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## CHAPTER 1

### SURVEY THE CHAPTER

#### Psychology Is a Science

CRITICAL THINKING AND THE SCIENTIFIC ATTITUDE

##### THINKING CRITICALLY ABOUT:

THE SCIENTIFIC ATTITUDE  
PSYCHOLOGICAL SCIENCE'S BIRTH AND  
DEVELOPMENT  
TODAY'S PSYCHOLOGY

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STUDYING AND PROTECTING HUMANS  
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#### Use Psychology to Improve Your Life and Become a Better Student

# Psychology's Roots, Critical Thinking, and Self-Improvement Tools

**H**oping to understand themselves and others, millions turn to psychology, as you now do. What do psychologists really know? You might think that psychologists analyze personality, examine crime scenes, testify in court, and offer advice about parenting, love, happiness, and overcoming personal problems. Do psychologists do all these things? Yes, and much more. Consider some of the questions psychologists study that you may also wonder about:

- Have you ever found yourself reacting to something as one of your biological parents would — perhaps in a way you vowed you *never* would — and then wondered how much of your personality you inherited? *How much are we shaped by our genes, and how much by our home and community environments?*
- Have you ever worried about how to act among people of a different culture, race, gender identity, or sexual orientation, or among people with differing abilities? *How are we alike as members of the human family? How do we differ?*
- Have you ever awakened from a nightmare and wondered why you had such a crazy dream? *Why do we dream?*

- Have you ever played peekaboo with a 6-month-old and wondered why the baby finds your disappearing/reappearing act so delightful? *What do babies actually perceive and think?*
- Have you ever wondered what leads to success in life? *Does the intelligence we are born with explain why some people get richer, think more creatively, or relate more sensitively? Or does gritty effort, and a belief that we can grow smarter, matter more?*
- Have you ever become depressed or anxious and wondered whether you'll ever feel "normal"? *What triggers our bad moods—and our good ones? What's the line between a routine mood swing and a psychological disorder?*

As you will see, psychological science has produced some fascinating and sometimes surprising answers to these questions. Psychology's roots are broad, reaching back into philosophy and biology, and its branches now spread out across the world.

## Psychology Is a Science

### Learning Objective Question LOQ 1-1

How is psychology a science? How does critical thinking feed a scientific attitude, and smarter thinking for everyday life?<sup>1</sup>

Once upon a time, on a planet in our neighborhood of the universe, there came to be people. These creatures became intensely interested in themselves and one another. They wondered, "Who are we? Why do we think and feel and act as we do? And how are we to understand—and to manage—those around us?"

To be human is to be curious about ourselves and the world around us. The ancient Greek naturalist and philosopher

Aristotle (384–322 B.C.E.) wondered about learning and memory, motivation and emotion, perception and personality. We may chuckle at some of his guesses, like his suggestion that a meal makes us sleepy by causing gas and heat to collect around what he thought was the source of our personality, the heart. But credit Aristotle with asking the right questions.

## CRITICAL THINKING AND THE SCIENTIFIC ATTITUDE

Psychology asks similar questions. But today's psychologists search for answers differently, by scientifically studying how we act, think, and feel. They do so with critical thinking and the scientific attitude.

**Critical thinking**<sup>2</sup> is smart thinking. Whether reading a research report or an online opinion, critical thinkers ask questions. *How do they know that? Who benefits? Is the conclusion based on a personal story and gut feelings or on scientific evidence? How do we know one event caused the other? How else could we explain things?*

Critical thinkers wince when people say something is true based on gut feelings: "I feel like climate change is [or isn't] happening." "I feel like self-driving cars are more [or less] dangerous." "I feel like my candidate is more honest." Such beliefs (commonly mislabeled as feelings) may or may not be true. Critical thinkers are open to the possibility that they (or you) might be wrong. Sometimes the best evidence confirms what we believe to be true. Sometimes it challenges these claims and leads us to a different way of thinking. To believe everything—or to reject everything—is to be a fool.

Some deeply religious people may view critical thinking and scientific inquiry, including psychology's, as a threat. Yet many of the leaders of the scientific revolution, including Copernicus and Newton, were deeply religious people acting on the idea that "in order

to love and honor God, it is necessary to fully appreciate the wonders of his handiwork" (Stark, 2003a,b).<sup>3</sup>

From a humorous Twitter feed:  
"The problem with quotes on the internet is that you never know if they're true."  
—Abraham Lincoln

In psychology, critical thinking has led to some surprising findings. Believe it or not . . .

- massive losses of brain tissue early in life may have few long-term effects (see Chapter 2).
- within days, newborns can recognize their mother's odor (Chapter 3).
- after brain damage, some people can learn new skills, yet at the mind's conscious level be unaware that they have these skills (Chapter 7).
- most of us—male and female, old and young, wealthy and not wealthy, with and without disabilities—report roughly the same levels of personal happiness (Chapter 10).
- an electric shock delivered to the brain (*electroconvulsive therapy*) may relieve severe depression when all else has failed (Chapter 14).

