Pin note paper, PicsFive/New; Blank yellow sticky note, Stocksy Photography/stocksy.
range from +1.00 to –1.00, with positive numbers indicating a positive relationship between variables and negative numbers indicating an inverse relationship between variables. The closer \( r \) is to +1.00 or to –1.00, the stronger the relationship. The closer \( r \) is to .00, the weaker the relationship. When the correlation coefficient is very close to zero, there may be no relationship at all between the variables. For example, consider the variables of shoe size and intelligence. Are people with bigger (or smaller) feet more intelligent? Probably not. There would be no link between these two variables, so the correlation coefficient between them (the \( r \) value) is around zero. Take a look at Infographic 1.3 to see how correlation coefficients are portrayed on graphs called scatterplots.

**THIRD VARIABLE** Even if there is a very strong correlation between two variables, this does not indicate a causal link exists between them. No matter how high the \( r \) value is or how logical the relationship seems, it does not prove a cause-and-effect connection. Researchers consistently report a positive relationship between exposure to violence in media and aggressive behavior, and it’s easy to jump to the conclusion that the exposure causes the aggression (Bushman et al., 2016). It is also important to consider that some other variable may be influencing both exposure to media violence and aggressive behavior. What additional variables might “cause” increases or decreases in aggression? One possibility is parenting behaviors; limiting the content and amount of exposure children have to violent media is associated with a decrease in aggressive behavior (Bushman et al., 2016). When parents actively discuss the portrayal of media violence with their children, aggression tends to decrease as well (Coyne, 2016). Parenting style therefore would be considered a third variable, some unaccounted for characteristic of the participants or their environment that explains the changes in the two other variables (parent involvement influences both exposure to violence and aggressive behaviors). When you observe strong links between variables, consider other factors that could be related to both.

Now let’s consider the direction of the relationship between variables. With a positive correlation between exposure to violent media and aggressive behavior, you might have assumed that exposure leads to aggression. The more violent video games a child plays, the more aggressive he is. But could it be that aggressive children are more likely to be attracted to violent video games in the first place? If this is the case, then aggressive tendencies influence the amount of time spent using violent media, not the other way around. The direction of the relationship (directionality) matters. And in the case of exposure to violent media and aggressive behaviors, the causal direction can go both ways (Coyne, 2016).

Remember, correlational and other descriptive methods can’t identify the causes of behaviors. But this type of research can provide clues to what underlies behaviors, and thus it serves as a valuable tool when other types of experiments are unethical or impossible to conduct (in the previous example, researchers couldn’t ethically manipulate real-world variables like exposure to violence). Moreover, descriptive research can produce fascinating results. In some cases, these results may even guide important government decisions; just consider the following example.

**ACROSS THE WORLD**

The Happiest Places on the Planet

Where in the world do the happiest people reside, and what is their secret to contentment? According to the *World Happiness Report*, published by the United Nations Sustainable Development Solutions Network (SDSN), Earth’s happiest people live in Switzerland (Figure 1.5). The runners up are Iceland, Denmark, and Norway, while the United States claims 15th place on the list of 158 countries. The unhappiest spots include several nations in sub-Saharan Africa, as well as Afghanistan and Syria.
On average, the women of the world are just a bit happier than the men (Helliwell, Layard, & Sachs, 2015).

Why are some populations happier than others? According to the report, most of the variation in happiness can be attributed to a handful of factors, and the three most critical are these: (1) “Gross Domestic Product (GDP) per capita” (a measure of economic prosperity), (2) “social support” or having people to lean on when times get tough, and (3) “healthy years of life expectancy,” meaning how long you can expect to enjoy good health (Helliwell et al., 2015, p. 6). Thus, it seems that financial security, caring relationships, and health are very important variables in the happiness equation.

The World Happiness Report is a great example of descriptive research, but what is the point of studying happiness around the globe? The concept of happiness is closely associated with that of sustainable development, or development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (Helliwell et al., 2015; United Nations, General Assembly, 1987, August 4, p. 54). Sustainable development is about making economic progress, but also protecting the environment and the social needs of citizens. When these goals are balanced, human happiness and well-being are likely to increase. Some governments are beginning to appreciate this relationship, and now use happiness data in making policy decisions (Helliwell et al., 2015).

10 HAPPIEST COUNTRIES IN THE WORLD

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1. ___________ is primarily useful for studying new or unexplored topics.
   a. An operational definition  c. Descriptive research
   b. Observer bias  d. A correlation

2. A researcher was interested in studying the behaviors of parents dropping off children at preschool. He gave teachers a stopwatch to measure how long it took a caregiver to enter and leave the classroom, and a checklist to record the subsequent behaviors of the children. This approach to collecting data is referred to as:
   a. naturalistic observation.  c. informed consent.
   b. representative sampling.  d. applied research.

3. Describe the strengths and weaknesses of the correlational method.

4. The more time students spend studying, the higher their grades will be. This is an example of a _________.

CHECK YOUR ANSWERS IN APPENDIX C.
Experimental Research

Debbie and Sharon are now in their sixties. Both are physically and mentally healthy, and they intend to stay that way for decades to come. Debbie keeps her body and mind fit by exercising at least 4–5 times a week, a regimen that includes zumba, body combat, and boot camp classes. She takes calcium supplements and doesn’t eat sugar, dairy, gluten, or processed foods. Sharon cares for her 2-year-old grandson, which keeps her very active, both physically and mentally.

