# Chapter One

## Psychology as a Science

## Chapter Outline



*Quest—An act or instance of seeking; an adventurous journey.*

The theme of this book is that both the science of psychology and your own life are journeys of discovery. Throughout your life you will undertake many quests, and a large number of these will be hopelessly doomed to fail. Others, however, will be fabulously successful due to a combination of factors, including good planning, skill, effort, fortunate circumstances, and the help of others. Certainly, one very important lesson in life is to learn to recognize the difference between the foolish quests and the profound ones. Perhaps an even more important lesson is that it is absolutely essential to undertake quests regularly, because in such quests—both the large and the small variety—you develop new ways of looking at yourself and the world. With this thought in mind, let's begin.

My personal and professional journey of discovery in psychology began when I was an undergraduate student, like you.

*Since the beginning of the twentieth century, people's innate desire to understand themselves—and the human condition—has found a new avenue toward the answer: the scientific method.*

—Jacqueline Swartz, contemporary Canadian journalist



The followers of Guru Maharaji Ji believed that this 16-year-old leader of the Divine Light Mission was "Lord of the Universe." How did they respond when the guru's mother proclaimed that he was no longer the Perfect Master?

Besides taking psychology courses, I also began conducting psychological studies. One of my more interesting undergraduate studies involved an investigation of the members of a very curious and popular religious cult. Allow me to describe this study by briefly transporting you back in time to the fall of 1974.

It was a pleasantly mild Midwest day in Kalamazoo, Michigan. I sat across from Dave, a young and energetic man of 21, in a small, two-story house that was the residence, or ashram, of the local Divine Light Mission. This was a red-letter day for me as an aspiring psychologist, and I wanted to be careful how I asked the question foremost in my mind. The Divine Light Mission was a neo-Hindu religious movement from India that had been receiving much national attention during the past few years. For two months I had visited the ashram, administering personality tests to its members. I was trying to understand why so many people were attracted to this new Eastern religion. Dave had been a devoted member for more than two years, despite the protests of his family. I was a senior in college with aspirations for graduate study in psychology. Now I had the opportunity, with Dave's help, to observe some classic psychological principles in operation.

That year, the Divine Light Mission claimed a worldwide membership of 6 million, with about 80,000 located in the United States. The leader of this new religious movement was a 16-year-old boy from India named Guru Maharaj Ji, hailed by his disciples (who were called Premies) as being "Lord of the Universe" and "Divine Incarnation." Premies believed that this young boy was about to usher in the New Age of Peace; and followers were promised salvation if they received the "Knowledge," which was described as being infinite and therefore unexplainable.

Although Guru Maharaj Ji touted himself as a divine entity, he very much enjoyed earthly pleasures such as expensive cars, airplanes, motorcycles, townhouses and mansions staffed with servants, and many Batman comic books and squirt guns as well. What allowed the young guru to live in such luxury were thousands of unpaid Premies, like Dave, who worked at a host of enterprises, including ten Divine Sales thrift stores, a "Cleanliness Is Next To Godliness" janitorial service, and a vegetarian restaurant in New York City. In addition to the income generated by these businesses, all new members' financial assets were routinely funneled into the mission's accounts upon joining, as was any income earned from worldly jobs.

Which brings me back to why I was sitting across from Dave in the ashram. The previous day, Guru Maharaj Ji had skipped town and eloped with his secretary. Upon learning of this youthful, and decidedly ungodlike, flight of spontaneous passion, his mother had publicly pronounced that Guru Maharaj Ji was no longer the Perfect Master. Instead, she angrily proclaimed that his older brother was the new divine incarnation. Within one day's time, members of the religious movement were being told to believe that Guru Maharaj Ji had gone from being the Perfect Master of their 6-million-member mission to being spiritually "grounded" by his "Holy Mother." How would Dave and the other members of the Kalamazoo ashram make sense of this turn of events? After all, they had paid a high price to gain admission to this religious cult that promised them divine salvation. Yet now the Mission that was their life's work was in danger of crumbling. Had Dave begun questioning the spirituality of his guru and his own commitment to the Divine Light Mission?

Dave's reply was immediate and unwavering. He told me that these recent events were all part of the

Perfect Master's plan of ushering in the New Age of Peace. If anything, Dave stated, Guru Maharaj Ji was now more in his thoughts than before; and he was even more certain that the New Age would be dawning soon.

Does Dave's strengthened conviction in the face of troubling evidence to the contrary surprise you? Was his reaction different from what you might expect from a normal person? Was it irrational? Was Dave suffering from some sort of mental illness?

Because I had been exposed to research and theories within psychology, I did not think that Dave's thinking reflected a psychological disorder. Instead, I strongly suspected that his far-fetched rationalizations were more similar to the normal and all-too-ordinary thoughts of someone caught in a very uncomfortable psychological position. Years ago, psychologist Leon Festinger (1957) had outlined a theory to explain how our need to maintain consistency between our beliefs can often lead to irrational behavior. That is, if people hold two thoughts that are inconsistent ("I've paid a high price to follow Guru Maharaj Ji" and "Guru Maharaj Ji is a spiritual fraud"), an internal conflict will be created that people will try to reduce or eliminate. The greater their investment in particular beliefs (for example, "Guru Maharaj Ji is a god and worthy of my devotion"), the more difficult it is for people to reject their beliefs. Known as the theory of cognitive dissonance, Festinger's ideas provided an explanation for how normally rational individuals can engage in some rather odd forms of thought and behavior while trying to justify their past actions.

*A journey of a thousand miles starts from beneath one's feet.*

—Lao-Tzu, Chinese philosopher, sixth century BC

For me, studying the Divine Light Mission represented one of the first of many scientific journeys of discovery that I have undertaken as a psychologist during the past four decades. Many of you reading this textbook will feel a similar intensity of interest in learning about the science of psychology. For others, whose passions burn for different life pursuits, this text, and the course in which it is offered, can still provide valuable knowledge that will serve you well while following other desires.

At its heart, the science of psychology is a journey of discovery undertaken both by researchers in their search for knowledge over the past 100-odd years and by you, the student, over the course of the term. Throughout this text, as you learn how psychology has expanded our understanding of the ways people think, feel, and behave (the discipline's journey of discovery), I will encourage you to apply this knowledge to better understand yourself and others (your own journey of discovery).

*Wheresoever you go, go with all your heart.*

—Confucius, Chinese philosopher, 551–479 BC

## 1.1 What Is Psychology?

A basic necessity for any successful journey is knowing how to read the road signs; and for you, the reader of this textbook, this means understanding the terminology. Throughout this book, I define important concepts that will help you navigate your understanding of the discipline of psychology.

### 1.1a Psychology Is the Scientific Study of Mental Processes and Behavior.

The term psychology comes from the Greek words *psyche*, meaning "mind," and *logos*, meaning "study." In its broadest sense, **psychology** is the scientific study of mental processes and behavior. This means that psychologists are interested in using scientific methods (see Section 1.3) to understand how we and other living creatures think, feel, and act.

People often confuse psychology with **psychiatry**, which is a branch of medicine concerned with the diagnosis and treatment of psychological disorders and that is

**Psychology** The scientific study of mental processes and behavior

**Psychiatry** A branch of medicine concerned with the diagnosis and treatment of psychological disorders. (The roughly comparable specialty area in psychology is known as clinical psychology.)

practiced by physicians. Psychology also deals with the diagnosis and treatment of such disorders (see Chapter 11), but this interest represents only one area of specialization in a discipline that has a much broader scope than psychiatry (see Section 1.2g). Whereas psychiatrists have completed medical school and obtained an MD (doctor of medicine), psychologists have completed graduate school in psychology and obtained a PhD (doctor of philosophy) or, in some cases, a Psy.D. (doctor of psychology).

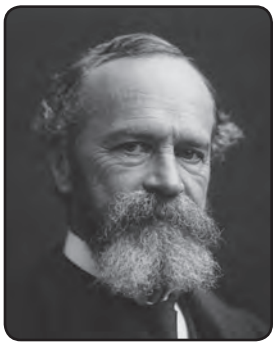
*Wikimedia Commons*

Wilhelm Wundt, the founder of psychology

## 1.1b Early Pioneers Established Paths for Later Discoveries.

**Structuralism** An early theory in psychology that sought to identify the components of the conscious mind

Most historians identify Wilhelm Wundt (pronounced "Vill-helm Voont," 1832–1920) as the "world's first psychologist." In 1879, Wundt established the first institute for research in experimental psychology at the University of Leipzig in Germany (Kim, 2009). Over the next 40 years, more than 100 students obtained doctoral degrees studying psychological topics under his supervision (Fernberger, 1933). Wundt's research focused on the study of consciousness; and his method for studying the mind was known as *introspection*, a research technique in which trained observers would report on the contents of their own immediate states of consciousness. His model of consciousness, which his student Edward Titchener later named **structuralism**, sought to identify the components of the conscious mind. Wundt's influence on the first generation of psychologists was so great that most contemporary psychologists can probably trace their historical lineage back to him.



*Wikimedia Commons*

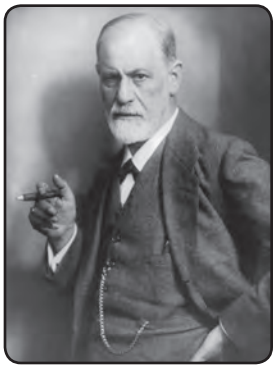
William James, the first major American psychologist

**Functionalism** An early approach to psychology that studied how the conscious mind helps humans survive and successfully adapt to their environment

Beyond Europe's shores, in the United States, the first American psychologist to exert a guiding influence on the young science of psychology was William James (1842–1910). Although both James and Wundt studied consciousness, James's desire was to understand how the mind affects what people do, rather than to merely identify its components. In addition, his approach to psychology had very little to do with laboratory studies and relied heavily, instead, on his own rich ideas and eloquent writing (Hoffman & Thelen, 2010). Because of James's interest in how the conscious mind helps humans survive and successfully adapt to their environment—that is, how the mind functions—his approach to psychology came to be called **functionalism**. In 1890, James published a brilliant two-volume text entitled *Principles of Psychology,* which today is still considered a classic among classics. Unlike Wundt, James had a relatively small group of students. Among them, however, were such luminaries as Mary Calkins (1863–1930), pioneer in memory research; Edward Thorndike (1874–1949), who investigated trial-and-error animal learning; and Robert Woodworth (1869–1962), a pioneer in motivation and drive theory. In Chapter 9, Section 9.5d, we will explore James's theory of emotion.

### Journey of Discovery

At the beginning of the twentieth century, Hermann Ebbinghaus (1850–1909), one of psychology's pioneers, stated that "Psychology has a long past, but only a short history." What do you think he meant by this statement?



*Wikimedia Commons*

Sigmund Freud, the founder of psychoanalysis

The third prominent founder of psychology was Sigmund Freud (1856–1939), an Austrian physician trained as a neurologist. Actually, because Freud was a physician, his proper title is "psychiatrist" and not "psychologist." Despite this technicality, psychology claims him as an important founder of one of the early schools of thought in the discipline. Instead of working in the lab (like Wundt) or

teaching at the university (like James), Freud developed his approach to psychology through clinical practice. Based on his work with patients who suffered from ailments that had no known physical causes, Freud developed a theory that all human behavior is determined by hidden or unconscious motives and desires that are sexual in nature. This approach to psychology, which Freud called **psychoanalysis**, influenced the study of such diverse topics as dreams, childhood development, aggression, sexuality, creativity, motivation, personality, and led to the development of psychotherapy. In Chapter 10, Section 10.2, we will examine Freud's theory of personality and its influence on contemporary psychological theories.

*I am actually not at all a man of science, not an observer, not an experimenter, not a thinker. I am by temperament not but a conquistador—an adventurer, if you want it translated—with all the curiosity, daring, and tenacity of a man of this sort.*

—Sigmund Freud, 1856–1939

Just as psychoanalysis is closely associated with Sigmund Freud, **behaviorism** is intimately intertwined with John Watson (1878–1958). This American's research with rats, dogs, and other animals caused him to question the mainstream view in psychology that the structure, content, and function of the mind were the proper focus of scientific inquiry. Instead, Watson (1913) asserted that psychology should study observable behavior rather than hidden psychological processes. Watson's radical behaviorism struck a responsive chord among many American psychologists who shared his impatience with what they considered to be the "fuzziness" of the other scientific approaches within psychology. Underlying behaviorism was a philosophy known as *logical positivism,* which contended that all knowledge should be expressed in terms that can be verified empirically or through direct observation. These new psychologists sought to describe, explain, predict, and control behavior. Behaviorism dominated psychology in North America from the 1920s through the 1950s.

**Psychoanalysis** An approach to psychology that studies how the unconscious mind shapes behavior

**Behaviorism** An approach to psychology that studies observable behavior rather than hidden mental processes; also referred to as the *behavioral perspective*

*Wikimedia Commons*

John Watson, the founder of behaviorism

**Journey of Discovery**

Consider the four early pioneers in psychology: Wundt, James, Freud, and Watson. What contribution did each make to our understanding of thinking and behavior?