The more people use critical thinking, the better they separate fiction from fact (Bensley et al., 2014). In psychology, this same critical inquiry has also overturned some popular beliefs. When we let the evidence speak for itself, we learn that . . .

- sleepwalkers are not acting out their dreams (Chapter 2).
- our past experiences are not recorded word for word in our brain. Neither brain stimulation nor hypnosis will let us replay and relive long-buried memories (Chapter 7).
- most of us do not suffer from low self-esteem, and high self-esteem is not all good (Chapter 12).
- opposites do not generally attract (Chapter 11).

<sup>1</sup> To assist your learning of psychology, numbered Learning Objective Questions appear at the beginning of major sections. You can test your understanding by trying to answer the question before, and then again after, you read the section.

<sup>2</sup> Throughout the text, the most important concepts are **boldfaced**. As you study, you can find these terms defined nearby, and all together in the Glossary and Glosario.

<sup>3</sup> This book's information sources are cited in parentheses, with name and date. Every citation can be found in the end-of-book References, with complete documentation.



In later chapters, you'll see many more examples in which psychology's critical thinking has challenged old beliefs and led us onto new paths. All of science, including psychology, lets the facts speak for themselves.

Science-aided thinking is smart thinking. No matter how sensible-seeming or wild an idea, the smart thinker asks: *Does it work?* A scientific attitude prepares us to think smarter. (See *Thinking Critically About: The Scientific Attitude*.)

### IN YOUR EVERYDAY LIFE

Were you surprised to learn that psychology is a science? How would you explain that now if someone asked you about it?<sup>4</sup>

### RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

1. Describe what's involved in critical thinking.
2. Describe the three parts of the scientific attitude.

## PSYCHOLOGICAL SCIENCE'S BIRTH AND DEVELOPMENT

**LOQ 1-3** How has psychology's focus changed over time?

Psychology as we know it was born on a December day in 1879, in a small, third-floor room at a German university. There, Wilhelm Wundt and his assistants created a machine to measure how long it took people to press a telegraph key after hearing a ball hit a platform (Hunt, 1993). (Most hit the key in about one-tenth of a second.) Wundt's attempt to measure "atoms of the mind"—the fastest and simplest mental processes—was psychology's first experiment. And that modest third-floor room took its place in history as the first psychological laboratory.

<sup>4</sup> Thinking about these *In Your Everyday Life* questions and *Improve Your Everyday Life* questions—and how they relate to your own life—will help you make psychology's concepts more personally meaningful, and therefore more memorable.



(a)



(b)

**Yesterday's lack of diversity** At this 1964 meeting of the Society of Experimental Psychologists (a), Eleanor Gibson was easy to spot among the many male members, all in a sea of White faces. By contrast, women now are 55 percent of Association for Psychological Science members and 75 percent of psychology graduate students, as is clear in this photo of graduate students from Lehigh University (b). People of color have made enormous contributions to the field (see, for example, coverage of Kenneth Clark and Mamie Phipps Clark later in this chapter), and psychology's diversity continues to grow. For more on the history of these changes, see the Historical Timeline at the end of this text and in LaunchPad (LaunchPadWorks.com).

Psychology's earliest explorers—"Magellans of the mind," Morton Hunt (1993) called them—came from many disciplines and countries. Wundt was both a philosopher and a physiologist. Charles Darwin, whose thinking on species variation in the natural world led to *evolutionary psychology*, was an English naturalist. Ivan Pavlov, who taught us much about learning, was a Russian physiologist. Sigmund Freud, a famous personality theorist and therapist, was an Austrian physician. Jean Piaget, who explored children's developing minds, was a Swiss biologist. William James, who shared his love of psychology in his 1890 textbook, was an American philosopher.

Few of psychology's early pioneers were women. In the late 1800s, psychology, like most fields, was a man's world.

William James helped break that mold when he chose to mentor Mary Whiton Calkins, by accepting her into his graduate seminar. Although Calkins went on to outscore all the male students on the Ph.D. exams, Harvard University denied her the degree she had earned. In its place, she was told, she could have a degree from Radcliffe College, Harvard's undergraduate "sister" school for women. Calkins resisted the unequal treatment and turned down the offer. But she continued her research on memory, which her colleagues honored in 1905

**critical thinking** thinking that does not blindly accept arguments and conclusions. Rather, it examines assumptions, assesses the source, uncovers hidden values, weighs evidence, and assesses conclusions.

# Thinking Critically About: The Scientific Attitude

**LOQ 1-2** What are the three key elements of the scientific attitude, and how do they support scientific inquiry?

**Three basic attitudes helped make modern science possible.**

## 1 CURIOSITY:

**Does it work?**

**When put to the test, can its predictions be confirmed?**



- No one has yet been able to demonstrate extrasensory mind-reading.
- Many studies have found that higher stress relates to poorer health.