Staying active and eating a healthy diet are critical for women in Sharon and Debbie’s age group, who are at risk for developing osteoporosis, a disease characterized by frail, brittle bones. Vitamin D is of particular importance for bone health, but its benefits appear to be broader. For example, studies suggest vitamin D is essential for maintaining a strong immune system and perhaps even optimal cognitive performance for some people (Assmann et al., 2015; Christakos et al., 2013; Lee, O’Keefe, Bell, Hensrud, & Holick, 2008; Przybelski & Binkley, 2007).

Suppose you are interested in researching how vitamin D supplements affect cognitive abilities, such as problem solving and memory among women in their sixties. How could you isolate the effects of vitamin D when so many other factors can affect cognitive function, such as intelligence, education, age, diet, and overall physical health? There is a research method that allows you to monitor these other possible sources of interference: the experimental method. Performing research in a controlled laboratory environment using this type of method has huge benefits; you have greater control over who participates in the study, freedom to manipulate variables, and the ability to draw comparisons between groups that differ only with respect to your target variables.

Experimental Method

At last, we arrive at the type of research method we have been alluding to all along, a design that uncovers causes of behaviors and events. Unlike the descriptive studies discussed earlier, the experimental method can tell us about cause and effect, because it aims to ensure that every variable except those being manipulated by the researcher is held constant, or controlled (INFGRAPHIC 1.4). To identify a particular cause of an outcome, we assign research participants to two or more groups, and with the exception of some sort of manipulation or treatment done by the experimenter, these groups are equivalent. If, following the manipulation or treatment, the groups differ on a measure of interest, we can say with confidence that the experimental manipulation caused that change. This allows researchers to observe the variable of interest without interference from other variables.

If you are having trouble understanding what it means to control variables, consider this analogy: You are outside a football stadium, desperately trying to follow a friend lost in a swarm of people. Everyone is moving in different directions, making it exceedingly difficult to pinpoint your friend’s location and direction of movement. But what if everyone in the crowd except your friend froze for a moment in time? Would it be easier to observe him now that he is the only one moving? This is similar to what researchers try to do with variables—hold everything steady except the variables they are examining.

Returning to your population of older women, let’s examine how you might design a simple research study using the experimental method to investigate the cognitive effects of a vitamin D supplement. Your hypothesis is that participants who are given vitamin D supplements for a certain amount of time will perform better on cognitive tasks than participants given a sugar pill. In order to conduct this study the right way, we must gather a group of women who are very similar in age, educational background,
physical health, and other variables that might affect their cognitive performance. You would also want to make sure none of them have taken vitamin D supplements prior to the study, and that their exposure to the sun is roughly the same. (Exposure to the sun enables the body to produce vitamin D.) Before doing this, you would obtain permission from an ethics committee and informed consent from the participants—more on this to come. Next you would divide the women into two groups—one receives vitamin D supplements and the other gets a sugar pill—and compare their performance on various mental tasks after a designated amount of time has passed. If the group receiving the vitamin D performs better, then you can attribute the difference to vitamin D. Although this may sound fairly straightforward, there are still a few more things you need to know.

**RANDOM ASSIGNMENT** Assigning participants to groups is a crucial step of the experimental method. Fail to divide participants in the correct way and your whole study is compromised. For this reason, researchers use random assignment to ensure that participants have an equal chance of being assigned to any of the groups. Randomly choosing which treatment the participants receive reduces the possibility of some participant characteristics influencing the findings. You may have noticed some similarities between random assignment and the “random sample” introduced earlier in the chapter. But here’s the difference: Random sampling is used at the onset of a study to gather participants from a larger population. Random assignment comes into play later, when you are assigning participants to different groups. You can flip a coin, roll dice, or use a computer to generate numbers, but the goal of random assignment is always the same: to ensure that the groups are roughly equal on all characteristics. If the groups are lopsided with respect to some variable, the results may be affected. Getting back to your study on vitamin D and cognition, imagine that you assigned all the highly educated participants to one group and the less educated participants to the other. Might educational experience influence the results of a cognitive test? Perhaps. Random assignment helps reduce some of the interference resulting from these types of characteristics.

**EXPERIMENTAL AND CONTROL GROUPS** Let’s assume you did use random assignment to divvy your participants into two groups. One will receive the treatment (a daily dose of vitamin D), and the other will receive no treatment at all (the participants will, however, be handed a sugar pill that looks identical to the vitamin D supplement). Those who get the treatment (the real vitamin D supplements) comprise the experimental group, and those who get the sugar pill (fake treatment) are the control group. (We explain the need for the fake treatment in a moment.)

**INDEPENDENT AND DEPENDENT VARIABLES** Let’s restate a point we made earlier in the section, this time using our new vocabulary terms: The only difference between the experimental and control groups should be the variable the researchers are manipulating—in this case, vitamin D intake. The different treatments the two groups receive is called the independent variable (IV), because it is the one variable the researchers are deliberately changing (in this case, some participants get vitamin D, others a sugar pill). In the experimental method, an independent variable is that which the researcher is manipulating, and due to the complex nature of human behavior, often more than one independent variable may be used. The dependent variable (DV) is the characteristic or response the researchers are trying to observe or measure. In the hypothetical study, the dependent variable is the participants’ performance on cognitive tests. Just remember, the independent variable is what is manipulated and the dependent variable is what is being measured as a result of that manipulation. In other words, researchers are trying to determine whether the dependent variable (in this case, performance on cognitive tests) “depends” on the treatment (either vitamin D or the sugar pill).
The Experimental Method: Are You in Control?