## 1.1c Women and Ethnic Minorities Faced Discrimination as Pioneers in Psychology.

During the first 75 years of psychology's existence, women and minorities were generally excluded from graduate education due to the prejudice and discrimination of the time (Minton, 2000). Those who were fortunate enough to be granted the opportunity to pursue a career in psychology often had a substandard environment in which to conduct their research (Furumoto & Scarborough, 2002). Even with such impediments, many women and ethnic minorities made valuable contributions to the development of psychology.

A good example of the prejudice and discrimination faced by women comes from the career of Mary Calkins, who completed all requirements for a PhD at Harvard University in 1895. William James described her dissertation defense as "the most brilliant examination for the PhD that we have had at Harvard." Yet, despite a unanimous recommendation by James and her other professors, Calkins's doctorate was denied because the university did not grant degrees to women. Indeed, when James first allowed Calkins to enroll in his seminar, the male students walked out in protest—leaving Calkins as the sole student with her professor! So how did Harvard University respond to this brilliant woman's attempt

*Archives of the History of American Psychology—The University of Akron*

Mary Calkins, the first female president of the American Psychological Association

*Archives of the History of American Psychology—The University of Akron*

Margaret Washburn, the first woman to receive a PhD in psychology

to be recognized as an equal among her peers? The college offered Calkins a PhD from its "sister college," Radcliffe; however, she declined, stating that accepting it would mean that she also accepted the college's discriminatory policies. Pursuing the few career paths open to her, Calkins became a non-PhD professor at the all-female Wellesley College. There, she established one of the first psychology laboratories in the United States, pioneered research in short-term memory, and in 1905 became the first woman president of the American Psychological Association (Madigan & O'Hara, 1992). Remarkably, Harvard has repeatedly resisted efforts to grant Calkins the degree she earned more than more than a century ago, with the last effort being rejected in 2002.

The first woman to actually receive her doctorate in psychology was Margaret Washburn (1871–1939) from Cornell University in 1894. During her distinguished career, Washburn was a research pioneer in comparative psychology and served as president of the American Psychological Association in 1921. Like Calkins, but unlike most of her male colleagues, Washburn never married because a woman's decision to marry generally required her not to work outside the home.

*Library of Congress*

Kenneth and Mamie Clark's scientific findings that racial segregation had a negative impact on Black children's self-concept were instrumental in shaping the U.S. Supreme Court's 1954 decision to integrate the nation's educational institutions.

Similar obstacles also impeded the careers of ethnic minorities (Schultz & Schultz, 2000). The first African American to receive a PhD in psychology was Gilbert Jones, who obtained his degree from the University of Jena in Germany in 1901. Thirty-two years later, Inez Prosser, after teaching many years with a master's degree, became the first African American woman to receive her doctorate in psychology from the University of Cincinnati. Despite the discrimination faced by African Americans during these early years, many made significant contributions to this budding science. For example, in 1920 the structural psychologist J. Henry Alston discovered how we sense heat and cold from our skin receptors (see Chapter 4, Section 4.4b). In the field of social psychology, Kenneth Clark and Mamie Phipps Clark's ground-breaking research in the 1930s and 1940s on the self-concept of Black children provided the scientific justification for the United States Supreme Court to end the practice of racially segregated education. In 1971, Kenneth Clark became the first African American elected president of the American Psychological Association.

Hispanic psychologists have also made many important contributions. For example, George Sanchez was an influential educational and cultural psychologist who was a civil rights advocate and an early critic of using culturally biased psychological tests in assessing Mexican American children. Similarly, John Garcia pioneered research on taste aversion in the 1960s (see Chapter 6, Section 6.1d).

*AP Wide World Photo*

George Sanchez (1906–1972), early pioneer in educational and cultural psychology

Today, in the United States, about half of all psychologists holding doctoral degrees are women; they make up almost three-fourths of all the new PhDs, and they now outnumber men as members of the American Psychological Association by almost 2 to 1 (American Psychological Association, 2008). Moreover, members of ethnic minority groups now account for about 23 percent of graduate students in psychology master's degree and doctoral programs. Similar diversity trends are found in Canada.

Despite these advances, more work is needed. For example, although the majority of new doctorates in psychology today are women, men are still far more likely than women to hold the most powerful positions of authority in university psychology departments. It is also true that there are still far too few ethnic minorities in the discipline compared to their numbers in the general population. As an example, although Latinos make up about 13 percent of the U.S. population, fewer than 8 percent of graduate school students and only about 1 percent of psychology practitioners and psychology full professors are Latino (Dingfelder, 2005). Similar patterns are found among African Americans. Thus, although

women and ethnic minorities have begun to share more of the center stage with their White male colleagues, the twenty-first century awaits a more diverse cast of characters in this ever-changing science. Some of you reading this textbook will be part of this new generation of psychologists. What would you do to encourage this greater diversity without unfairly limiting the opportunities of young White men?

BVT Lab

Flashcards are available for this chapter at www.BVTLab.com.

Section REVIEW

- Psychology is the scientific study of mental processes and behavior.
- Wilhelm Wundt and structuralism sought to identify the components of the conscious mind.
- William James and functionalism studied how the conscious mind helps humans survive and successfully adapt to their environment.
- Sigmund Freud and psychoanalysis studied how the unconscious mind shapes behavior.
- John Watson and behaviorism considered only observable behaviors to be legitimate topics of scientific inquiry.
- Despite discrimination, women and ethnic minorities made valuable contributions to the development of psychology.

## 1.2 Contemporary Perspectives and Areas of Specialization

Of the early schools of psychology, only psychoanalysis and behaviorism have survived as contemporary perspectives, and even they have been significantly altered from their original form. Let us now briefly examine seven contemporary perspectives within psychology that shape current psychological theory and research, and their applications in everyday settings.

### 1.2a *The Psychoanalytic and Behaviorist Perspectives Still Influence Theory and Research.*

Many psychoanalysts today downplay Freud's emphasis on sexual drives and emphasize, instead, cultural experiences in explaining personality. Despite this shift in focus, the unconscious mind and early childhood experiences are still central areas of attention within this perspective. Yet, many contemporary psychoanalysts, influenced by Erik Erikson's (1902–1994) writings, have rejected Freud's view that personality development, for all practical purposes, is complete by age 5. Instead, contemporary psychoanalysis generally accepts Erikson's (1980) view that personality continues to be shaped and changed throughout life. Erikson's work is discussed in Chapter 3.

The central figure shaping contemporary behaviorism was B. F. Skinner (1904–1990), who stressed the role of consequences in controlling behavior. His research, which is discussed in Chapter 6, found that people and other animals tend to repeat behaviors that are followed by positive consequences and avoid behaviors that bring negative consequences. For example, if you are rewarded for being helpful, you are likely to repeat such actions in the future; however, you are unlikely to do so if your helpfulness is punished. In addition, this psychological perspective played a key role in insisting that

psychologists precisely define and objectively measure the concepts they study. Although behaviorism does not exert the influence over psychology that it once enjoyed, you will recognize its footprints throughout this text as you examine various psychological topics.

## 1.2b Humanistic Psychology and Positive Psychology Highlight Personal Growth.

**Humanistic psychology** An approach to psychology that emphasizes human beings' innate capacity for personal growth and their ability to consciously make choices

Arising out of the dissatisfaction of many psychologists with both the psychoanalytic and the behavioristic views of human nature, a third force exerted its influence on psychology in the 1950s. **Humanistic psychology** emphasizes people's innate capacity for personal growth and their ability to consciously make choices. Carl Rogers (1902–1987) and Abraham Maslow (1908–1970) were the primary architects of this perspective; and both contended—like William James before them—that psychology should study people's unique subjective mental experience of the world. In the 1960s, humanistic psychology served as the intellectual inspiration of the *human potential movement,* which became a loosely knit social movement striving to help individuals achieve their full human potential. Both within psychology and throughout the larger culture, humanistic psychology has had a broad impact by stressing the important role that positive life experiences play in people's lives.

Although the humanistic approach has been criticized for being the least scientifically based of all contemporary perspectives within psychology, its emphasis on conscious experience and the essential goodness of people has promoted the scientific study of previously neglected topics, such as self-awareness, love, helping behavior, and positive personality growth—all issues that we will explore in this text.

**Positive psychology** A new scientific approach to studying optimal human functioning that asserts that the normal functioning of human beings cannot be accounted for in purely negative (or problem-focused) terms

Within the past ten years, a new psychological perspective called *positive psychology,* which is a direct descendant of the humanistic perspective, has emerged. **Positive psychology** is a scientific approach to studying optimal human functioning that asserts the normal functioning of human beings cannot be accounted for within purely negative (or problem-focused) frames of reference. Because this new perspective is more firmly grounded in rigorous scientific methodology than is the traditional humanistic perspective, positive psychology may be in a better position to shape the future direction of psychology. Researchers who identify themselves as positive psychologists are currently studying what it means to be a well-adapted person and what makes people happy and optimistic in their daily living (McNulty & Fincham, 2012; Ong & Dulmen, 2007). For example, when does an optimistic view of life help you overcome hurdles to success, and when does it cause you to overlook impending failure? Teaching people to avoid harmful self-deceptions while still maintaining a sense of realistic optimism about life is one of the goals of positive psychology.

## 1.2c Cognitive Psychology Focuses on How the Mind Organizes and Interprets Experiences.

**Cognitive psychology** An approach to psychology that attempts to understand behavior by studying how the mind organizes perceptions, processes information, and interprets experiences

Accompanying the criticism of behaviorism by humanistic theorists was the fact that laboratory research was finding some interesting phenomena difficult to explain without reintroducing the concept of consciousness. In the 1960s, when this evidence had reached a sufficient "critical mass," the theoretical center of gravity in psychology shifted from behaviorism to cognitive psychology. The word *cognitive* comes from the Latin for "to know." **Cognitive psychology** is a psychological approach that attempts to understand behavior by studying how the mind organizes perceptions, processes information, and interprets experiences (Bargh & Mosella, 2008). For example, how do you remember a new friend's phone number? While serving on a jury, how do you decide whether a defendant is guilty or innocent? Cognitive theories provide insights

into these kinds of mental processes. Two of the principal leaders of this cognitive revolution in psychology were George Miller, who made important discoveries in human memory, and Ulric Neisser, who coined the term "cognitive psychology" and wrote one of the first books in the field.

The ascendancy of cognitive psychology coincided with the development of a new form of technology, namely, the computer. Cognitive psychologists argued that the mind was like a computer, in that it receives input from the environment, which it then transforms, stores, and later retrieves using a host of "programs," ultimately leading to specific response outputs. The computer is not only a useful metaphor for the mind. As new generations of computers are developed to actually work like the human brain, they have become invaluable subjects of study, simulating human thought. Today, behaviorist John Watson's description of the brain as "a black box forever mysterious" is no longer true, thanks largely to the discoveries of cognitive psychologists. This perspective provides valuable insights into many of the topics we will examine throughout this text.

## 1.2d The Neuroscience Perspective Focuses on the Nervous System.

In recent years, as new techniques and instruments have been developed to examine the brain and how it reacts under different circumstances, psychologists have become increasingly interested in biological mechanisms (Hasselmo, 2012). The resulting attempts to understand behavior and mental processes by examining the nervous system have come to be known as the **neuroscience perspective**. In its study of how the brain communicates with itself and other body organs, as well as its attempt to understand elementary biochemical processes, this approach to psychology is focused on the most precise microscopic levels of analysis.

**Neuroscience perspective** An approach to psychology that attempts to understand behavior and mental processes by examining the nervous system

Although neuroscientists do study humans, they conduct a good deal of their research using animals with simpler brains, hoping that the knowledge gained in these studies will lead to greater understanding of the brain's building blocks. For example, in attempting to better understand memory loss in Alzheimer's disease (the most common form of dementia in the elderly), a researcher might graft tissue from the brains of rat fetuses into the brains of elderly rats. If such a procedure improves the older rats' memory, this finding may provide a crucial clue to curing this disease in humans. Chapter 2 introduces you to some of the discoveries uncovered by this neuroscience approach.

## 1.2e Evolutionary Psychology Studies How Behavior Is Shaped by Natural Selection.

Fueled by the growing belief in the social sciences that behavior is at least partly influenced by the effects of *evolution,* a perspective known as **evolutionary psychology** is increasingly being incorporated into psychological theories (Al-Shawaf & Buss, 2011). Yet, what is evolution? The evolutionary perspective is partly based on the writings of biologist Charles Darwin (1809–1882), who theorized that changes in the population of a species occur over many generations due to the interaction of environmental and biological variables.