## 2 SKEPTICISM:

**What do you mean?**

**How do you know?**

Sifting reality from fantasy requires a healthy skepticism—an attitude that is not cynical (doubting everything), but also not gullible (believing everything).



- Our facial expressions and body postures can affect how we feel.
- Chapter 4 explains that there is not a relationship between parental behaviors and their children's sexual orientation.

## 3 HUMILITY:

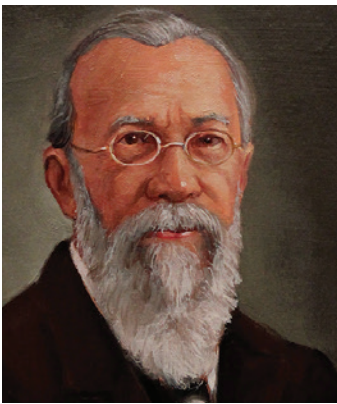
**That was unexpected!**  
**Let's explore further.**

Researchers must be willing to be surprised and follow new ideas. People and other animals don't always behave as our ideas and beliefs would predict.



One of psychology's mottos:  
The rat is always right.





**Wilhelm Wundt (1832–1920)**

Wundt established the first psychology laboratory at the University of Leipzig, Germany.



**William James (1842–1910) and Mary Whiton Calkins (1863–1930)**

James was a legendary teacher-writer who authored an important 1890 psychology text. He mentored Calkins, who became famous for her memory research and for being the first woman to be president of the American Psychological Association.



**Margaret Floy Washburn (1871–1939)**

After Harvard refused to grant Calkins the degree she had earned, Washburn became the first woman to receive a psychology Ph.D. She focused on animal behavior research in *The Animal Mind*.

by electing her the first female president of the American Psychological Association (APA). Animal behavior researcher Margaret Floy Washburn became the first woman to officially receive a psychology Ph.D. and the second, in 1921, to become an APA president. (Between 1997 and 2019, more than half of the elected presidents of the science-focused Association for Psychological Science were women.)

The rest of the story of psychology—the story this book tells—develops at many levels, in the hands of many people, with interests ranging from therapy to the study of nerve cell activity. As you might expect, agreeing on a definition of psychology has not been easy.

For the early pioneers, *psychology* was defined as “the science of mental life”—inner sensations, images, thoughts, and emotions. As it developed, psychology became organized into different branches. **Structuralism** (promoted by Wundt) focused on the structure of the mind, and **functionalism** (promoted by James) focused on how the mind functions.

And so it continued until the 1920s, when the first of two larger-than-life American psychologists challenged the idea of studying internal, mental processes. John B. Watson, and later B. F. Skinner, insisted that *psychology* must be “the scientific study of observable

*behavior*.” After all, they said, science is rooted in observation. What you cannot observe and measure, you cannot scientifically study. You cannot observe a sensation, a feeling, or a thought, but you *can* observe and record people’s *behavior* as they are *conditioned*—as they respond to and learn in different situations. Many agreed, and **behaviorism** was one of psychology’s two major forces well into the 1960s.

The other major force was Sigmund Freud’s *psychoanalytic psychology*, which emphasized the ways our unconscious mind and childhood experiences affect our behavior. Some students wonder: Is psychology mainly about Freud’s teachings on unconscious sexual conflicts and the mind’s defenses against its own wishes and impulses? No. Today’s psychological science does not support Freud’s theory of sexuality. It does, however, agree that much of the human mind operates outside our conscious awareness. (In chapters to come, we’ll look more closely at Freud and others mentioned here.)

As the behaviorists had rejected the early 1900s definition of *psychology*, other groups in the 1960s rejected the behaviorists’ definition. In the 1960s, **humanistic psychologists**, led by Carl Rogers and Abraham Maslow, found both behaviorism and Freudian psychology

too limiting. Rather than focusing on conditioned responses or childhood memories, Rogers and Maslow drew attention to our growth potential, to our needs for love and acceptance, and to environments that nurture or limit personal growth.

Another group searching for a new path in the 1960s pioneered a *cognitive revolution*, which led the field back to its early interest in how our mind processes and retains information. **Cognitive psychology** today continues its scientific exploration of how we perceive, process, and remember information, and of how thinking and emotion

**structuralism** an early school of thought promoted by Wundt that focused on the structure of the human mind.

**functionalism** an early school of thought promoted by James and influenced by Darwin that focused on how the mind functions.

**behaviorism** the view that psychology (1) should be an objective science that (2) studies behavior without reference to mental processes. Most psychologists today agree with (1) but not with (2).

**humanistic psychology** a historically important perspective that emphasized human growth potential.

**cognitive psychology** the study of mental processes, such as occur when we perceive, learn, remember, think, communicate, and solve problems.



Macmillan Learning



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### John B. Watson (1878–1958) and Rosalie Rayner (1898–1935)

Working with Rayner, Watson championed psychology as the scientific study of behavior. In a controversial study on a baby who became famous as “Little Albert,” he and Rayner showed that fear could be learned. (More about this in Chapter 6.)