Imagine you want to know if laws that ban texting while driving are worthwhile. Does texting really cause more accidents? Perhaps texting is merely correlated with higher accident rates in certain populations, such as college students, because college students are both more likely to text and more likely to have accidents. In order to find out, you have to perform an experiment.
EXTRANEOUS VARIABLES When planning their experiments, researchers must take steps to ensure that extraneous variables are not allowed to interfere with their measures. Extrinsic variables are characteristics of the environment or participants that potentially interfere with the outcome of the research. While conducting your study of vitamin D supplements, you discover that three of the participants have been working a night shift and sleeping during the day. If these individuals came directly from work, their exhaustion would affect their performance on the cognitive tasks. Unfortunately, you failed to consider this very important variable in your research design, making it an extraneous variable. Researchers have to carefully contemplate the different kinds of variables that might influence the dependent variable.

There is a specific type of extraneous variable that can confound the results of an experiment. Confounding variables are a type of extraneous variable that changes in sync with the independent variable, making it very difficult to discern which variable—the independent variable or the confounding variable—is causing changes in the dependent variable. Imagine you house the participants in your study in a very nice lab setting, but because the lab can only hold half the participants at a time, you decide to wait and collect data from the control group later in the year. At that point, your lab assistant has gone on maternity leave, so you need to hire a new lab assistant, a young man who will administer the sugar pills to the control group. When the data are collected on cognitive performance, you can’t be sure whether the differences between groups on test scores result from the vitamin D pills, or some other variables. Perhaps only the male lab assistant wore a white coat, which influenced participants’ perceptions of authority, or maybe the time of year affected the participants’ vitamin D levels (a result of seasonal differences in exposure to sunlight). These other variables (gender of lab assistant and time of year) could be confounding variables.

The good news is that there are numerous ways of eliminating the influence of an extraneous variable. This is called controlling a variable. As we mentioned earlier, random assignment to the treatment and control groups can help to lessen the impact of such variables. In this example, that means ensuring both groups have approximately the same number of participants who are working the night shift. Or, if you wanted to control the impact of exhaustion on the outcome of your study, you could just remove these participants from your sample and not include their information in your statistical analyses.

If you succeed in holding all variables constant except the independent variable, then you can make a statement about cause and effect. Let’s say your study does uncover cognitive differences between the experimental and control groups. It is relatively safe to attribute that disparity to the independent variable. In other words, you can presume that the vitamin D caused the superior performance of the experimental group.

DOUBLE-BLIND STUDY Deception can sometimes be useful in scientific research. One way researchers use deception is by conducting a single-blind study in which participants do not know what treatment they are receiving. An even stronger experimental design is a double-blind study, an experiment in which neither the participants nor the researchers working directly with those participants know who is getting the real treatment and who is getting the pretend treatment. In our example, neither the person administering the pills nor the participants would know who was receiving the vitamin D supplement and who was receiving the sugar pill. Keeping participants in the dark is relatively easy; just make sure the treatment and sugar pill look the same from the outside (see how the vitamin D and sugar pill look identical in the photo to the right). Blinding the researchers is a little trickier but can be accomplished with the help of clever assistants who make it appear that all participants are getting the same treatment.

THINKING IS BELIEVING There are some very compelling reasons for making a study double-blind. Prior research tells us that the expectations of participants can
influence results. If someone hands you a sugar pill but tells you it is real medicine, you might end up feeling better simply because this is what you expect will happen when you believe you are being treated. Apparently, thinking is believing. When people are given a fake pill or other inactive “treatment” known as a placebo (pluh-SEE-bo), they often get better even though the contents of the pill are inert. The placebo effect has been shown to ease pain, anxiety, depression, and the symptoms of Parkinson’s disease. And although placebos are not able to shrink the size of tumors, they can help with some of the side effects of treatment, such as pain, fatigue, and nausea (Kaptchuk & Miller, 2015). Researchers believe that the placebo effect arises through both conscious expectations and unconscious associations between treatment cues and healing. One’s expectation influences the placebo’s actual effect.

EXPERIMENTER BIAS We’ve discussed the rationale for keeping participants in the dark, but why is it necessary to keep the researchers clueless as well? Researchers’ expectations can influence the outcome of a study, a phenomenon known as experimenter bias. A researcher may unwittingly color a study’s outcome through subtle verbal and/or nonverbal communication with the participants, conveying hopes or beliefs about the experiment’s results (Nichols & Edlund, 2015). A statement by the researcher like “I really have high hopes for this medicine” might influence participants’ reactions to the treatment. The researcher’s value system may also impact the results in barely noticeable but very important ways. Beliefs and attitudes can shape the way a researcher frames questions, tests hypotheses, or interprets findings (Rosenthal, 2002).