**Evolutionary psychology** An approach to psychology based on the principle of natural selection

According to evolutionary theory, living organisms struggle to survive; and within each species, a great deal of competition and biological variation occurs among individuals (Darwin, 1859). Those individuals with genetic traits best adapted for survival in their environment will produce more offspring; as a result, their numbers will increase in frequency in the population. As the environment changes, however,

**Natural selection** The process by which organisms with inherited traits best suited to the environment reproduce more successfully than less well-adapted organisms over a number of generations, which leads to evolutionary changes

**Evolution** The genetic changes that occur in a species over generations due to natural selection

other members of the species possessing traits better suited to the new conditions will flourish, a process called **natural selection**. In this way, the environment selects which genetic traits are passed on to future generations (see Figure 1-1). As natural selection continues and the features best suited for survival change again and again, the result is **evolution**, a term that refers to the gradual genetic changes that occur in a species over generations. Reproduction is central to natural selection; the essence of the natural selection process is that the characteristics of some individuals allow them to produce more offspring than others. For example, in an environment that is mostly frigid and snowy, mammals that have a lot of insulating fur are more likely to survive and reproduce than are those with less fur. Similarly, animals that look white are more likely than darker-appearing members of their species to blend in with the snow. This may protect them from predators or make them more stealthy hunters of prey (see the accompanying photo of a polar bear). Thus, this "whiteness" will lead to more offspring being produced. The result of this natural selection process is that mammals from many species living in a frigid and snowy environment will have thick, white fur covering their bodies.

In summarizing the evolutionary process, keep in mind that it is ongoing. Every species on the planet is undergoing some sort of evolution, even though the speed of the process differs substantially across species. Species that experience a great deal of change in their environment evolve faster than those that live in stable environments. Also keep in mind that individual organisms do not evolve—populations evolve. Individuals play a role in evolution by interacting with the environment and having their genes screened by natural selection. Thus, individuals contribute to a change in their species' population by their own successes or failures in reproducing. Over many generations, the accumulated effects of literally thousands or even millions of individuals' reproductive successes and failures lead to evolution of the species (Barrett et al., 2002). The specific role that genes play in reproduction will be discussed more fully in Chapter 2, Section 2.4a.

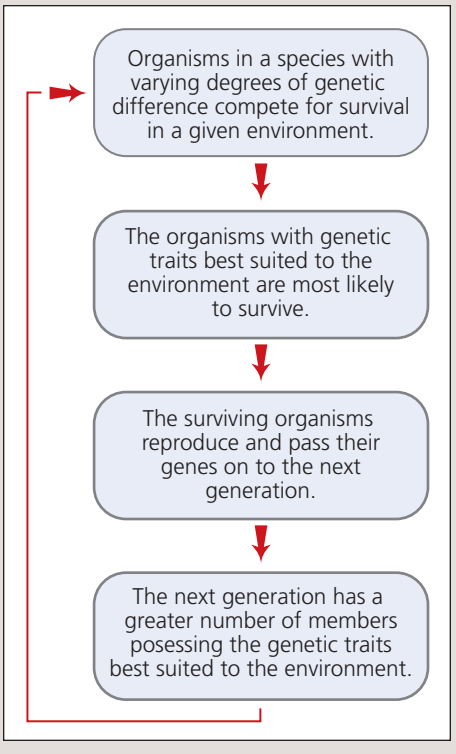
*It may metaphorically be said that natural selection is daily and hourly scrutinising … the slightest variations; rejecting those that are bad, preserving and adding up all that are good; silently and insensibly working, whenever and wherever opportunity offers, at the improvement of each organic being in relation to its organic and inorganic conditions of life. We see nothing of these slow changes in progress, … we see only that the forms of life are now different from what they formerly were.*

—Charles Darwin, 1859, *On the Origin of Species*, pp. 90–91

**FIGURE 1-1**

**How Natural Selection Works**

Environments are always undergoing changes. Throughout these changes, those organisms in a species that possess genetic traits which allow them to best adapt to the changes are most likely to survive, reproduce, and pass their genes on to the next generation. This is the reason that evolutionary theorists contend that it is the environment that "selects" which traits will be passed on to future generations. The result of this natural selection process is evolution.



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According to natural selection, animals that live in very cold and snowy environments will be more likely to survive and reproduce if their fur provides both insulating warmth and camouflage so that they blend in with the snow. Why doesn't the fur of zoo-housed polar bears turn darker to better match their zoo environment?

**INFO-BIT**

Some historians trace the scientific concept of evolution back 2,500 years to the Greek philosopher Anaximander, who contended that life arose in water and that simpler life-forms preceded more complex ones. However, the more influential Greek philosopher Aristotle held that species are fixed and do not evolve. Aristotle's views, combined with the Judeo-Christian beliefs that God created the earth and all species, and they are only about 6,000 years old, dominated scientific and intellectual debate until the mid-1800s. To what degree has your own thinking been shaped by these contrasting views?

**Journey of Discovery**

By *evolution,* do we mean the changes observed in a single member of a species or the changes in the species as a whole?

## 1.2f The Sociocultural Perspective Studies How Behavior Is Shaped by Social and Cultural Forces.

While the evolutionary perspective examines how the behavior of humans and other living creatures is shaped due to inherited genes, the **sociocultural perspective** emphasizes the role that social and cultural factors play in explaining behavior (Kirschner & Martin, 2010). **Culture** is the total lifestyle of people from a particular social grouping, including all the ideas, symbols, preferences, and material objects that they share. It is a shared system of ideas about the nature of the world and consists of rules governing how people should think, feel, and act within this world.

Many countries contain a number of distinct cultures. For example, in the United States you can identify many cultural heritages—among them Native American,

**Sociocultural perspective** An approach to psychology that emphasizes social and cultural influences on behavior

**Culture** The total lifestyle of people from a particular social grouping, including all the ideas, symbols, preferences, and material objects they share

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According to dynamic systems theory, new forms of behavior emerge through the interactions between people's biology and their culture and physical environment.

Hispanic, European, African, Asian, and Middle Eastern. In analyzing culture, it's important to understand that lifestyle changes over time. Thus, Native American culture today is not the same as Native American culture in the 1800s or even in the mid-1900s. This attention to social and cultural factors as a means to explain human thought and behavior is a central element in many psychological theories.

Are the sociocultural and evolutionary perspectives compatible? Yes, say a growing number of psychologists who believe that these cultural and evolutionary forces operate simultaneously in shaping behavior (Buss & Schmitt, 2011). They argue that a culture is based on its people's relationship with the environment, and that the evolution of our species is a story of how we have adapted to our environment. Thus, just as our bodies and brains are a product of evolutionary forces, so too is our culture. Yet, culture change occurs much more rapidly than genetic change. This is why there is a great deal of variation between the world's cultures, but little meaningful genetic variation between cultural groups.

In this textbook, the evolutionary perspective will provide insight into how we, as a species, got to where we are with our biological structure and behavioral traits. The sociocultural perspective, on the other hand, will suggest how culture can either reinforce or attempt to change these evolutionary-based tendencies and patterns. This idea that new forms of behavior emerge from the interactions between people's biology and their culture and physical environment is referred to as **dynamic systems theory** (Hickman et al., 2011; Van Geert & Steenbeek, 2010). Essentially, this theory proposes that life is shaped by a set of vigorously active components or factors; therefore, a full understanding of living creatures, including humans, must take into account how those factors shape the life course of both individuals and entire species (see Exploring Culture & Diversity 1.1).

**Dynamic systems theory** The idea that new forms of behavior emerge from the interactions between people's biology and their culture and physical environment

## *Exploring* CULTURE & DIVERSITY 1.1

### Do Cultures Differ in How Members Relate to Their Groups?

One aspect of culture that has a great deal of importance to the understanding of the psychology of human behavior is the belief system concerning how individuals relate to their groups (Triandis, 1989, 1995). The human species has evolved within a social group sphere. One of the fundamental dilemmas we have faced throughout our existence is that each individual's inherent desire to pass her or his genes on to the next generation pushes

**TABLE 1-1 Differences Between Collectivist and Individualist Cultures**

| Collectivist Cultures | Individualist Cultures |
|---|---|
| Identity is given by one's group. | Identity is achieved by one's own striving. |
| Individuals are socialized to be emotionally dependent on their social group, and conformity is valued. | Individuals are socialized to be emotionally independent of their social group, and independence is valued. |
| Personal and group goals are generally consistent; when inconsistent, group goals have priority. | Personal and group goals are often inconsistent; when inconsistent, personal goals have priority. |
| Trust is placed in group decisions. | Trust is placed in individual decisions. |

the individual toward selfish, self-serving actions that can potentially threaten the survival of the individual's group, and thus the individual's own survival. Somehow through the process of natural selection, we have struck a delicate balance between these conflicting tendencies. Today, the cultural belief systems known as *individualism* and *collectivism* are products of this evolutionary-based tension between the desire to selfishly maximize one's reproductive fitness and the need to cooperate with others in order to survive (Kâgitçibasi, 1994; Oyserman et al., 2002).

**Individualism** is a philosophy of life characterized by stressing the priority of personal goals over group goals, a preference for loosely knit social relationships, and a desire to be relatively free of others' influence. In contrast, **collectivism** is a philosophy of life characterized by the priority of group needs over individual needs, a preference for tightly knit social relationships, and a willingness to submit to the influence of one's group (Hornsey et al., 2006; Tower et al., 1997). Table 1-1 lists some of the differences between these two philosophies of life. Collectivism is considered the older of the two philosophies because it focuses on the type of thinking and behavior that affords the most protection for people who live in the type of highly threatening environments that have historically confronted all human groups until fairly recently (Singelis et al., 1995). Individualism is a much more recent philosophy of life because it develops among people who inhabit relatively safe environments where their survival is less dependent on maintaining strong group ties. This liberation from immediate physical threats reduces the importance of survival-focused values and gives higher priority to freedom of choice (Inglehart & Oyserman, 2004). Currently, 70 percent of the world's population live in cultures with a collectivist orientation.

**Individualism** A philosophy of life characterized by the priority of personal goals over group goals, a preference for loosely knit social relationships, and a desire to be relatively autonomous of others' influence

**Collectivism** A philosophy of life characterized by the priority of group needs over individual needs, a preference for tightly knit social relationships, and a willingness to submit to the influence of one's group

Although we know that cultures differ in their individualist-collectivist orientations, we do not know whether one is better than the other in any ultimate evolutionary sense. In this text, we periodically examine how the psychology of people from different cultures differs due to their individualist-collectivist bents. For example, in the chapter on human development (Chapter 3), you will discover that within collectivist societies, child-rearing practices tend to emphasize conformity, obedience, and knowing one's proper place, whereas within more individualist societies, independence and self-reliance are stressed (Peterson et al., 2005). One consequence of these differing views is that in an individualist society, people develop a belief in their own uniqueness and diversity. This sense of individuality is nurtured and fostered within the educational system, and its manifestation is considered to be a sign of maturity. In a collectivist society, on the other hand, uniqueness and individual differences are often seen only as impediments to proper self-growth. Instead, the person becomes most meaningful and complete when she or he is closely identified with—not independent of—the group.

*Wikimedia Commons*

Seventy percent of the world's population live in collectivist societies. How might the thinking and behavior of these Japanese schoolchildren differ from those of children in the United States, Canada, and Europe?

## 1.2g Psychology's Subfields Tend to Have Either a Research or Application Emphasis.

Now that you have learned something about the different schools of thought within psychology, you might be wondering who employs psychologists and what they do in these jobs. About one-fourth of all psychologists who received their PhDs during the past 25 years are employed at colleges, universities, or institutes where they teach and conduct research in their areas of specialization (see Figure 1-2). Their goals are to acquire psychological knowledge through scientific methods and to teach this knowledge to students. Seven areas of specialization for these research psychologists are as follows:

1. ***Neuroscience*** (also called *psychobiology, biopsychology, physiological psychology*) focuses on behavior by examining physiological processes, especially those occurring in the brain. Neuroscientists/psychobiologists are increasingly investigating the genetic bases of thought and action.
2. ***Developmental psychology*** focuses on how people mature and change physically, cognitively, and socially throughout the life span, from conception to old age.
3. ***Experimental psychology*** focuses on basic psychological processes such as sensation, perception, learning, motivation, emotion, and states of consciousness. Keep in mind, however, that psychologists in every area of psychology use experiments.
4. ***Comparative psychology*** focuses on similarities and differences in the physiology, behavior, and abilities of different species, including humans.
5. ***Cognitive psychology*** focuses on all aspects of thinking, including problem solving, decision making, memory, reasoning, and language.
6. ***Personality psychology*** focuses on the consistent and distinct ways in which people think, feel, and behave, including how these characteristics originated and developed.
7. ***Social psychology*** focuses on how people think about and influence one another in social settings, including how the social settings and the cultural beliefs of the individuals shape the interaction.