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**B. F. Skinner (1904–1990)** This leading behaviorist rejected the idea of studying inner thoughts and feelings. He believed psychology should study how consequences shape behavior.



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### Sigmund Freud (1856–1939)

The controversial ideas of this famous personality theorist and therapist have influenced humanity's self-understanding.

interact in anxiety, depression, and other disorders. The marriage of cognitive psychology (the science of the mind) and neuroscience (the science of the brain) gave birth to **cognitive neuroscience**. This specialty, with researchers in many disciplines, studies the brain activity underlying mental activity.

Today's psychology builds upon the work of many earlier scientists and schools of thought. To include psychology's concern with observable behavior and with inner thoughts and feelings, we now define **psychology** as the science of behavior and mental processes.

Let's unpack this definition. Behavior is anything a human or nonhuman animal does—any action we can observe and record. Yelling, smiling, blinking, sweating, talking, and questionnaire marking are all observable behaviors. Mental processes are our internal, subjective experiences—sensations, perceptions, dreams, thoughts, beliefs, and feelings.

By now you've learned that the key word in today's psychology is science. Psychology is less a set of findings than a way of asking and answering questions. Our aim, then, is not merely to report results but also to show you how psychologists play their game. You will see how researchers evaluate conflicting opinions and ideas. And you will learn more about how you, whether as

a beginner scientist or simply a curious person, can think harder and smarter when explaining events and making choices in your own life.

## IN YOUR EVERYDAY LIFE

How would you have defined psychology before taking this class? How do you think psychology might change in the future as more women, and others from historically excluded groups, contribute their ideas to the field?

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

- ▶ 3. What event defined the start of scientific psychology?
- ▶ 4. From the 1920s through the 1960s, the two major forces in psychology were \_\_\_\_\_ and \_\_\_\_\_ psychology.
- ▶ 5. How did the cognitive revolution affect the field of psychology?

**LaunchPad** Our online learning tools will help you excel in this course. Take advantage of the LearningCurve adaptive quizzing that adjusts to your individual needs, “Assess Your Strengths” personal self-assessments, interactive simulations, and “How Would You Know?” research activities. For more information, see LaunchPadWorks.com. And for an excellent tour of psychology's roots, view the 9.5-minute *Video: The History of Psychology*.

## TODAY'S PSYCHOLOGY

**LOQ 1-4** What are psychology's current perspectives, and what are some of its subfields?

Today there are more than 1 million psychologists around the world (Zoma & Gielen, 2015). The International Union of Psychological Science has 82 member nations, from Albania to Zimbabwe. Psychology is *growing* and it is *globalizing*. The story of psychology is being written in many places, with studies ranging from the exploration of nerve cell activity to international conflicts. Modern psychology is shaped by many forces.

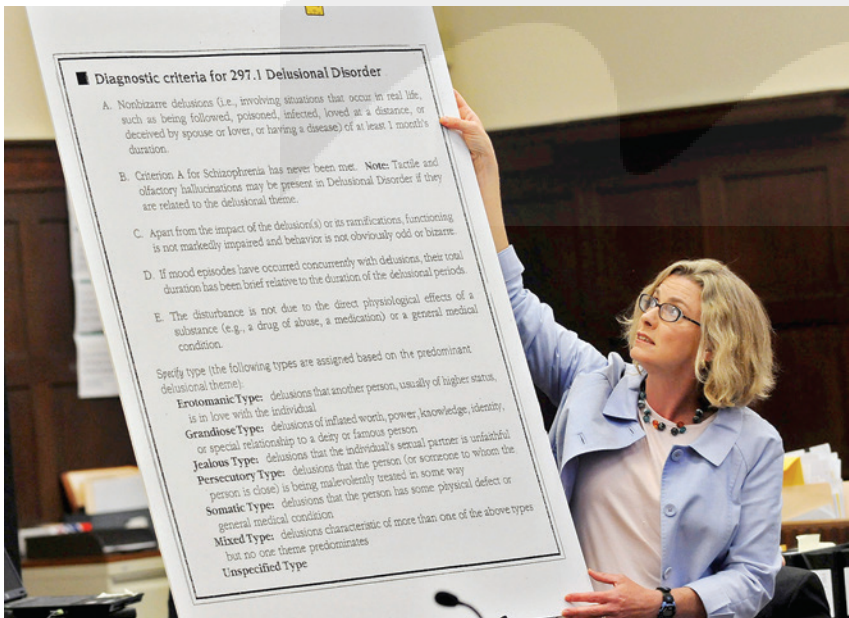
Psychologists' wide-ranging interests make it hard to picture a psychologist at work. You might start by imagining a neuroscientist probing an animal's brain, an intelligence researcher studying how quickly infants become bored with a familiar scene, or a therapist listening closely to a client's anxieties. Psychologists examine behavior and mental processes from many viewpoints, which are described in **TABLE 1.1**. These perspectives range from the biological to the social-cultural, and their settings range from the laboratory to the clinic. But all share a common goal: *describing and explaining behavior and the mind underlying it*.