Congratulations! You have now learned the nuts and bolts of the experimental method, one of psychology’s greatest myth-debunking, knowledge-gathering tools (Infographic 1.4). This method gives us more control over variables than any other type of study we have discussed; it also stands out in its ability to establish cause and effect. However, like any scientific approach, the experimental method is not without its flaws. Laboratory settings are inherently unnatural and therefore cannot always paint an accurate picture of behaviors that would occur in a natural setting. Remember, when people know they are being observed, their behavior changes. Other weaknesses of the experimental method include cost (it’s expensive to maintain a laboratory) and time (collecting data in a laboratory setting can be much slower than, say, sending out a survey). Table 1.6 gives an overview of some of the advantages and disadvantages of the research methods we have described.

Now it’s time to test our understanding of the experimental method with the help of a sprightly yellow square named SpongeBob.

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**TABLE 1.6 RESEARCH METHODS: ADVANTAGES AND DRAWBACKS**

<table>
<thead>
<tr>
<th>Research Method</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive</td>
<td>Good for new research questions; can study phenomena in their naturally occurring environment.</td>
<td>Very little control; increased experimenter bias; cannot determine cause and effect.</td>
</tr>
<tr>
<td>Correlational</td>
<td>Shows whether two variables are related; useful when experimental method is not possible.</td>
<td>Directionality and third-variable problems; cannot determine cause and effect.</td>
</tr>
<tr>
<td>Experimental</td>
<td>Can determine cause and effect; increased control over variables.</td>
<td>Results may not generalize beyond lab setting; potential for extraneous variables.</td>
</tr>
</tbody>
</table>

How does a researcher choose which method to use? It depends on the research question. Each research method has advantages and disadvantages.

---

“Good morning. Here’s your placebo—I mean medicine... well, I’m fired.”

Cartoonstock.

**Synonyms**

- experimenter bias experimenter effect, researcher expectancy effect

- placebo An inert substance given to members of the control group; the fake treatment that has no benefit, but is administered as if it does.

- experimenter bias Researchers’ expectations that influence the outcome of a study.

---

DIDN’T SEE THAT COMING
SpongeBob on the Brain

A little television won’t hurt a child, will it? Kids’ programs are interspersed with lessons on colors, words, and numbers, and only run for periods of 20 to 30 minutes. It seems reasonable to assume that little snippets of TV can’t possibly have any measurable effect.

When it comes to the rapidly developing juvenile brain, however, it’s probably not safe to assume anything. Consider the following controlled experiment examining the cognitive changes observed in preschool children after just 9 minutes of exposure to a talking yellow sponge zipping across a television screen.

The research participants were 60 four-year-olds, most of whom came from white, upper-middle-class households. Researchers randomly assigned the children to one of three conditions: watching the extremely fast-paced cartoon SpongeBob SquarePants, viewing an educational program, or drawing with crayons and markers. Following 9 minutes of the assigned activities, the children took a series of four commonly used tests to assess their executive function—the collection of brain processes involved in self-control, decision making, problem solving, and other higher-level functions. The results were shocking: Children in the SpongeBob group performed considerably worse than those in the other groups (Lillard & Peterson, 2011). Just 9 minutes of SpongeBob produced a temporary lapse in cognitive function.

How do we know that this was not the result of a different variable, such as some children’s preexisting attentional issues or television-watching habits at home? Those factors were accounted for in the study. In the experimental method, researchers hold nearly all variables constant except the one they want to manipulate—the 9-minute activity, in this case. This is the independent variable (IV). That way, the researchers can be somewhat confident that changes in the IV are driving changes in the dependent variable (DV)—performance on the cognitive tests.

What aspect of the cartoon caused these effects? The researchers hypothesized it had something to do with the show’s “fantastical events and fast pacing” (Lillard & Peterson, 2011, p. 648), and a subsequent study suggests that the fantastic content may be the problem. Shows that are highly fantastical, or involve “physically impossible events” (think cartoon characters that magically change shape, disappear in poofs of smoke, or fly with capes), seem to compromise short-term executive function in a way that non-fantastical shows do not. The negative impact of fantasy is even apparent with slow-paced programs like Little Einsteins and “educational” shows, such as Martha Speaks (Lillard, Drell, Richey, Boguszewski, & Smith, 2015). Researchers have yet to determine how fantastical television affects the developing brain, but further studies are in the works. And as we noted earlier, the replication of findings is a key component of the scientific method. Stay tuned.

TURNING YOUNG BRAINS TO “SPONGE”??
Research Ethics

Shady Research?

In the 1960s, researchers Peter Neubauer and Viola Bernhard launched an ethically dubious twin study in New York City. Their research focused on identical twins and triplets who had been given up for adoption and intentionally placed in separate homes. It was no secret a study was occurring, because the researchers periodically observed the children in their homes, interviewed the mothers, and administered tests. But neither the children nor the adoptive parents were told about the existence of the twin/triplet siblings being raised by other families (Perlman & Segal, 2005). Do you think this approach was fair to the adopted children and their families?

LO 11. Identify measures psychologists take to support ethical treatment of their research participants.

Conducting psychological research carries an enormous ethical responsibility. Psychologists do not examine dinosaur fossils or atomic particles. They study humans and other living creatures who experience pain, fear, and other complex feelings, and it is their professional duty to treat them with dignity and respect.