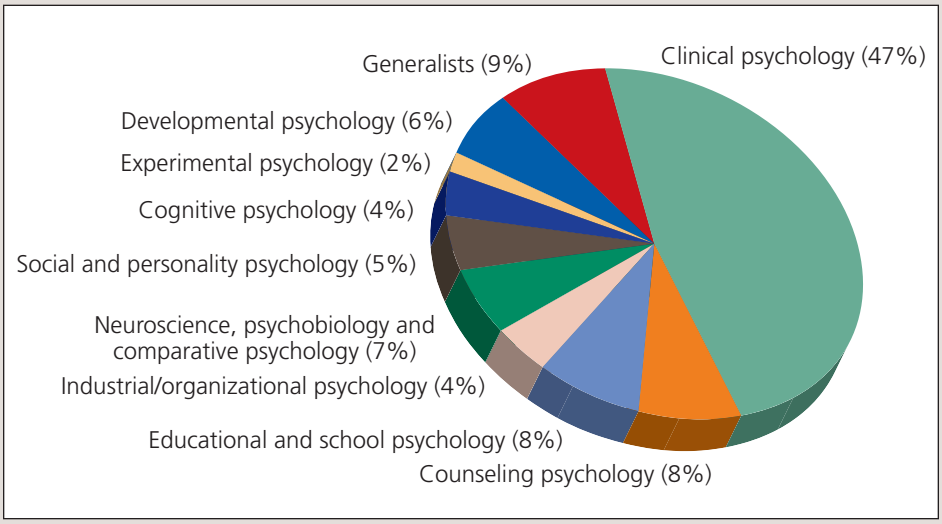


**FIGURE 1-2**
**Recent PhDs in the Major Subfields in Psychology**
Based on data from the 2004 Graduate Study in Psychology Collected by the American Psychological Association Research Office

In addition to psychologists within these seven areas, two-thirds of the psychologists who received their PhDs during the past ten years have careers in specialty areas where they use existing psychological knowledge to solve and prevent problems (see Figure 1-2). These **applied psychologists** most often work in mental health centers, schools, industries, governmental agencies, or private practice; some also work at colleges and universities. Four major applied specialties are as follows:

**Applied psychologists**
Psychologists who use existing psychological knowledge to solve and prevent problems

1. ***Clinical psychology*** focuses on diagnosing and treating people with psychological disorders, such as depression and schizophrenia, as well as seeks to determine the causes for these disorders.
2. ***Counseling psychology*** focuses on diagnosing and treating people with personal problems that do not involve psychological disorders. It includes marriage counseling, social skills training, and career planning.
3. ***Industrial/organizational psychology*** focuses on ways to select, motivate, and evaluate employees, as well as improving the management structure and working conditions.
4. ***Educational and school psychology*** focuses on assessing and treating both students and the educational environment in order to facilitate children's learning and adjustment in school.

## Section REVIEW

- Of the early schools of psychology, only psychoanalysis and behaviorism survived as contemporary perspectives.
- The humanistic perspective and positive psychology emphasize human beings' capacity for personal growth and their ability to consciously make choices.
- The cognitive perspective attempts to understand behavior by studying how the mind organizes perceptions, processes information, and interprets experiences.
- The neuroscience perspective attempts to understand behavior by examining physiological processes, especially those occurring in the brain.
- The evolutionary perspective assumes that all species have evolved in ways that maximize the chances of their genes being passed on to their offspring.
- The sociocultural perspective emphasizes social and cultural influences on behavior.
- Seven primary areas of specialization for research psychologists include: neuroscience, developmental psychology, experimental psychology, comparative psychology, cognitive psychology, personality psychology, and social psychology.
- Four primary areas of specialization for applied psychologists include: clinical psychology, counseling psychology, industrial/organizational psychology, and educational and school psychology.

# 1.3 Scientific Methods in Psychology

When you were a child, did you ever try building something that came with a set of plans? I remember making my first model airplane—and being so excited about getting it to look like the image on the box that I ignored the directions and simply slapped the pieces together as fast as my little fingers would allow. Of course, employing such a slapdash method did not lead to a very pleasing final result. Through such experiences, I gradually learned the value of designing a plan of action when undertaking projects. This basic lesson is what the rest of this chapter is about. That is, in order for psychologists to effectively study the mind and behavior, they must employ scientific methods to carefully plan and execute their research projects.

## 1.3a Scientific Methods Minimize Error and Lead to Dependable Generalizations.

**Scientific methods** A set of procedures used in science to gather, analyze, and interpret information in a way that reduces error and leads to dependable generalizations

**Sample** A group of subjects selected to participate in a research study

**Population** All the members of an identifiable group from which a sample is drawn

**Random selection** A procedure for selecting a sample of people to study in which everyone in the population has an equal chance of being chosen

When conducting research, psychologists employ **scientific methods**, which consist of a set of procedures used to gather, analyze, and interpret information in a way that minimizes error and leads to dependable generalizations. By *generalizations*, I mean statements that apply to members of a group as a whole, rather than to specific members.

In research, a **sample** is a group of subjects who are selected to participate in a given study, whereas a **population** consists of all the members of an identifiable group from which a sample is drawn. The closer a sample is in representing the population, the greater the confidence researchers have in generalizing their findings beyond the sample. Researchers have the most confidence that their sample is an accurate representation of the population when everyone in the population has an equal chance of being selected for the sample. Such **random selection** of participants, although highly desirable, is not always possible. For instance, in studying the effects of using cell-phones while driving a motor vehicle, it would be impossible to design a study in which every driver in the United States had an equal chance of being included in the sample.

Beyond sample selection, how might you employ the scientific method to understand the personalities of your research participants? Often, psychologists use well-established, highly structured questionnaires in their research. For example, in my study of religious cult members described in the chapter-opening story, instead of simply asking these people questions that I thought of at the moment, I asked them all to respond to the same set of questions that other researchers had previously developed to measure specific aspects of personality. I then compared, using a series of statistical computations, their responses to one another as well as to those of other young adults who were not cult members. These statistical analyses allowed me to determine whether these groups differed from one another, and if so, how.

**Critical thinking** The process of deciding what to believe and how to act based on careful evaluation of the evidence

Based on my brief description of scientific methodology, you can see that the guidelines psychologists follow when conducting research are far more stringent than those typically employed in everyday thinking. Psychologists also approach the study of the mind by engaging in **critical thinking**, which is the process of deciding what to believe and how to act based on a careful evaluation of the evidence. An important aspect of critical thinking is ruling out alternative explanations. Can a hypnotized person be induced to commit murder? Is there compelling evidence that psychics can predict future events? Can subliminal tapes improve memory and increase self-esteem? These are a few of the fascinating questions we will examine in our journey of discovery, and we will do so while using critical thinking skills. The "Psychological Applications" section at the end of this chapter discusses how you can develop critical

thinking skills to aid you in your journey. In the meantime, let's examine the research process itself and then scrutinize more thoroughly the structure of the various scientific methods psychologists use in their research.

## 1.3b The Research Process Unfolds in a Series of Stages.

For psychologists to effectively study the mind and behavior, they must carefully plan and execute their research projects, employing scientific methods. This process occurs in a series of four sequential stages, which are summarized in Figure 1-3.

The first stage involves selecting a topic and reviewing past research. Scientists get their ideas from many sources. Inspiration could come from someone else's research, from an incident in the daily news, or from some personal experience in the researcher's life. After selecting a topic, researchers need to search the scientific literature to determine whether prior investigations exist. The findings from these previous studies generally shape the course of the current investigation. Today, psychologists can vastly accelerate literature searches by using a number of computer-based programs that catalog even the most recently published studies. Keeping abreast of other colleagues' discoveries and insights is a necessity during all stages in the research process. For this reason, searching the research literature may be thought of as a never-ending endeavor.

The second stage involves developing a theory and hypotheses. A **theory** is an organized system of ideas that seeks to explain why two or more events are related. Put simply, a theory provides a picture of reality concerning some phenomena. What makes a good theory depends on a number of factors, some of which are listed in

**Theory** An organized system of ideas that seeks to explain why two or more events are related


**FIGURE 1-3**
**Stages in the Psychological Research Process**

**TABLE 1-2 What Makes a Good Theory?**

| |
|---|
| *Predictive accuracy*: Can the theory reliably predict behavior? |
| *Internal coherence*: Are there logical inconsistencies between any of the theoretical ideas? |
| *Economy*: Does the theory contain only what is necessary to explain the phenomenon in question? |
| *Fertility*: Does the theory generate research, and can it be used to explain a wide variety of behaviors? |

*One of the most serious problems confronting psychology is that of connecting itself with life. … Theory that does not someway affect life has no value.*

—Lewis Terman, U.S. psychologist, 1877–1959

Table 1-2 (Higgins, 2004). The most salient factor is a theory's *predictive accuracy*. In other words, can it reliably predict behavior? A second factor is that it should have *internal coherence*—there shouldn't be any logical inconsistencies or unexplained coincidences among the theoretical principles and concepts. A third characteristic of a good theory is that it should be *economical*, meaning that it includes the minimum number of principles or concepts necessary to adequately explain and predict the phenomena in question. Finally, a fourth and equally important quality in a good theory is *fertility*—the ability to generate sufficient interest in other scientists so that the theory is tested and extended to a wide variety of behavior.

**Hypothesis** An educated guess or prediction about the nature of things based upon a theory

The way that scientists determine the predictive accuracy of a theory is by formulating hypotheses. A **hypothesis** is an educated guess or prediction about the nature of things based upon a theory—it is the logical implication of the theory. The researcher asks, "If the theory is true, what observations would we expect to make in our investigation?" An example of a hypothesis developing from a theory is William Dement's interest in dreaming. Following the discovery by other researchers (Aserinsky & Kleitman, 1953) that dreaming was associated with periods of rapid eye movement (REM sleep), Dement (1960) developed a theory that dreaming was a fundamental requirement for all humans. He hypothesized that if people were not allowed to dream over a series of nights (by waking them when they entered REM sleep), they would experience some kind of pressure to increase their "dream time" on subsequent nights. This hypothesis was a logical extension of Dement's theory that there was something basic in our need to dream (refer to Chapter 5, Section 5.2d, for the results of Dement's research).

After collecting data to determine whether the hypothesis successfully predicts the outcome of the study, researchers reevaluate the theory. Was the research hypothesis supported by the data, which thereby support the validity of the theory? If the data do not support the study's hypothesis, the theory needs revising. Although results that do not support stated hypotheses are often greeted with disappointment by researchers, great discoveries often follow such disappointment. In this regard, psychologist William McGuire contends that the task of science is "not the dull and easy job of showing that a fixed hypothesis is right or wrong in a given context. Science has the more exciting task of discovering in what senses the hypotheses and its theoretical explanations are true and in what senses false" (McGuire, 1999, p. 407).

The research process reflects a cyclical relationship between a theory and a testable hypothesis (see Figure 1-4), with the data from a research study providing the evidence to support or refute the hypothesis. If the research hypothesis is supported, the validity of the theory is also supported, generating new hypotheses to test in future research. If the hypothesis is not supported, the theory's validity is questioned,

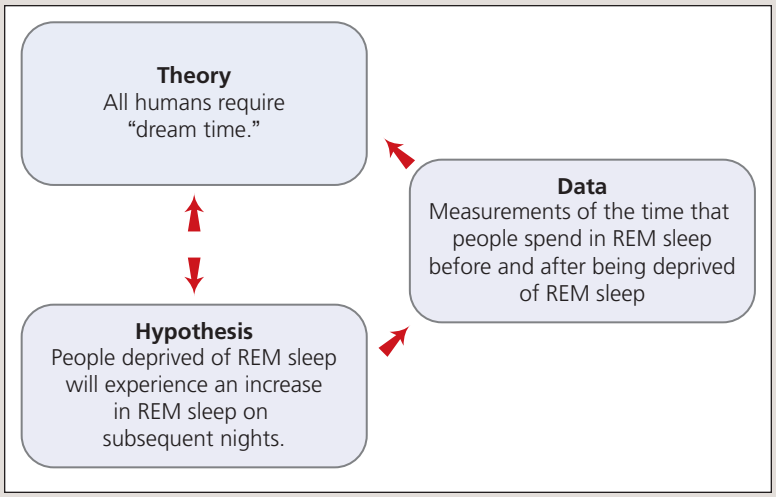


**FIGURE 1-4 The Theory-Hypothesis Relationship**

There is a cyclical relationship between a theory and a hypothesis, with the data from a research study providing the evidence to support or reject the hypothesis. If the hypothesis is supported, the validity of the theory is also supported, generating new hypotheses to test in future research. If the research hypothesis is not supported, the validity of the theory is questioned, prompting a revision of the theory. From the revised theory, new hypotheses are developed that are then tested in another round of studies.

prompting a revision of the theory. From the revised theory, new hypotheses are developed that are then tested in another set of empirical studies. Scientists who can think "outside the box" of their own theories and entertain alternative explanations for their hypotheses are the most likely candidates to advance scientific knowledge.

The third research stage involves selecting a scientific method and obtaining approval to conduct the study. In all scientific methods, psychologists seek to determine the nature of the relationship between two or more factors, called *variables* because they are things that can be measured and that can vary. When scientists describe a variable, they do so by using an **operational definition**, which is a very precise description of how a variable in a study is measured. For example, when studying hunger, scientists often operationally define this variable as "the beginning of stomach contractions," and they use specialized instruments to measure when those contractions begin. This precise and concrete definition of hunger provides other psychologists with the necessary information concerning what was measured in the study, and it also allows them to repeat the same scientific procedures in future studies.