Psychology also relates to many other fields. You'll find psychologists teaching



TABLE 1.1 Psychology’s Current Perspectives

Perspective	Focus	Sample Questions	Examples of Subfields Using This Perspective
Neuroscience	How the body and brain enable emotions, memories, and sensory experiences	How do pain messages travel from the hand to the brain? How is blood chemistry linked with moods and motives?	Biological; cognitive; clinical
Evolutionary	How the natural selection of traits passed down from one generation to the next has promoted the survival of genes	How has our evolutionary past influenced our modern-day mating preferences? Why do humans learn some fears so much more easily than others?	Biological; developmental; social
Behavior genetics	How our genes and our environment influence our individual differences	To what extent are psychological traits such as intelligence, personality, sexual orientation, and vulnerability to depression products of our genes? Of our environment?	Personality; developmental; legal/ forensic
Psychodynamic	How behavior springs from unconscious drives and conflicts	How can someone’s personality traits and disorders be explained in terms of their childhood relationships?	Clinical; counseling; personality
Behavioral	How we learn observable responses	How do we learn to fear particular objects or situations? What is the most effective way to alter our behavior, say, to lose weight or stop smoking?	Clinical; counseling; industrial-organizational
Cognitive	How we encode, process, store, and retrieve information	How do we use information in remembering? Reasoning? Solving problems?	Cognitive neuroscience; clinical; counseling; industrial-organizational
Social-cultural	How behavior and thinking vary across situations and cultures	How are we affected by the people around us, and by our surrounding culture?	Developmental; social; clinical; counseling



**Psychology in court** Forensic psychologists apply psychology’s principles and methods in the criminal justice system. They may assess witnesses or testify in court about a defendant’s state of mind and future risk.

in psychology departments, medical schools, law schools, business schools, and theological seminaries. You’ll see them working in hospitals, factories, and corporate offices.

In this course, you will hear about

- **biological psychologists** exploring the links between brain and mind.
- **developmental psychologists** studying our changing abilities from womb to tomb.
- **cognitive psychologists** experimenting with how we perceive, think, and solve problems.

**cognitive neuroscience** the interdisciplinary study of the brain activity linked with mental activity (including perception, thinking, memory, and language).

**psychology** the science of behavior and mental processes.



- **personality psychologists** investigating our persistent traits.
- **social psychologists** exploring how we view and affect one another.
- **health psychologists** investigating the psychological, biological, and behavioral factors that promote or impair our health.
- **industrial-organizational psychologists** studying and advising on work-place-related behaviors and system and product designs.

Psychology is both a science and a profession. Some psychologists conduct *basic research*, to build the field's knowledge base. Others conduct *applied research*, tackling practical problems. Many do both.

Psychology also influences modern cultures. Knowledge transforms us. After learning about psychology's findings, people less often judge psychological disorders as moral failures. They less often regard women as men's inferiors. They less often view children as ignorant, willful beasts in need of taming. And as thinking changes, so do actions. "In each case," noted Hunt (1990, p. 206), "knowledge has modified attitudes, and, through them, behavior." Once aware of psychology's well-researched ideas—about how body and mind connect, how we construct our perceptions, how we learn and remember, how people across the world are alike and



"I'm a social scientist, Michael. That means I can't explain electricity or anything like that, but if you ever want to know about people I'm your man."

The New Yorker Collection, 1986, J.B. Handelsman from cartoonbank.com

different—your own mind may never be quite the same.

Now let's consider some of modern psychology's big ideas, which you will find woven throughout this book: the *biopsychosocial approach* to understanding our behavior and mental processes, the surprising *dual processing* in our two-track mind, and the way psychology explores human challenges (*clinical psychology*) as well as strengths (*positive psychology*).

### IN YOUR EVERYDAY LIFE

Which of psychology's theoretical perspectives is most interesting to you? Why?

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

6. The \_\_\_\_\_ perspective in psychology focuses on how behavior and thought differ from situation to situation and from culture to culture, while the \_\_\_\_\_ perspective emphasizes observation of how we respond to and learn in different situations.

## The Biopsychosocial Approach

**LOQ 1-5** How do psychologists use the biopsychosocial approach, and how can it help us understand our diverse world?

Each of us is part of a larger social system—a family, ethnic group, culture, and socioeconomic class (level of income). But we also define ourselves individually by gender, physical ability, and sexual orientation. We share a biologically rooted human nature. Yet many biological, psychological, and social-cultural influences fine-tune our assumptions, values, and behaviors. The **biopsychosocial approach** integrates these three levels of analysis—the biological, psychological, and social-cultural. Each level's viewpoint gives us insight into a behavior or mental process. Each asks different questions and has limits, but together they offer the most complete picture.