Like most other professionals, psychologists have established specific guidelines to help ensure ethical behavior in their field. Professional organizations such as the American Psychological Association (APA), the Association for Psychological Science (APS), and the British Psychological Society (BPS) provide written guidelines their members agree to follow. These guidelines attempt to ensure the ethical treatment of research participants, both human and animal. (Keep in mind that notions of “ethical treatment” are highly variable; not everyone agrees with the codes established by these organizations.)

The guidelines encourage psychologists to do no harm; safeguard the welfare of humans and animals in their research (see Table 1.7); know their responsibilities to society and community; maintain accuracy in research, teaching, and practice; and respect human dignity, to name a few examples (APA, 2010a).

WHOSE WORDS ARE THESE? One important way that psychologists share information is through scientific journal articles. Along with this sharing comes an ethical responsibility to give credit where credit is due. Let’s take a look at how APA style supports the fair use of other people’s work.

In Class: Collaborate and Report

In your group, discuss the meaning of fair use and explain how it differs from plagiarism.
A) Pick any short paragraph in this chapter and copy it, word-for-word, at the top of a piece of paper.
B) Copy the paragraph again, but this time include quotation marks at its beginning and end, and use APA style to cite the authors’ last names, year of publication, and page number from the textbook.
C) Finally, paraphrase the content of the paragraph in your own words, and use APA style to cite the authors’ last names and year of publication.
D) Which of the paragraphs would be plagiarism and which would be fair use? Discuss with your group why it is important to cite other people’s work and how the APA guidelines make it obvious to whom the words belong.

CONFIDENTIALITY An important component of ethical treatment is confidentiality. Researchers must take steps to protect research data from misuse or theft. Psychologists who offer therapy services are obligated to keep client and therapy session information confidential; in fact, they are required to safeguard this information in their offices. Confidentiality enables clients to speak freely about deeply personal issues. It ensures
that research participants feel protected when they share sensitive information (about sexual or controversial matters, for example), because they may rest assured researchers will keep it safe.

**INFORMED CONSENT AND DEBRIEFING** Ethical treatment also involves sharing information. Researchers have a duty to tell participants as much as they can about a study's purpose and procedures; they do this through **informed consent** and **debriefing**.

Suppose a researcher has chosen a population of interest and identified her sample. Before enlisting these people as participants and collecting data, she must make certain that they are comfortable with their involvement. Through **informed consent**, participants acknowledge that they understand what their participation will entail, including any possible harm that could result. For example, Sharon, Debbie, and all the twins who participated in the Minnesota twin study gave informed consent before undergoing any tests or examinations. As Dr. Segal recalls in her book *Born Together—Reared Apart,* “We first reviewed the week-long schedule with the twins as part of the informed consent procedure. We encouraged them to complete all the medical and psychological tests we administered, but we assured them that they were free to decline any activity they preferred not to do” (Segal, 2012, p. 55). Informed consent is a participant's way of saying, “I understand my role in this study, and I am okay with it.” It’s also the researcher's way of ensuring that participants know what they are getting into.

Following a study, there is a second step of disclosure called **debriefing**. In a debriefing session, researchers provide participants with useful information about the study; in some cases, this means revealing any deception or manipulation used—information that couldn’t be shared beforehand. Remember that deception is a key part of the double-blind study (neither participants nor researchers know which group is getting the treatment and which is receiving the placebo). Other types of psychological research require deception as well. Reading this book, you will learn about experiments in which participants were initially unaware of the study's

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**TABLE 1.7 ETHICAL USE OF ANIMALS IN RESEARCH**

<table>
<thead>
<tr>
<th>Guiding Principles</th>
<th>Ethical Conduct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approving the use of animals</td>
<td>• Before any nonhuman animal can be used in research, the Institutional Animal Care and Use Committee (IACUC) must approve the research methods as humane.</td>
</tr>
</tbody>
</table>
| Housing animals               | • Researchers must meet standards that “exceed current regulations.”  
  • The housing conditions will be inspected twice a year.  
  • Their conditions must be “humane and healthful” and must be approved by the IACUC.                                               |
| Obtaining animals             | • Animals must be obtained legally.  
  • During transport, the animals must have access to food, water, ventilation, space.  
  • No undue stress should be placed on the animal(s).                                                                                     |
| Experimenting on animals      | • The animals’ welfare must be part of the design of the experiment.                                                                                   |
| Animals in the classroom      | • Can be very useful in the classroom, but needs approval by the IACUC.  
  • Psychologists should determine if the animal is necessary, or if there are “non-animal alternatives.”                                      |

The American Psychological Association (APA) provides guidelines for the ethical use of animals in research. The principles listed here are not exhaustive, and good judgment should be used. Information from American Psychological Association (2012).
purpose. In some cases, researchers purposely lied to participants, either because it was part of the manipulation, or because they needed to conceal the study’s objective until the debriefing phase. It is important to note that no one is or should ever be forced to become a research participant. Involvement is completely voluntary, and participants can drop out at any time. And remember, all experiments on humans and animals must be approved by an **Institutional Review Board (IRB)** to ensure the highest degree of ethical standards.