**Operational definition** A scientist's precise description of how a variable has been quantified so that it can be measured

Each scientific method has its advantages and disadvantages, and we will examine these in greater detail in Sections 1.3c through 1.3e. After settling upon the method by which data will be collected, researchers must present their proposed study to an *institutional review board (IRB),* which monitors and evaluates all research involving both human and animal subjects (Fisher et al., 2012). To guard against harm to participants, the guidelines followed by IRBs focus on the *risk/benefit ratio,* which weighs the potential risks to those participating in a study against the benefits that the study may have for advancing knowledge about humanity (Hayes, 2002; Rice, 2011). In assessing proposed studies involving human participants, priority is always given to the welfare of the participants over any potential benefits of the research. Table 1-3 lists some of the guidelines followed when conducting research involving human participants (American Psychological Association, 2010).

IRBs also evaluate animal research, which accounts for about 5 percent of all research published in psychology journals (Kiple & Ornelas, 2001). The vast majority of these studies involve little more than slightly modifying the environment of animals and observing how these changes affect their behavior. A minority of studies, however, involve painful and dangerous experimental procedures that would never be attempted on human participants. For example, research investigating the effect of drugs on brain function or the treatment of

BVT Lab

Visit www.BVTLab.com to explore the student resources available for this chapter.

**TABLE 1-3 Guidelines for Conducting Research with Human Participants**

In assessing proposed studies involving human subjects, priority is always given to ensuring their welfare over any potential benefits of the research. The guidelines also urge researchers to do the following:

1. Provide enough information to possible participants about the activities they will perform in the study so that the participants can freely give their *informed consent.*
2. Be truthful whenever possible. *Deception* should be used only when absolutely necessary and when adequate debriefing is provided.
3. Allow participants the *right to decline* to be a part of the study and the right to discontinue their participation at any point without this decision resulting in any negative consequences (for example, not receiving full payment for their participation).
4. *Protect participants* from both physical and psychological harm. If participants suffer any undesirable consequences, the researcher must do as much as possible to remove the damaging effects.
5. Ensure that any information provided by individual participants is kept *confidential.*
6. *Debrief* individuals once they have completed their participation. Explain all aspects of the research, attempt to answer all questions and resolve any negative feelings, and make sure they realize that their participation contributes to better scientific understanding.

brain disorders and brain damage often begins with animal studies. This research has helped explain the causes of human mental illness and has facilitated the development of effective treatments. Animal research has also contributed greatly to explanations of how the brain works, as well as to the discovery of basic principles of perception, motivation, and learning (Swanson, 2004).

Virtually all scientists who conduct animal research state that they support the humane treatment of animals, but they deny that animals have the same rights as people. Instead, they contend that every advance in science must sooner or later be tried on a living creature. If animals are not substituted for humans in studies that pose significant health risks, then we must either (1) place human participants at serious risk in these studies or (2) simply abandon the research altogether. Because neither of these options is acceptable to most people, animal research continues, as does the debate (Bateson, 2011). Table 1-4 lists some myths and facts about animal research.

## Journey of Discovery

For every dog or cat used in a laboratory experiment, 10,000 dogs and cats are abandoned by their owners (Miller, 1985). When these abandoned animals are brought to local humane societies and are not adopted, should they be made available as subjects for scientific research? Upon what values would you base your decision?

Finally, the fourth research stage involves collecting and analyzing data and reporting results. There are three basic techniques of data collection: (1) *self-reports,* (2) *direct observations,* and (3) *archival information*. Collecting data using self-reports allows researchers to measure important subjective states such as people's perceptions, emotions, or attitudes. However, because people may not always be able to

**TABLE 1-4 Some Myths and Facts About Animal Research**

| |
|---|
| **Myth:** Most animal research is unnecessary.<br>**Fact:** This may have been partly true 30 years ago when, for example, psychology students regularly used laboratory rats in their courses to better understand well-documented principles of learning. Today, however, strong economic pressures weigh against the unnecessary use of animals in research. The extremely limited funds available to conduct animal research minimize the possibility that animals will be used for such trivial purposes. |
| **Myth:** Other research methods can be used so that animals are not needed in behavioral research.<br>**Fact:** In most cases, no good alternatives exist. For example, computerized models of complex behavior still do not truly mimic actual behavior. |
| **Myth:** Most research animals are dogs, cats, and nonhuman primates.<br>**Fact:** Dogs and cats account for less than 1 percent of the total number of animal subjects. The same is true of nonhuman primates. Nearly 90 percent of the animals used in research are rats, mice, and other rodents. |
| **Myth:** Most animals in research suffer great pain and distress.<br>**Fact:** The vast majority of behavioral and biomedical research (over 90 percent) does not cause pain or significant distress to the animal. In only 6 percent of experiments are anesthesia or painkillers withheld. In such instances, researchers withhold pain relief because it would interfere with the objectives of the research (for example, studying the effects of pain). |
| **Myth:** Animal research benefits only humans.<br>**Fact:** Animal research benefits both humans and animals. For example, knowledge of animal sexual and feeding behavior has helped save a number of species from extinction. Further, insights gained through animal research on taste aversion have been used by both ranchers and conservationists to condition animal predators in the wild to avoid killing livestock and endangered species (see Chapter 6, Section 6.1d). |

accurately describe these internal states, many researchers prefer to directly observe people's behavior, recording its quantity and direction of change over time. Finally, researchers will sometimes examine existing documents, or archives, to gather information. These accumulated records come from a wide variety of sources (for example, census information, court records, newspaper articles) and can provide researchers with a great deal of valuable information.

Once the data have been collected, the researcher must analyze them. Such data analysis generally requires extensive knowledge of statistical procedures and computer software packages. The two basic kinds of statistics employed by psychologists are descriptive and inferential. **Descriptive statistics** simply summarize and describe the behavior or characteristics of a particular sample of participants in a study; **inferential statistics** move beyond mere description to make inferences about the larger population from which the sample was drawn. Inferential statistics are used to estimate the likelihood that a difference found in the groups studied would also be found if everyone in the population participated in the study. Psychologists generally accept a difference as statistically significant if the likelihood of it having occurred by chance is less than 1 in 20—that is, a probability of less than 5 percent (Nickerson, 2000). Because one of the main objectives of psychological research is to generalize research findings to the population of interest, inferential statistics are the more valued type of statistic. See Closer Look 1-1 for an explanation of how data from multiple studies can be analyzed using statistical techniques.

**Descriptive statistics**
Numbers that summarize and describe the behavior or characteristics of a particular sample of participants in a study

**Inferential statistics**
Mathematical analyses that are used to determine whether the data support or do not support the research hypothesis

## Closer LOOK 1-1

### What Is Meta-Analysis?

**Replication** Repeating a previous study's scientific procedures using different participants in an attempt to duplicate the findings

Repeating a previous study's scientific procedures using different participants in an attempt to duplicate the findings is known as **replication**. Replication is important in advancing scientific knowledge because the findings from a single study are far less convincing than the same findings from a series of related studies. Yet what happens when studies are repeated numerous times and the results often differ? If, for example, seven studies find that one type of psychotherapy is effective in treating depression, while four studies find that it is ineffective, what conclusions should be drawn?

In the past, researchers often used the "majority rules" approach to resolve such controversies. That is, they merely counted up the number of studies that found or did not find a particular psychological effect and then concluded that the effect existed if it occurred in the majority of studies. During the past 20 years, researchers have increasingly relied on a more sophisticated comparison procedure called *meta-analysis* to better assess the findings from numerous studies (Card, 2012). **Meta-analysis** is the use of statistical techniques to sum up a body of similar studies in order to objectively estimate the reliability and overall size of the effect. Because many studies may find small differences that do not reach statistical levels of significance between groups, meta-analysis can determine whether these small effects are indeed "real" or merely measurement error.

**Meta-analysis** The use of statistical techniques to sum up a body of similar studies in order to objectively estimate the reliability and overall size of the effect

The last task in the fourth stage of the research process is to report results. By informing fellow scholars of their discoveries, researchers build upon and refine one another's work, and the understanding of psychology is enriched. Yet, others do not uncritically accept a psychologist's research findings. At scientific conventions where research is often first reported and in scientific journals where studies are ultimately published, all stages in the research process are scrutinized for possible errors and oversights. It is through such critical analysis that psychological knowledge is advanced.

## 1.3c Description Is the Goal of Observational Research.

To understand behavior so that it can be predicted and controlled, a scientist must first describe it accurately. Scientific methods that have description as their primary goal fall under the category of observational research (Rustin, 2011). Within this category are the methods of *naturalistic observation, participant observation,* and *case study.*

### Naturalistic Observation

**Naturalistic observation** A scientific method that describes how people or animals behave in their natural environment

**Naturalistic observation** is a method that investigates behavior in its natural environment (Crabtree & Miller, 1992; Schnicker et al., 2011). Settings for such research range from day-care centers, where developmental psychologists might record the play behavior of children, to the jungles of Africa, where comparative psychologists might study how a troop of baboons defends itself against predators. In all such naturalistic studies, behavior is merely observed and recorded—it is not manipulated.

One example of a naturalistic observation study was Robert Levine and Ara Norenzayan's (1999) analysis of the pace of everyday life in 31 cultures. Some of

the data they collected were measurements of people's average walking speed on city sidewalks, the speed at which postal clerks responded to a simple request, and the accuracy of clocks in public settings. Notice that these measurements simply involved the researchers observing how people behaved in their natural surroundings. Their findings indicated that the pace of life was faster in colder and more economically productive cultures (such as Switzerland and Japan) than in those that were hotter and less economically energetic (such as Mexico and Indonesia).

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Naturalistic observation involves studying behavior in its natural environment, such as the daily behavior of residents in an urban setting. What are some advantages of this research method?

## Participant Observation

Another type of observational method is **participant observation**. Here, as in naturalistic observation, a researcher records behavior as it occurs in its natural environment—but does so as a participant of the group being studied. One of the chief benefits of this research strategy is that it allows investigators to get closer to what they are studying than does any other method.

**Participant observation** A descriptive scientific method in which a group is studied from within by a researcher who records behavior as it occurs in its natural environment

An excellent example of this method was Leon Festinger's study of a doomsday cult in the 1950s (Festinger et al., 1956). The leader of the cult, Mrs. Keetch, claimed that aliens from outer space had told her the world would come to an end on a specific date, December 21. She also stated that the only survivors of this catastrophe would be members of her group. When Festinger and his coworkers learned of Mrs. Keetch, they became interested in measuring the psychological changes that would occur within the group when the doomsday came and passed with the world still intact. To accomplish this task, these researchers infiltrated the group as participant observers and began describing its dynamics over a period of several weeks. This descriptive study was one of the first tests of a very influential theory in psychology called *cognitive dissonance theory* (see Chapter 14, Section 14.2c).

The following are four advantages of both naturalistic and participant observation research:

1. Researchers are able to watch behavior in its "wholeness," providing the full context in which to understand it.
2. Researchers are able to record rare events that may never occur in a controlled laboratory environment.
3. Researchers are able to systematically record events that were previously observed only by nonscientists.
4. Researchers are able to observe events that would be too risky, dangerous, or unethical to create in the laboratory.

Despite these benefits, there are also some problems in using naturalistic and participant observation methods. First, because of the absence of control that researchers have in such studies, conclusions must be drawn very carefully. Second, researchers must be mindful that their participation in, or even observation of, events can significantly alter the participants' behavior and thus taint the data. Although researchers assume that after a period of time those who are being observed become accustomed to the researchers' presence, it is difficult to evaluate to what degree this actually occurs. Finally, observational methods pose the most ethical problems involving invasion of others' privacy—more than any other scientific method.

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The case study method produces a more detailed analysis of a subject than does any other method, but what are two of its disadvantages?

## Case Study

Another form of observational research is a **case study**, which involves an in-depth analysis of a single subject (Dunbar-Hall, 2011). This method of inquiry is common in clinical work, where psychotherapists provide an extensive description of a person suffering from a particular psychological disorder to illustrate the factors that lead to and influence it. Sigmund Freud's work is perhaps the most famous example of this method. The advantage of the case study is that it produces a more detailed analysis of a person than any other method. One disadvantage is that researchers must be extremely cautious in generalizing from a single case to the population as a whole. Another problem is that this method often depends on people's memories of the past, which all too often are both selective and inaccurate (see Chapter 7, Section 7-3d).

**Case study** A descriptive scientific method involving in-depth analysis of a single subject, usually a person

## 1.3d Correlational Research Is Used to Analyze the Nature of the Relationship Between Variables.

Besides simply describing a phenomenon under study, often psychologists also want to know whether two or more variables are related; and if so, how strongly. When changes in one variable relate to changes in another variable, we say that they *correlate*. **Correlational research** assesses the nature of the relationship between two or more variables that are not controlled by the researcher. The importance of correlational research for psychologists is *prediction:* It allows psychologists to predict a change in one variable by knowing the value of another variable.