Suppose we want to study gender differences. Although early psychological research focused mostly on men, federal research agencies now expect researchers to examine gender differences. You will see throughout this book (and especially in Chapter 4) that *gender* is not the same as *sex*. *Gender* refers to the behavioral characteristics that people associate with *boy, girl, man, or woman* in a specific culture. *Sex* refers to the biologically influenced characteristics, which people inherit thanks to their genes. To study gender similarities and differences, we would want to know about biological influences. But we would also want to understand how the group's **culture**—the shared ideas and behaviors that one generation passes on to the



Paul Sakuma/AP Images



Photo 12/Alamy

**Life after studying psychology** The study of psychology, and its critical thinking strategies, have helped prepare people for varied occupations. Facebook founder Mark Zuckerberg studied psychology and computer science while in college. Actor and film producer Natalie Portman majored in psychology and co-authored a scientific article in college—and on one of her summer breaks filmed *Star Wars: Episode I*.

**A smile is a smile the world around** Throughout this book, you will see examples not only of our incredible diversity but also of the similarities that define our shared human nature. People vary in when and how often they smile, but a naturally happy smile *means* the same thing to all of us everywhere.



Roy Tori/Getty Images



Antonia Brune

next—views gender. Critical thinking has taught psychologists to be careful about making statements about people in general if the evidence comes from studies done in only one time and place. Participants in many studies have come from the WEIRD cultures—Western, Educated, Industrial, Rich, and Democratic (Henrich et al., 2010). We are also increasingly aware that the categories we use to divide people are socially constructed. In terms of gender and sex, we will see that many individuals' *gender identity* differs from their sex.

If we knew about a group's culturally influenced gender expectations, our view would still be incomplete. We

would also need some understanding of how the group's *individuals* differ from one another because of their personal abilities and learning.

Studying all these influences in various people around the world, researchers have found some gender differences—in what we dream, in how we express and detect emotion, and in our risk for alcohol use disorder, eating disorders, and depression. Psychologically as well as biologically, we differ. But research shows we are also alike. Whether female or male, we learn to walk at about the same age. We experience the same sensations of light and sound. We remember vivid emotional events and forget everyday

details. We feel the same pangs of hunger, desire, and fear. We exhibit similar overall intelligence and well-being.

We are each in certain respects like all others, like some others, and like no other. Studying all kinds of people helps us see our similarities and our differences, our human kinship and our diversity.

Psychologists have used the biopsychosocial approach to study many of the field's big questions. One of the biggest and most persistent is the **nature–nurture issue**: How do we judge the contributions of *nature* (biology) and *nurture* (experience)? Today's psychologists explore this age-old question by asking, for example:

- How are intelligence and personality differences influenced by heredity and by environment?
- Is our *sexual orientation* written in our genes?
- Can life experiences affect the expression of the genes we inherit?
- Should we treat depression as a disorder of the brain or a disorder of thought—or both?

In most cases, *nurture works on what nature provides*. However, in Chapter 3, you'll also learn about *epigenetics*—how experience in turn influences genetic expression. And in Chapter 2 you will see that our species has been graced with the great biological gift of brain *plasticity*: an enormous ability to learn and adapt. Every psychological event—every thought,



Jane Barlow/Getty Images



Hemis/Alamy

**Culture and kissing** Kissing crosses cultures. Yet how we do it varies. Imagine yourself kissing someone on the lips. Do you tilt your head right or left? In Western cultures, in which people read from left to right, about two-thirds of couples kiss right, as in Prince Harry and Meghan's wedding kiss, and in Auguste Rodin's sculpture, *The Kiss*. People reading Hebrew and Arabic read from right to left, and in one study 77 percent of those readers kissed tilting left (Shaki, 2013).

**biopsychosocial approach** an approach that integrates different but complementary views from biological, psychological, and social-cultural viewpoints.

**culture** the enduring behaviors, ideas, attitudes, values, and traditions shared by a group of people and handed down from one generation to the next.

**nature–nurture issue** the age-old controversy over the relative influence of genes and experience in the development of psychological traits and behaviors. Today's psychological science sees traits and behaviors arising from the interaction of nature and nurture.





rubberball/Getty Images



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**A nature-made nature–nurture experiment** Identical twins have the same genes. This makes them ideal participants in studies designed to shed light on hereditary and environmental influences on personality, intelligence, and other traits. Fraternal twins have different genes but often share a similar environment. Twin studies provide a wealth of findings—described in later chapters—showing the importance of both nature and nurture.

every emotion—is also a biological event. Thus, depression can be both a brain disorder *and* a thought disorder. (You'll learn more about this in Chapter 13.)

### IN YOUR EVERYDAY LIFE

Think of one of your own unique traits. (This can be anything from whether you usually complete assignments on time or late to whether you become energized by social interactions or recharge by spending time alone.) How do you think that trait was influenced by nature and nurture?

## Dual Processing With Our Two-Track Mind

**LOQ 1-6** What are we learning about *dual processing* from psychological science?

Today's psychological science explores how our perception, thinking, memory, and attitudes all operate on two independent levels: a conscious, aware track, and an unconscious, automatic, unaware track (Wang, 2017). It has been a surprise to learn how much information processing happens without our awareness.