### THINK IT THROUGH

**Psychology in the Media**

As you venture deeper into the study of psychology, you may find yourself becoming increasingly skeptical of media reports on psychological research. We encourage a healthy dose of skepticism. Although many news stories on scientific findings are accurate and balanced, others are flawed and overhyped. Look at these headlines about a 2012 study on the psychological impact of pacifier, or “binkie,” use:

- “Pacifier Use Can Lead to Emotional Problems in Boys, Study Finds”
  (Fox News, 2012, September 19)
- “UW Study Says Boys’ Pacifier Use Limits Social Development”
  (Seely, 2012, September 19).

It sounds as if pacifiers are causing emotional problems in males. We must have a cause-and-effect relationship, right? Wrong. The following is a rough description of the research, which is actually a combination of three studies described in one article. In a study of elementary schoolchildren, researchers found that boys (but not girls) who had used pacifiers during infancy were more likely to have trouble mimicking the facial expressions of others. (Mirroring facial expressions is believed to promote empathy, or the ability to put oneself in someone else’s shoes, and pacifiers could potentially interrupt the development of this skill by blocking muscles around the mouth.) Additional studies of college students linked pacifier use during infancy to lower levels of empathy and emotional intelligence, but only in males (Niedenthal et al., 2012).

Provocative as these findings may be, they do not allow us to conclude that pacifiers cause emotional impairments. Isn’t it possible that the reverse is true? Infants

---

**False Balance in the Media**

If 97% of climate scientists agree that humans are causing global warming, and only 3% disagree, why do news outlets often present this issue as a “debate” between two individuals? By giving equal attention to the two viewpoints, the media promote the misconception that scientists are split 50-50 on the issue. We call this “false balance.”

---

**Synonyms**

**Institutional Review Board (IRB)**
reviewing committee, Animal Welfare Committee, Independent Ethics Committee, Ethical Review Board

**Institutional Review Board (IRB)** A committee that reviews research proposals to protect the rights and welfare of all participants.

---

Scientists debate whether humans are causing global warming
with emotional problems are more likely to be given pacifiers (thus, the emotional problems are leading to the pacifier use)? The authors explicitly highlight this problem: “The studies do not allow us to draw causal conclusions, as the children were not randomly assigned to pacifier use” (Niedenthal et al., 2012, p. 392). And while the researchers did control for some variables such as the mother’s education and the child’s anxiety level, it is impossible to control for every third variable that might influence emotional health. Can you think of any other factors that could impact the results?

The take-home message: If a news report claims that $X$ causes $Y$, don’t automatically assume that the media have it right. The only way to really understand the results and limitations of a psychological study is to read it for yourself.

---

**show what you know**

1. _____ is the process through which research participants acknowledge their understanding of their role in a study.
   - a. Informed consent
   - b. Research ethics
   - c. Debriefing
   - d. Positive psychology

2. Following a study involving a double-blind procedure with a treatment and a placebo, a researcher met with each participant individually to discuss important information about the study. This is known as:
   - a. informed consent.
   - b. debriefing.
   - c. deception.
   - d. naturalistic observation.

3. In the study about pacifier use, newspapers and websites ran headlines that were somewhat misleading with regard to the findings. How would you write a headline for an article on the findings of this study so that it draws readers in but still represents the findings fairly?

---

**“LET’S ENJOY IT”** People sometimes ask Sharon and Debbie if they are sad that they spent the first 45 years of life apart. The twins don’t spend much time thinking about what “could have been.” They feel blessed to have met when they did and believe their relationship is stronger as a result. “We’re very competitive,” Debbie says. “I don’t think we would have really gotten along as well [if we had grown up together].” Both twins believe, though, that it would have been nicer had they been there for each other during the early years of parenting. The infant stage was especially difficult for both mothers, full of ear infections and projectile vomit. “I think it would have been helpful for both of us to have each other during those times. But you can’t dwell on that,” Debbie says. “We were 45 when we met, and we don’t know how much longer we have,” says Debbie. “It’s like a miracle. Let’s enjoy it.”

For Sharon, meeting Debbie came at a perfect time: “It was like God’s hand came down, and he lifted me up.” Sharon’s son had just left home to participate in the civil service program AmeriCorps, and she missed him terribly. “When I was at my lowest, wow did I get a surprise!” Sharon says, “It’s just been a wonderful adventure not just to have Debbie, but to go to so many places together. . . . We’ve done things that we never would have been able to do on our own.” When the twins are together, their courage appears to multiply, and good things seem to happen to them. “It can only get better,” Sharon says. “So we didn’t celebrate our twelfth birthday together. Big whoop.”

---

**Family × 2**

After the twins reunited at age 45, they introduced one another to their relatives. As Debbie says, “It was like getting this family that you’ve always wanted to have.” Sharon’s son and Debbie’s daughter, who are 5 years apart and genetically as close as real siblings, developed a special bond. Courtesy Debbie Mehlman and Sharon Poset.
Think Positive

Introducing Positive Psychology

Sharon and Debbie are wonderful examples of people who opt to see the brighter side of life. Instead of lamenting the fact that they spent decades apart, they rejoice in being united, and anticipate good things to come. As Debbie explains, they even look forward to rolling their wheelchairs through a nursing home and telling people the same stories day after day.