**Correlational research** Research designed to examine the nature of the relationship between two or more naturally occurring variables

## Using Surveys When Conducting Correlational Research

Although studying the relationships among variables can be done by directly observing behavior, it is often accomplished by asking people carefully constructed questions. A **survey** is a structured sets of questions or statements given to a group of people to measure their attitudes, beliefs, values, or behavioral tendencies (Nestor & Schutt, 2012). Obtaining information using surveys is generally relatively easy; however, its main disadvantage is that it relies on people's self-reports, which are often faulty. My Divine Light Mission study involved the use of surveys.

**Survey** A structured set of questions or statements given to a group of people to measure their attitudes, beliefs, values, or behaviors

Surveys are often used to gather information on behavior or other psychological processes that are difficult, if not impossible, to observe directly. For example, imagine that you are a psychologist interested in learning the degree to which people pay attention to their private thoughts and feelings, and the degree to which they disclose these private thoughts and feelings to others. You might ask them to complete a survey questionnaire similar to the one in Self-Discovery Questionnaire 1-1, which measures both the personality trait known as *private self-consciousness* and the behavioral tendency to *self-disclose*. Before reading further, spend a few minutes answering these items and check how your responses compare with those of other adults.


## How Do Psychologists Measure Self-Consciousness and Self-Disclosure Tendencies?

### Measuring Private Self-Consciousness

Items on the Self-Consciousness Scale (SCS) (Fenigstein et al., 1975) measure the personality trait of private self-consciousness. To obtain information on the degree to which you attend to your own private thoughts and feelings, read each item below and then indicate how well each statement describes you, using the following response scale:

0 = extremely uncharacteristic (not at all like me)
1 = uncharacteristic (somewhat unlike me)
2 = neither characteristic nor uncharacteristic
3 = characteristic (somewhat like me)
4 = extremely characteristic (very much like me)

___ 1. I'm always trying to figure myself out.
___ 2. Generally, I'm not very aware of myself.*
___ 3. I reflect about myself a lot.
___ 4. I'm often the subject of my own fantasies.
___ 5. I never scrutinize myself.*
___ 6. I'm generally attentive to my inner feelings.
___ 7. I'm constantly examining my motives.
___ 8. I sometimes have the feeling that I'm off somewhere watching myself.
___ 9. I'm alert to changes in my mood.
___ 10. I'm aware of the way my mind works when I work through a problem.

The two items with an asterisk (*) are reverse-scored; that is, for these items, a lower rating actually indicates a greater tendency to attend to private thoughts and feelings. Before summing the items, recode those with an asterisk so that 0 = 4, 1 = 3, 3 = 1, and 4 = 0. To calculate your private self-consciousness score, simply add up your responses to the 10 items. The average, or mean, score for college students on private self-consciousness is about 26. The higher your score is above this value, the greater is your tendency to reflect upon your private thoughts and feelings compared to the average American college student. The lower your score is below this value, the less likely is your tendency to regularly engage in this sort of private self-awareness compared to other students.

### Measuring the Tendency to Self-Disclose

Items on The Self-Disclosure Scale (Miller et al., 1983) measure one's willingness to self-disclose. To obtain information on your self-disclosure tendencies, indicate for the topics listed below the degree to which you have disclosed to a close romantic partner, using the following scale:

Discussed not at all 0 1 2 3 4 Discussed fully and completely

___ 1. My personal habits
___ 2. Things I have done that I feel guilty about
___ 3. Things I wouldn't do in public
___ 4. My deepest feelings
___ 5. What I like and dislike about myself
___ 6. What is important to me in life
___ 7 What makes me the person I am
___ 8. My worst fears
___ 9. Things I have done that I am proud of
___ 10. My close relationships with other people

### Total Score

You can determine your overall self-disclosure score by adding up the scores in the column. The higher the score, the greater is your willingness to self-disclose.

*Every journey into the past is complicated by delusions, false memories, false namings of real events.*

—Adrienne Rich, U.S. poet, b. 1929

If you simply used survey data to determine how people compare on various personality and behavioral measures, this type of research would involve observational methods in which description is the primary goal. However, returning to our example, imagine that you are interested in discovering whether there is a relationship between private self-consciousness and willingness to self-disclose. That is, do people who regularly attend to their private thoughts and feelings disclose this private side of themselves more than those who do not habitually self-reflect? Now, you are seeking information on whether these two variables are *correlated*. That is, can you predict whether people are likely to self-disclose based on their level of private self-consciousness, or vice versa? In correlational research, as in observational research, you would not try to influence how much time people in your study actually spent thinking about themselves. Instead, you would merely gather information on how often they attended to their own thoughts and feelings, and the degree to which they self-disclosed to others.

## The Correlation Coefficient

Correlational research aids in prediction by providing information on the *direction* and *strength* of the relationship between two variables. The direction of the relationship between variable A and variable B tells the researcher how they are related (positively or negatively). The strength of the relationship can be thought of as the degree of accuracy with which you can predict the value of one variable by knowing the value of the other variable. The direction and strength of the relationship between two variables are described by the statistical measure known as the **correlation coefficient (*r*)**. This correlation coefficient can range from –1.00 to +1.00.

**Correlation coefficient (*r*)** A statistical measure of the direction and strength of the linear relationship between two variables, which can range from –1.00 to +1.00

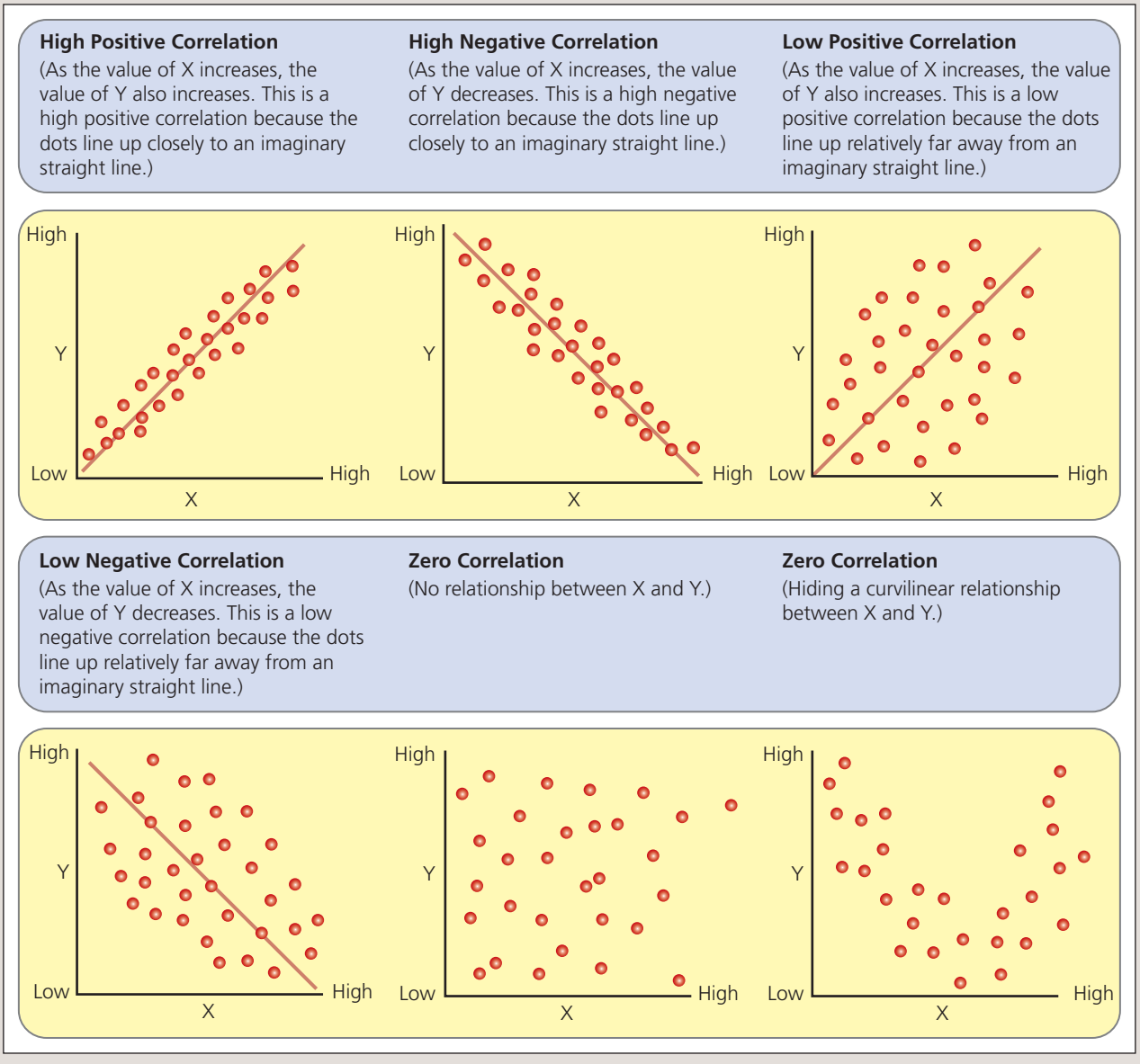
Returning to the example of self-consciousness and self-disclosure, a correlation at or very near zero indicates the absence of a *linear relationship* between these two variables. This zero correlation may mean one of two things: (1) regularly self-reflecting has no association with self-disclosing, or (2) there is a *curvilinear relationship* between self-reflection and self-disclosing. One can easily determine the meaning of a zero correlation by plotting the pairing of these two variables on a graph, as is illustrated in Figure 1-5. In marked contrast to a zero correlation, one that is near +1.00 would suggest that people who regularly attend to their private thoughts and feelings are much more likely to self-disclose than those who engage in little self-reflection. In contrast, a correlation near –1.00 indicates that those who regularly self-reflect are much less likely to self-disclose to others than those who engage in little self-reflection.

Regarding the strength of a relationship, researchers seldom find a perfect or near perfect ($r$ = +1.00 or $r$ = –1.00) correlation between variables. For example, a study investigating the relationship between young adults' private self-consciousness and their degree of self-disclosure to their romantic partners found a correlation of .36 for men and a correlation of .20 for women (Franzoi et al., 1985). Due to the direction of the correlation, you might predict that men with a high level of private self-consciousness would be more likely to self-disclose to their romantic partners than men with a low level of private self-consciousness. For women, you would make the same prediction, but you would be less confident due to this correlation's lower strength.

Although these correlations might seem small, in social science research correlations seldom exceed .60. Correlations of .50 to .60 are regarded as strong, those between .30 and .50 are moderately strong, and those below .30 or .20 are considered rather weak. The reason correlations rarely exceed .60 is that many variables determine human behavior. In the example of self-disclosing to someone, many variables will influence people's degrees of self-disclosure. In addition to the disclosers' own levels

**FIGURE 1-5 Graphing the Relationship Between Variable X and Variable Y**

The points on the graphs represent a pairing of variable X with variable Y for each participant in the study. As you can see in the curvilinear relationship graph, the zero correlation is hiding a meaningful relationship, one in which both high and low levels of X are associated with high levels of Y, but moderate levels of X are associated with low levels of Y. Can you think of variables that would have a curvilinear relationship? In addition to the direction of the relationship between variable X and variable Y, correlations can have different values. The greater the scatter of values on the graph, the lower the correlation. A perfect correlation occurs when all the values fall on an imaginary straight line.

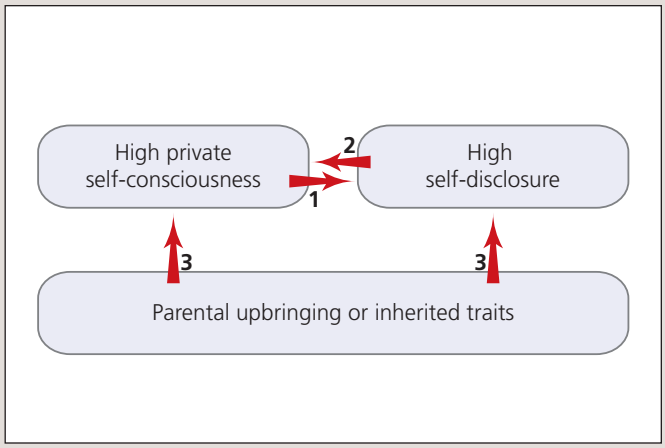



of private self-consciousness, we must consider their partners' willingness to listen, the closeness of the relationship, and the amount of time they actually spend together. Furthermore, even if researchers could isolate all the important variables that influence self-disclosing, because of the nature of our subject—humans with minds of their own—it's unlikely they would be able to predict with perfect reliability people's actions.