Our conscious mind *feels* like the boss of our body, and we do process much information on our brain's conscious track, with full awareness. But at the same time, a large unconscious, automatic track is also processing information outside of our awareness. Today's researchers call it **dual processing**. We know more than we know we know.

Vision is a great example of our dual processing. As science often reveals, truth can be stranger than fiction.

During a stay at Scotland's University of St. Andrews, I [DM] came to know research psychologists Melvyn Goodale and David Milner (2004, 2006). They studied a local woman, D. F., who was overcome by carbon monoxide one day. The resulting brain damage left her unable to consciously perceive objects. Yet she acted as if she could see them. Slip a postcard into a mail slot? Yes, she could do so without error. Report the width of a block in front of her? No, but she could grasp it with just the right finger-thumb distance. How could a woman who is perceptually blind grasp and guide objects accurately? A scan of D. F.'s brain revealed the answer.

The eye sends information to different brain areas, and each of these areas has a different task. A scan of D. F.'s brain revealed normal activity in an area concerned with reaching for and grasping objects, but not in another area concerned with consciously recognizing objects. A few other patients have a reverse pattern of damage. As you might expect, their symptoms are the reverse of D. F.'s. They can see and recognize objects, but they have difficulty pointing toward or grasping them.

We think of our vision as one system: We look. We see. We respond to what we see. Actually, vision is a two-track system (Foley et al., 2015). Our *visual perception track*

enables us to think about the world—to recognize things and to plan future actions. Our *visual action track* guides our moment-to-moment actions.

Our thinking, memory, and attitudes also operate on two levels—conscious and unconscious. More than we realize, much of our mental life happens automatically, off screen. Like jumbo jets, we fly mostly on autopilot. This may be a strange new idea for some of you. It was for me [DM]. I long believed that my own intentions and deliberate choices ruled my life. In many ways they do. But as you will see in later chapters, there is much, much more to being human.

## Clinical Psychology

**LOQ 1-7** How is psychology also a helping profession?

Psychology is a science, but it is also a profession that helps people have healthier relationships, overcome feelings of anxiety or depression, and raise thriving children. *Counseling psychology* and *clinical psychology* grew out of different historical traditions. Early counseling psychologists offered job skills guidance, whereas clinical psychologists worked alongside psychiatrists to assess and provide psychotherapy to people in the first psychology clinics. Today's counseling psychologists and clinical psychologists have a lot in common. **Counseling psychologists** help people to cope with challenges and crises (including school, work, and relationship issues) and to improve their personal and social functioning. **Clinical psychologists** often assess and treat people with mental, emotional, and behavior disorders. Both counseling and clinical psychologists give and interpret tests, provide counseling and therapy to people with all levels of psychological difficulties, and undergo the same licensing exams. They sometimes also conduct basic and applied research. By contrast, **psychiatrists**, who also may provide psychotherapy, are medical doctors. They are licensed to prescribe drugs and otherwise





LAURENT/GLUCKAGE Fotostock



Hope College Public Relations



Scott J. Ferrell/Getty Images

**Psychology: A science and a profession** Psychologists experiment with, observe, test, and help change behavior. Here we see psychologists testing a child, measuring emotion-related physiology, and doing face-to-face therapy.

treat physical causes of psychological disorders.

Rather than seeking to change people to fit their environment, **community psychologists** work to create social and physical environments that are healthy for all (Bradshaw et al., 2009; Trickett, 2009). To prevent bullying, for example, they might consider ways to improve the culture of the school and neighborhood, and how to increase bystander intervention (Polanin et al., 2012).

## Positive Psychology

**LOQ 1-8** What is *positive psychology*?

Psychology's first hundred years focused on understanding and treating troubles, such as abuse and anxiety, depression and disease, prejudice and poverty. Much of today's psychology continues the exploration of such challenges. Without slighting the need to repair damage and cure disease, Martin Seligman and

others (2002, 2005, 2011) have called for more research on *human flourishing*, on understanding and developing the emotions and traits that help us to thrive. These psychologists call their approach **positive psychology**. They believe that happiness is a by-product of a pleasant, engaged, and meaningful life. Thus, positive psychology focuses on building a "good life" that engages our skills, and a "meaningful life" that points beyond ourselves. Positive psychology uses scientific methods to explore

- **positive emotions**, such as satisfaction with the past, happiness with the present, and optimism about the future.
- **positive character traits**, such as creativity, courage, compassion, integrity, self-control, leadership, wisdom, and spirituality. Current research examines the roots and fruits of such qualities, sometimes by studying the lives of individuals who offer striking examples.

- **positive institutions**, such as healthy families, supportive neighborhoods, effective schools, and socially responsible media.

Will psychology have a more positive mission in this century? Can it help us all to flourish? An increasing number of scientists worldwide believe it can.

## IN YOUR EVERYDAY LIFE

When you signed up for this course, what did you know about different psychology specialties?