The twin’s viewpoint is somewhat analogous to the positive psychology movement in the study of human behaviors and mental processes. Positive psychology is a relatively new approach that studies the positive aspects of human nature—happiness, creativity, love, and all that is best about people (Seligman & Csikszentmihalyi, 2000). Historically, psychologists have tended to focus on the abnormal and maladaptive patterns of human behavior. Positive psychology does not deny the existence of these darker elements; it just directs the spotlight elsewhere. Positive psychologists explore the upside of subjective experiences, traits, and institutions. They generally believe that humans “strive to lead meaningful, happy, and good lives” (Donaldson, Dollwet, & Rao, 2015, p. 185). In this sense, positive psychology is similar to the humanistic perspective. In fact, the early work of the humanists helped set the stage for the current field of positive psychology (Friedman, 2014; Robbins, 2008). Many studies have focused on well-being and optimal functioning (Donaldson et al., 2015), producing results with immediate relevance to everyday life. For example, early evidence suggests that people who have a positive outlook tend to flourish and have better mental health than their less optimistic peers (Catalino & Fredrickson, 2011).

In this book, we feature the stories of people like Sharon and Debbie, underscoring the importance of nature and nurture, culture, gender, and positive psychology.

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<td>Nature and Nurture</td>
<td>The relative weight of heredity and environment in relation to behaviors, personality characteristics, and so on</td>
<td>Adaptation, heredity, environment, genes, instincts, reflexes, upbringing, peers, parents</td>
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<tr>
<td>Culture</td>
<td>The relative importance of cultural influences on behaviors, personality characteristics, and so on</td>
<td>Diversity, ethnicity, ethnic groups, cultural context, cross-cultural factors, ethnocentrism</td>
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<tr>
<td>Gender</td>
<td>The relative importance of one’s gender as it relates to behaviors, personality characteristics, and so on</td>
<td>Gender bias, gender differences, social roles, masculinity, femininity, gender roles</td>
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<td>Positive Psychology</td>
<td>The focus on positive aspects of human beings, as opposed to the more traditional focus on abnormality and maladaptive behavior</td>
<td>Strengths, optimal behavior, happiness, well-being, achievement, self-confidence, human potential</td>
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Throughout this textbook, you will come across four important themes: nature and nurture, culture, gender, and positive psychology.
summary of concepts

**LO 1** Define psychology and describe its scope. (p. 2)
Psychology is the scientific study of behavior and mental processes. Psychologists are scientists who work in a variety of fields, studying behavior and mental processes. They conduct two major types of research: basic and applied. Basic research focuses on collecting data to support or refute theories, gathering knowledge for the sake of knowledge. Applied research focuses on changing behaviors and outcomes, often leading to real-world applications.

**LO 2** Summarize the goals of psychology. (p. 6)
The goals of psychology are to describe, predict, explain, and control behavior. These goals lay the foundation for the scientific approach and the research designs used to carry out experiments.

**LO 3** Identify the people who helped establish psychology as a discipline, and describe their contributions. (p. 9)
The roots of psychology lie in disciplines such as philosophy and physiology. The early philosophers established the foundation for some of the longstanding discussions in psychology (nature and nurture). In 1879 psychology was officially founded when Wilhelm Wundt created the first psychology laboratory, located in Leipzig, Germany. Edward Titchener established structuralism to study the elements of the mind. In the late 1870s, William James offered the first psychology class in the United States, at Harvard, and his work helped to establish the early school of psychology known as functionalism.

**LO 4** List and summarize the major perspectives in psychology. (p. 12)
Psychologists use different perspectives to understand and study issues and topics in the field. Each perspective provides a different vantage point for uncovering the complex nature of human behavior. The psychoanalytic perspective looks at the unconscious conflicts at the root of personality development. The behavioral perspective examines human behavior as learned primarily through associations, reinforcers, and observation. The humanistic perspective focuses on the positive and growth aspects of human nature. The cognitive perspective considers the mental processes that direct behavior. The evolutionary perspective examines heritable traits that increase or decrease in frequency across generations. The biological perspective identifies the physiological basis of behavior. The sociocultural perspective looks at the social and cultural influences that impact behavior. The biopsychosocial perspective explains human behavior in terms of biological, psychological, and sociocultural factors.

**LO 5** Evaluate pseudopsychology and its relationship to critical thinking. (p. 20)
Pseudopsychology is any approach to explaining and predicting behavior and events that appears to be psychology but is not supported by empirical, objective evidence. Critical thinking, on the other hand, is the process of weighing various pieces of evidence, synthesizing them, and determining how each contributes to the bigger picture. Critical thinking is absent from the “pseudotheories” used to explain the pseudopsychologies.

**LO 6** Describe how psychologists use the scientific method. (p. 22)
Psychologists use the scientific method to provide empirical evidence based on systematic observation or experiments. The scientific method includes five basic steps: develop a question, formulate a hypothesis, collect data, analyze the data, and publish the findings. The scientific method is a continuing cycle of exploration that uses critical thinking at each step in the process, and asks new questions along the way.