The major disadvantage of the correlational study is that it cannot definitively determine the cause of the relationship between two variables. That is, besides

**FIGURE 1-6 Difficulties in Determining Causation from Correlation**

People who are high in private self-consciousness (PSC) are more willing self-disclosers than those low in PSC. Thus, you might conclude that being high in PSC causes increased self-disclosing in people (arrow 1). However, an alternative explanation is that the act of regular self-disclosing causes an increase in people's level of PSC (arrow 2). What is this methodological problem of correlation interpretation called? Now look at arrow 3. What if parental upbringing or inherited genes were causing the changes in both PSC and self-disclosing? What sort of correlation problem would this example illustrate?




*The invalid assumption that correlation implies cause is probably among the two or three most serious and common errors of human reasoning.*

—Stephen Jay Gould, *The Mismeasure of Man* (1981), p. 242

knowing the strength and direction of a relationship, another piece of information that is extremely valuable when conducting an empirical study is knowing which variable caused a change in the other. Does attending to their own thoughts and feelings make people more eager to self-disclose, or does self-disclosing make people more attentive to these thoughts and feelings? This methodological disadvantage can result in the *reverse-causality problem,* which occurs whenever either of the two variables correlated with one another could just as plausibly be the cause or the effect (see Figure 1-6).

A second problem resulting from the inability to confidently determine causality is that it is possible that a third, unmeasured variable causes changes in both variables under study. This is known as the *third-variable problem* (see Figure 1-6 again). Regarding our previous example, it's possible that what looks like a positive correlation between private self-consciousness and self-disclosing is really an illusion because it is really another variable—perhaps parental upbringing or inherited traits—that is causing both those changes.

## 1.3e Experimental Research Determines Cause-Effect Relationships.

**Experimental research** Research designed to test cause-effect relationships between variables

**Independent variable** The experimental variable that the researcher manipulates

**Dependent variable** The experimental variable that is measured because it is believed to depend on the manipulated changes in the independent variable

**Random assignment** Placement of research participants into experimental conditions in a manner that guarantees that all have an equal chance of being exposed to each level of independent variable

Because correlational studies cannot conclusively tell us *why* variables are related to one another, psychologists conduct **experimental research** to examine cause-effect relationships (Nestor & Schutt, 2012). In an experiment, the psychologist manipulates one variable by exposing research participants to contrasting levels of it (for example, high, medium, low, no exposure) and then observes what effect this manipulation has on the other variable, which has not been manipulated. The variable that is manipulated is called the **independent variable**, and it is the one the experimenter is testing as the possible cause of any changes that might occur in the other variable. The variable whose changes are considered to be the effect of the manipulated changes in the independent variable is called the **dependent variable**. Once participants have been exposed to the independent variable, their behavior is carefully monitored to determine whether the dependent variable changes in the predicted fashion with different levels of the independent variable. If it does, the experimenter concludes that the independent variable is the cause of the changes in the dependent variable.

A key feature of most experiments is that participants are randomly assigned to the different levels of the independent variable. In such a **random assignment**, the

experimenter, by some random procedure, decides which participants are exposed to which level of the independent variable. Due to this procedure, the experimenter can be reasonably confident that the participants in the different experimental conditions don't differ from one another.

Some of the better-known experiments in psychology are Albert Bandura's Bobo doll studies, in which he and his colleagues studied whether children would imitate the behavior of an aggressive adult (Bandura et al., 1961). In one of these experiments, a child was first brought into a room to work on an art project. In another part of the room, an adult who was a *confederate*—meaning she was an accomplice of the experimenter—was playing quietly with some Tinker Toys. Near these toys were a mallet and a Bobo doll, which is a big, inflatable clownlike toy that is weighted down so that when it is pushed or punched down it will bounce back to an upright position. With half of the children in the study, the adult, after playing with the Tinker Toys for a minute, stood up, walked over to the Bobo doll, and began to attack it. She punched the doll, kicked it, hit it with the mallet, and even sat on it. As she pummeled the clown doll, she yelled out, "Sock him in the nose! ... Kick him! ... Knock him down!" With the other children, the adult simply played quietly and nonaggressively with her toys for ten minutes.

In Bandura's study, the independent variable (remember, that is the variable that is manipulated) was the aggressiveness of the adult's play behavior. After witnessing either the aggressive or nonaggressive adult confederate, each child was led into another room filled with many interesting toys. However, before the child could play with them, the experimenter aroused frustration by saying that these were her best toys and she must "save them for the other children." The child was then led to a third room, containing both aggressive and nonaggressive toys, including a Bobo doll. What children did in this third room was the essential question of the study, for their level of aggressive play here was the dependent variable. The children who had observed the aggressive adult were in what is called the **experimental condition**, which is the condition where participants are exposed to different levels of the independent variable (in this case, the adult's aggression). In contrast, the children who had observed the nonaggressive adult were in what is called the **control condition**, which is the condition where participants are not exposed to the independent variable. Because the only difference between the experimental and control conditions in this study was whether or not the children had been exposed to an aggressive adult (the independent variable), any subsequent differences in the children's aggression (the dependent variable) could be explained as being caused by the manipulation of the independent variable.

**Experimental condition** The condition in an experiment whereby participants are exposed to different levels of the independent variable

**Control condition** The condition in an experiment in which participants are not exposed to the independent variable

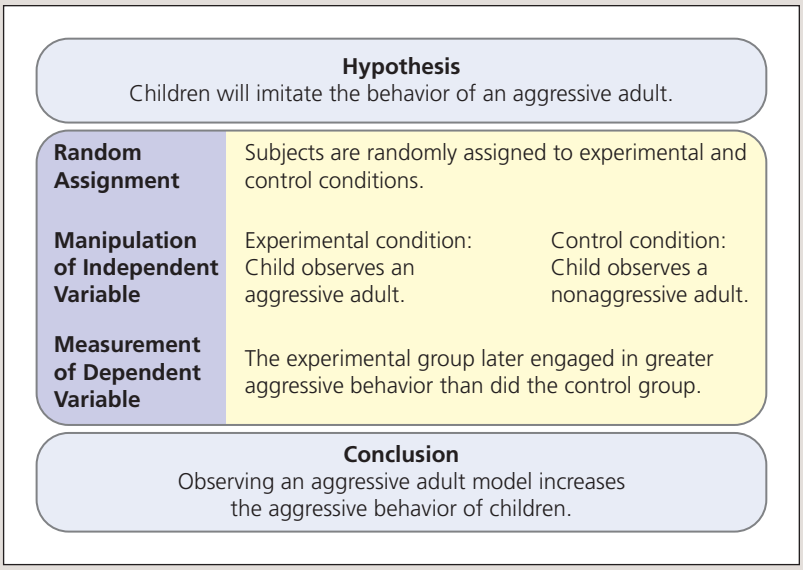
So what happened in the third room? Children in the control condition tended to play nonaggressively with the toys, whereas those in the experimental condition tended to beat up the Bobo doll, often shouting the same things at the clown as the previous aggressive adult. Based on this experiment and others like it, Bandura concluded that observing adult aggression could teach children to act more aggressively themselves. Figure 1-7 provides an overview of the elements in an experiment, using Bandura's study as an example.

Recently, some psychologists have begun using *virtual environment technology (VET),* in which they create a virtual research environment using a computer (Schmelter et al., 2009). Once this simulated reality is created, research participants wearing virtual reality equipment are "immersed" in the setting. A commonly used piece of virtual reality equipment is a head-mounted or binocular-style device that allows an individual to view 3-D images and to "walk" through the virtual environment. Although this type of simulated environment is completely controlled by the experimenter—even more than the traditional laboratory setting—it has a

**FIGURE 1-7**

**The Basic Elements in an Experiment**

As illustrated in the Bandura study, the power of experimental research is based on treating the experimental and control groups exactly alike except for the manipulation of the independent variable. Any later observed differences in the dependent variable between the two groups can then be confidently attributed to the effects of the independent variable.




very "real-world" feel to it. Studies employing virtual environment technology suggest that participants behave relatively naturally in such settings (Waller et al., 2002). Although still in its infancy, virtual environment technology is currently being used to study such topics as conformity, eyewitness testimony, effects of violent video games, and simulated weightlessness. As this technology improves, psychologists hope to involve senses beyond sight and hearing, as well as to improve the ways people can interact with the virtual creations they encounter. This technology is not meant to replace traditional laboratory studies but instead is meant to provide another research vehicle that psychologists can use in their journey of discovery.

## Journey of Discovery

What role should values play in science? Is it possible or desirable to separate values from science?

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Should psychologists use their scientific knowledge about the harmful effects of television violence to influence social decisions? Will the knowledge you gain by studying psychology influence how you raise your own children?

Now that you have learned about the different scientific methods that psychologists use, which is best? Actually, what I hope you take from this overview is that there is no one best method for all research settings. In each investigation, the psychologist must decide what method would provide the best test of the hypotheses under consideration. The best overall strategy for psychologists to take is a multimethod approach—employing different methods to study the same topic, thereby capitalizing on each method's strengths and controlling for its weaknesses.

## 1.3f There Are No "Final Truths" in Science.



In the United States, an increasing number of school boards are in the grip of a controversy concerning whether *creation science* should be taught in science classes as an alternative explanation to evolutionary theory. The core of this argument involves what qualifies as a scientific theory. Advocates of creation science (sometimes referred to as *creationism* or *intelligent design*) reject evolution and adhere to a Bible-based explanation of God creating the world in seven days (Evans, 2001). Some followers of creation science proclaim a more literal interpretation of the Bible's creation story than do others. *Young earth creationists* believe in the book of Genesis's literal 7-day creation story, while *old earth creationists* believe that the seven days should be interpreted as figurative lengths of time. Whatever their differences concerning how much time passed while God created life, all creationists assert that their explanation is at least as scientifically based as evolutionary theory. My purpose here is not to judge the validity of the Bible's creation story. Instead, I would like to pose the following question: Based on your understanding of the scientific method, does creation science have a legitimate claim on being referred to as a scientific theory?

Let's review what constitutes a scientific theory. A *theory* is an organized system of ideas that seeks to explain why two or more events are related. To qualify as a scientific theory, an explanation must be testable by the methods of science. The explanation must also be *falsifiable,* meaning that it must be possible to find fault with, or disconfirm, the explanation. If no one can think of a test that would falsify an explanation, then the explanation is not a scientific theory—even if it is true. "God exists" is a statement that cannot be tested because there is no conceivable experiment or observation that would falsify it. Belief in God's existence is a matter of faith, not science. Likewise, the statement "God created life" is not falsifiable. Therefore, creationism does not qualify as a scientific theory (Perakh, 2004). In 1987, the U.S. Supreme Court agreed with this assessment and ruled that creationism is religion, not science, and cannot be advocated as a scientific theory in public school classrooms (*Edwards v. Auguillard*).

As already noted, creationism stands sharply opposed to evolutionary theory. Why does the theory of evolution qualify as a scientific theory? The simple answer is that this theory is falsifiable. Tests can determine whether or not evolutionary theory is correct as it currently stands (actually, there is more than one theory of evolution), and these tests can be carried out. Current and past evolutionary theories have all been subjected to these tests, and the general principles of evolutionary theory have been repeatedly supported. Based on this wealth of evidence, virtually all scientists express strong confidence in the overall theory. Likewise, many religious organizations have concluded that evolutionary theory is not inconsistent with descriptions of creation and the origin of the human species. Many members of these religious organizations could be classified as *theistic evolutionists:* They believe that evolution is an accurate explanation of how organisms change over time, but they also believe in a God who is both personal and concerned about his (or her) creation (which is different from a Deist God who isn't concerned). Their first belief rests on the findings of science, while their second belief rests on their religious faith, which is beyond the bounds of science.

The vast majority of Americans, including many scientists, believe that God created the universe and life on this planet (Deckman, 2002). This belief in theistic evolution does not necessarily contradict or otherwise stand in opposition to scientific explanations of evolution. Perhaps one way to approach science and religion is in the following manner, suggested by Roman Catholic Pope Pius X:

> *... science is entirely concerned with the reality of phenomena, into which faith does not enter at all; faith on the contrary concerns itself with the divine reality which is entirely unknown to science ..[T]here can never be any dissension between faith and science, for if each keeps on its own ground they can never meet and therefore never be in contradiction.*
>
> —Pius X, Roman Catholic Pope, 1835–1914

In summary, it is important to understand that truth in science is never final. Scientific theories are explanations of how things in the world are related to one another and how they operate. They are logically constructed and reconfigured from careful observations and testable hypotheses. You can have such overwhelming data supporting your theory that you have very strong confidence that it accurately explains the phenomena in question; at the core of the scientific journey of discovery, however, is the assumption that any theory can be modified or completely discarded tomorrow. Thus, if you seek to understand the human mind using the scientific method, it is a mistake to believe that any theory can achieve a "final truth."