**LO 7** Distinguish between a random sample and a representative sample. (p. 28)
A population includes all members of a group a researcher wants to study. If the population is large, then the researcher will select a subgroup, called a sample. A random sample is a subset of the population chosen through a procedure that ensures all members have an equal chance of being selected. Random sampling increases the likelihood of achieving a representative sample, or subgroup, whose characteristics are similar to the population of interest.
LO 8 Recognize the forms of descriptive research. (p. 29)
Descriptive research is a type of investigation used to explore and describe a phenomenon. It is especially useful for studying new or unexplored topics when researchers might not have specific expectations about outcomes. Descriptive research methods include naturalistic observation, case studies, the survey method, and the correlational method.

LO 9 Describe the correlational method and identify its limitations. (p. 33)
The correlational method is a type of descriptive research that examines relationships, or correlations, between variables. Variables can be positively correlated (as one variable goes up, the other goes up), negatively correlated (as one variable goes up, the other goes down), or not at all related. The correlation coefficient ($r$) is a statistical measure indicating the strength and direction of the correlation between variables; $r$ values range from +1.00 to −1.00, with positive numbers indicating the relationship is positive and negative numbers indicating it is negative (the inverse). The closer $r$ is to +1.00 or −1.00, the stronger the relationship. The correlational method is useful for illuminating links between variables, and it helps researchers make predictions, but it cannot determine cause and effect. Even if variables X and Y are strongly correlated, we cannot assume that changes in X are driving changes in Y (or vice versa); there may be some third variable influencing both X and Y.

key terms

behavioral perspective, p. 14
behaviorism, p. 14
biological perspective, p. 15
biopsychosocial perspective, p. 16
case study, p. 31
cognitive perspective, p. 14
confounding variable, p. 40
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structuralism, p. 11
test prep are you ready?

1. Researchers at a large university were asked to devise a stop-smoking campaign and assess its effectiveness. Using findings from prior research, they created a program to help students, faculty, and staff quit smoking. This is an example of:
   a. basic research.
   b. applied research.
   c. naturalistic observation.
   d. case studies.

2. __________ is a collection of knowledge that any reasonably smart person can pick up through casual observations of everyday experiences.
   a. Common sense
   b. Hindsight bias
   c. Psychology
   d. Psychomythology

3. The Greek philosopher Plato believed that truth and knowledge exist in the soul before birth and that humans have innate knowledge. This position supports:
   a. empiricism.
   b. the nurture side of the nature-nurture issue.
   c. the nature side of the nature-nurture issue.
   d. dualism.

4. Inspired by the work of Charles Darwin, William James proposed that the purpose of thought processes, feelings, and behaviors is to adapt to the environment, which is an important concept of:
   a. introspection.
   b. behaviorism.
   c. structuralism.
   d. functionalism.
5. ______________ suggests that human nature is by and large positive.
   a. Natural selection  c. Structuralism
   b. Psychoanalysis  d. Humanistic psychology

6. Psychology is driven by ______________, but pseudopsychology is not.
   a. unverified guesses  c. lessons learned
   b. critical thinking  d. folk wisdom

7. The goal of ______________ is to provide empirical evidence or data based on systematic observation or experimentation.
   a. operational definitions  c. the scientific method
   b. critical thinking  d. a hypothesis

8. ______________ allow us to make inferences and determine the probability of certain events occurring.
   a. Inferential statistics  c. Operational definitions
   b. Descriptive statistics  d. Theories

9. A psychologist studying identical twins was interested in their leadership qualities and educational backgrounds. These characteristics are generally referred to as:
   a. operational definitions.  c. variables.
   b. hypotheses.  d. empiricism.

10. One way to pick a random sample is to make sure every member of the population has:
    a. no extraneous variables.
    b. no confounding variables.
    c. an equal chance of having a characteristic in common.
    d. an equal chance of being picked to participate.

11. Descriptive research is invaluable to psychologists at the beginning stages of a study. Some forms of descriptive research can provide information on:
    a. cause-and-effect relationships.
    b. random assignment.
    c. relationships among variables.
    d. experimenter bias.

12. A researcher interested in learning more about the effect of separating identical twins shortly after birth might use the “Jim Twins” as a(n) ______________ which is a type of descriptive research invaluable for studying rare events.
    a. experiment  c. naturalistic observation
    b. case study  d. correlational study

13. The ______________ variable is what the researcher manipulates, and the ______________ variable is the response the researcher measures.
    a. confounding; extraneous  c. dependent; independent
    b. extraneous; confounding  d. independent; dependent

14. With a(n) ______________ study, neither the researchers nor the participants know who is getting the treatment or who is receiving the placebo.
    a. double-blind  c. correlational
    b. experimental  d. blind

15. A researcher forming a ______________ of high school seniors might use a comprehensive database of all seniors in the United States to select participants, as all members of the population theoretically would have an equal chance of being selected to participate in the study.
    a. control group  c. random assignment
    b. experimental group  d. random sample

16. Describe the goals of psychology and give an example of each.

17. A researcher is planning to conduct a study on aggression and exposure to media violence. What can she do to ensure the ethical treatment of the children in her study?

18. Use as many of the major perspectives of psychology to explain the similarities between the “Jim Twins.”

19. Find an article in the popular media that presents variables as having cause-and-effect relationships, but that is really a correlational study.

20. Reread the feature on the SpongeBob study. How does it establish a cause-and-effect relationship between watching the cartoon and changes in cognitive function? If you were to replicate the study, what would you do to change or improve it?

✓ CHECK YOUR ANSWERS IN APPENDIX C.