## Section REVIEW

- Scientific methods help psychologists gather, analyze, and interpret information in a way that reduces error and leads to dependable generalizations.
- The process of scientific inquiry occurs in stages:
  - Stage 1 involves selecting a topic and searching the research literature.
  - Stage 2 involves developing theories and hypotheses.
  - Stage 3 involves selecting a scientific method and submitting a proposed study for ethical evaluation.
  - Stage 4 involves collecting and analyzing data, and reporting results.
- Observational research describes behavior as it occurs in its natural setting.
- Correlational research assesses the direction and strength of the relationship between two or more variables.
- Experimental research involves manipulation of one or more independent variables to determine what effect this has on nonmanipulated dependent variables.
- A basic assumption in science is that any theory can be modified or completely discarded in the light of new evidence.

PSYCHOLOGICAL applications

## How Can You Develop Critical Thinking Skills?

In this last section of Chapter 1, I discuss the kinds of critical thinking skills that not only are necessary in conducting scientific research but also are important in making you both a wise consumer of psychological knowledge and a capable decision maker in your own journey of discovery.

### What Is Critical Thinking?

When my oldest daughter, Amelia, was 9 years old, I took her to a toy store so that she could pick out a new bicycle for her birthday present. The colors, names, and styles of the bikes were clearly aimed at steering girls and boys toward different choices. Yet, Amelia ignored these gender labels and tested all the bikes. At the end of this process, she knew which bike felt the best riding-wise—the blue Huffy Hyper Force boy's bike. She also knew, however, that if she picked a boy's bike, some of the neighborhood kids would tease her. Amelia realized she could avoid the negative comments by picking her second choice, the pink Barbie Fashion Fun girl's bike. All this she explained to me as we stood in the store scanning the array of possibilities before us. Perhaps she was hoping that I would draw upon that mystical "father knows best" wisdom that I had sometimes alluded to and simply tell her which bike to choose. Instead, I said, "Amelia, this is your decision. Think about what's most important to you." After carefully evaluating the evidence and weighing the possible consequences of her two choices, she picked the Hyper Force boy's bike.

This Amelia example illustrates an important type of problem-solving skill known as *critical thinking.* As defined earlier in the chapter, critical thinking is the process of deciding what to believe and how to act based on a careful evaluation of the evidence. In picking a bike, Amelia could have uncritically followed the color designations and bike styles that her culture designates for girls; instead, she decided that these gender labels unnecessarily restricted her choices. By challenging the assumption that a bike's color and style restricted who could ride it, Amelia could now entertain many more bike possibilities. Once she had gathered her own information by riding all the bikes, she also could have ignored the evidence of her senses and chosen the gender-appropriate but less rider-worthy bike. Again, based on careful reflection of her options, she made her choice. That is one hallmark of critical thinking.

What if Amelia had decided, after going through this entire process, that the benefits of the better-riding boy's bike were not enough to justify the social hassles associated with it? Would this decision to pick the girl's bike not be based on critical thinking? The answer is no. The choice is not what determines whether critical thinking took place. Rather, it is the type of cognitive process that one engages in that is crucial. What we know is that thinking critically about the arguments that you make to yourself, or that others make to you, can greatly improve your own decision making (Anderson, 1993; McBride et al., 2002).

### Guidelines for Critical Thinking

The following are some general guidelines on how to think critically:

1. *Be willing to ask questions.* Knowledge begins with questioning the nature of things. Think of the process of questioning as a sign of inquisitiveness, not as a lack of intelligence.
2. *Analyze assumptions.* Instead of passively accepting assumptions as facts, think about possible exceptions and contradictions.
3. *Examine the evidence.* Instead of accepting a conclusion without evidence, ask for and analyze the evidence that supports and contradicts the various positions.
4. *Be cautious of emotional decisions.* Although there is certainly nothing wrong with being emotionally involved with a particular decision, avoid basing your decision on what you would like to be true rather than what you know to be true.
5. *Avoid oversimplifying issues.* It can be comforting to make simple generalizations about complex events, but resisting glib explanations provides the opportunity for creative complexity.
6. *Tolerate ambiguity.* By rejecting simple answers, you must learn to develop a tolerance for ambiguity. Don't be afraid to admit that you don't know the correct answer when the evidence suggests not one correct solution, but many possible ones.

Critical thinking can be fostered through many activities, but the study of psychology is particularly helpful in promoting this type of cognitive activity (Haw, 2011). In fact, when researchers examined the reasoning ability of graduate students in psychology and chemistry, they found that as the two groups advanced through graduate school, the psychology students became better at analyzing everyday events, while the chemistry students showed no improvement (Lehman et al., 1988).

One of the likely reasons that psychology promotes critical thinking is that students of psychology learn a great deal about how the mind works, including the many biases and errors that are obstacles to intelligent thinking. In this instance, knowledge really is power. Hopefully, one of the benefits of taking this course is that your increased knowledge of how people think and behave will allow you to make more intelligent decisions in your everyday life.

### Using Critical Thinking While Reading This Textbook

Although greater knowledge of psychology may ultimately benefit future decision making, one of your more immediate concerns may be how critical thinking can improve your study skills in college. This is certainly a legitimate concern. Let me briefly describe how you can use a critical thinking strategy known as PRQR while reading the textbook.

### The PRQR Technique

Before reading each chapter, *preview* (P) the material by first reading the chapter-opening story and outline, as well as the section summaries and "Journey of Discovery" questions. This will provide you with a general understanding of what you are about to read so that you can better organize the text material in memory. Next, *read* (R) an entire chapter section; and as you do, ask *questions* (Q) that focus your attention on the topics. Regularly ask yourself how the text material supports or calls into question any prior beliefs you may have had on the topic. Further, how can the material you are reading help you better understand your own life and events in your world? In writing this text, I attempted to facilitate your critical thinking by regularly asking you questions within the main body of the text and in the captions accompanying the tables, figures, and photographs. Finally, once you have read the chapter, *review* (R) the material so that the information is more securely stored in memory.

In addition to this reading technique, I recommend that you read text material before your professor talks about it in lecture. By staying slightly ahead of lecture content, you will better comprehend and remember the material presented in class because you already have information in memory upon which you can "hang" the new lecture material. Also, spend time answering the "Journey of Discovery" questions contained within each chapter. These focused questions encourage you to analyze psychological concepts, provide alternative explanations for research findings, and explore the implications of the text material.

In summary, to be an efficient consumer of psychological knowledge and a capable decision maker in your everyday activities, you need to be willing to exercise your mind like athletes exercise their bodies. You must condition yourself to actively question and scrutinize not only course material but also life events. If you learn to think critically, you will retain something of value long after this textbook and your psychology course are distant memories.

> *We do not live to think, but, on the contrary, we think in order that we may succeed in surviving.*
>
> —José Ortega y Gasset, Spanish philosopher, 1883–1955

Chapter Review

## Suggested Websites

### Today in the History of Psychology

http://www.cwu.edu/~warren/today.html

This site contains a collection of dates and brief descriptions of over 3,100 events in the history of psychology. Type in any day of the year and find out what happened on that day.

### American Psychological Association

http://www.apa.org

This official APA site provides access to many APA-sponsored websites related to various psychological issues.

### Association for Psychological Science

http://www.psychologicalscience.org

This official website of the APS provides access to many psychology-related websites and APS journals.

### Psychology Web Links by Topic

http://www.socialpsychology.org/psylinks.htm

This is the general psychology link on the Social Psychology Network, which has more than 5,000 links to psychology topics. The Psychology Subject Areas list provides important information on the various subdisciplines in psychology.

**Animal Welfare Information Center**

http://www.nal.usda.gov/awic

This website provides information on the ethical treatment of animals in government-sponsored research programs.

**Critical Thinking and Psychology Links**

http://www.mcckc.edu/longview/ctac/psychlink.htm

This website contains exercises for promoting critical thinking in psychology.

## Key Terms

Applied psychologists, 17
Behaviorism, 7
Case study, 26
Cognitive psychology, 10
Collectivism, 15
Control condition, 31
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## Review Questions

1. In what year was the first institute for research in experimental psychology opened?
   a. 1879
   b. 1890
   c. 1921
   d. 1940
   e. 1960

2. Which of the following is true of William James?
   a. He wrote a classic book, titled Principles of Psychology.
   b. He wanted to understand how the mind affects what people do rather than merely identifying its components.
   c. He did very little lab work; rather, he relied on his ideas and writings.
   d. His approach to psychology became known as functionalism.
   e. All of the above

3. Which of the following is true of Sigmund Freud?
   a. He contended that our personality matures slowly but surely over the years.
   b. He emphasized the study of the conscious experience.
   c. He had no direct experience working with patients.
   d. He was technically a psychiatrist, not a psychologist.
   e. He is closely associated with behaviorism.

4. Which of the following founders of psychology believed psychology should study observable behavior rather than hidden psychological processes?
   a. Sigmund Freud
   b. William James
   c. John Watson
   d. Wilhelm Wundt
   e. Max Wertheimer

5. Of the four early schools of psychology discussed in the chapter, which perspective(s) survived as (a) contemporary perspective(s)?
   a. psychoanalysis
   b. behaviorism
   c. structuralism
   d. functionalism
   e. a and b

6. Who were considered the architects of the perspective that emphasized people's innate capacity for personal growth and their ability to make choices?
   a. William James and Wilhelm Wundt
   b. Carl Rogers and Abraham Maslow
   c. Mary Calkins and Mamie Phipps Clark
   d. Sigmund Freud and B. F. Skinner
   e. None of the above

7. Which of the following is true of the cognitive perspective?
   a. It emphasized the essential goodness of people.
   b. It coincided with the development of the computer.
   c. It is the least scientifically based of the contemporary perspectives.
   d. It promoted the scientific study of love.
   e. None of the above

8. Which of the following is true of the neuroscience perspective?
   a. A good deal of its research is done on humans.
   b. It does not believe that research on animals can benefit humans.
   c. It is focused on the most precise microscopic levels of analysis.
   d. It is based on the writings of the biologist Charles Darwin.
   e. All of the above

9. Which of the following statements is true?
   a. Evolutionary factors along with social and cultural factors can help explain human thought and behavior.
   b. The sociocultural and evolutionary perspectives are not compatible.
   c. Genetic change occurs more rapidly than cultural changes.
   d. There is a great deal of genetic variation among cultural groups.
   e. All of the above

10. Which of the following statements is true?
    a. Thirty percent of the world's population lives in cultures with a collectivist orientation.
    b. The cultural belief system of individualism is older than collectivism.
    c. From an evolutionary perspective, individualism is better than collectivism.
    d. All of the above
    e. None of the above

11. Which of the following is an applied specialty?
    a. clinical psychology
    b. counseling psychology
    c. industrial psychology
    d. school psychology
    e. all of the above

12. Dement's claim that there is something basic in our need to dream would be considered a _____.
    a. hypothesis
    b. theory
    c. case study
    d. correlational coefficient
    e. topic selection

13. Which of the following applies to institutional review boards (IRBs)?
    a. They monitor and evaluate research proposals involving only human subjects.
    b. They focus on risk/benefit ratio.
    c. They never allow participants to be deceived about a study's true purpose.
    d. They claim that human psychological research is a high-risk activity.
    e. a and b

14. Which of the following statements is true of animal research?
    a. Most animal research is unnecessary.
    b. Other methods could be used so that animals are not needed in behavioral research.
    c. Nearly 90 percent of animals used in research are rodents.
    d. Ninety percent of behavioral and biomedical research causes pain and significant distress to animals.
    e. Animals do not benefit from animal research.

15. Which of the following statements is true?
    a. Descriptive statistics are a more valued type of statistic than inferential statistics.
    b. A difference is considered statistically significant if the likelihood of it having occurred by mere chance is less than 1 in 5.
    c. Contemporary psychology does not require extensive knowledge of statistics.
    d. Meta-analysis is the technique of counting the number of studies that find or do not find a particular effect.
    e. Reporting results is an important stage of research.

16. All but which of the following are advantages of naturalistic research and participant observation research?
    a. There is an absence of control.
    b. They provide a full context for behavior.
    c. The opportunity to record events is difficult to replicate in a laboratory.
    d. They can observe events too risky to create in a laboratory.
    e. They can record events previously only observed by nonscientists.

17. Correlational studies cannot determine the cause of the relationship between two variables because of which of the following?
    a. the third-variable problem
    b. the reverse-causality problem
    c. research correlation rarely exceeds .60
    d. all of the above
    e. a and b

18. In Bandura's Bobo doll study, the level of aggressive play of the child in the third room was which of the following?
    a. the experimental condition
    b. the control condition
    c. the dependent variable
    d. the independent variable
    e. the random assignment

19. Considering the Amelia example, which of the following choices illustrates critical thinking?
    a. buying the boy's bike
    b. buying the girl's bike
    c. not buying a bike at all
    d. asking her dad's advice
    e. none of the above

20. Which of the following does the PRQR technique suggest you do?
    a. Preview the material by first reading the chapter-opening story and outline.
    b. Read an entire section.
    c. Ask questions that focus your attention on the topics.
    d. Review the material so that the information is more securely stored in memory.
    e. All of the above

Answers: 1.a 2.e 3.d 4.c 5.e 6.b 7.b 8.c 9.a 10.e 11.e 12.b 13.b 14.c 15.e 16.a 17.e 18.c 19.e 20.e