**LaunchPad** Want to learn more? See Appendix C, Career Fields in Psychology, at the end of this book, and go to our online *Pursuing a Psychology Career* resource to learn about the many interesting options available to those with bachelor's, master's, and doctoral degrees in psychology. To review and test your understanding of psychology's perspectives and subfields, engage online with *Concept Practice: Psychology's Current Perspectives and Concept Practice: Psychology's Subfields*.

**dual processing** the principle that our mind processes information at the same time on separate conscious and unconscious tracks.

**counseling psychology** a branch of psychology that assists people with problems in living (often related to school, work, or relationships) and in achieving greater well-being.

**clinical psychology** a branch of psychology that studies, assesses, and treats people with psychological disorders.

**psychiatry** a branch of medicine dealing with psychological disorders; practiced by physicians who sometimes provide medical (for example, drug) treatments as well as psychological therapy.

**community psychology** a branch of psychology that studies how people interact with their social environments and how social institutions (such as schools and neighborhoods) affect individuals and groups.

**positive psychology** the scientific study of human flourishing, with the goals of discovering and promoting strengths and virtues that help individuals and communities to thrive.

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

7. Match the specialty (i through iii) with the description (a through c).

- |                           |   |
|---------------------------|---|
| i. Clinical psychology    | a. works to create social and physical environments that are healthy for all                                      |
| ii. Psychiatry            | b. studies, assesses, and treats people with psychological disorders but usually does not provide medical therapy |
| iii. Community psychology | c. is a branch of medicine dealing with psychological disorders   |

## The Need for Psychological Science

Some people think psychology merely proves what we already know and then dresses it in jargon: “You get paid for using fancy methods to tell me what my grandmother knew?” Indeed, although sometimes mistaken, Grandma’s common sense is often right. As the baseball great Yogi Berra (1925–2015) once said, “You can observe a lot by watching.” (We also have Berra to thank for other gems, such as “Nobody ever goes there any more—it’s too crowded,” and “If the people don’t want to come out to the ballpark, nobody’s gonna stop ‘em.”) We’re all behavior watchers, and sometimes we get it right. For example, many people believe that love breeds happiness, and it does. (We have what Chapter 9 calls a deep “need to belong.”)

### THE LIMITS OF COMMON SENSE

**LOQ 1-9** How does our everyday thinking sometimes lead us to a wrong conclusion?

Common sense is indeed important. But it can also lead us astray. Our gut feelings may tell us that lie detectors work and that eyewitnesses recall events accurately. But as you will see in chapters to come, hundreds of scientific findings challenge these beliefs.

Hunches are a good starting point, even for smart thinkers. But thinking critically means checking assumptions, weighing evidence, inviting criticism, and testing conclusions. Does the death penalty prevent murders? Whether your gut tells you Yes or No, you need evidence. You might ask, *Do U.S. states with a death penalty have lower homicide rates? After states pass death-penalty laws, do their homicide rates drop? Do homicide rates rise in states that abandon the death penalty? If we ignore the answers to such*

questions (which the evidence suggests are No, No, and No), our gut feelings may steer us down the wrong path.

With its standards for gathering and sifting evidence, psychological science helps us avoid errors and think smarter. Before moving on to our study of how psychologists use psychology’s methods in their research, let’s look more closely at three common flaws in commonsense thinking—*hindsight bias*, *overconfidence*, and *perceiving patterns in random events*.

### Did We Know It All Along? Hindsight Bias

Consider how easy it is to draw the bull’s-eye *after* the arrow strikes. After the game, we credit the coach if a “gutsy play” wins the game and fault her for the same “stupid play” if it doesn’t. After a war or an election, its outcome usually seems obvious. Although history may therefore seem like a series of predictable events, the actual future is seldom foreseen. No one’s diary recorded, “Today the Hundred Years War began.”

This **hindsight bias** is easy to demonstrate by giving half the members of a group a true psychological finding, and giving the other half the opposite, false

result. Tell the first group, for example: “Psychologists have found that separation weakens romantic attraction. As the saying goes, ‘Out of sight, out of mind.’” Ask them to imagine why this might be true. Most people can, and after hearing an explanation, nearly all will then view this true finding as unsurprising—just common sense. Tell the second group the opposite: “Psychologists have found that separation strengthens romantic attraction. As the saying goes, ‘Absence makes the heart grow fonder.’” People given this false statement can also easily imagine it, and most will also see it as unsurprising. When opposite findings both seem like common sense, we have a problem!

More than 800 scholarly papers have shown hindsight bias in people young and old from around the world (Roese & Vohs, 2012). Hindsight errors in people’s recollections and explanations show why we need psychological research. Just asking people how and why they felt or acted as they did can be misleading. Why? It’s not that common sense is usually wrong. Rather, common sense describes, after the fact, what *has* happened better than it predicts what *will* happen.



**Hindsight bias** When drilling its Deepwater Horizon oil well in 2010, BP employees took shortcuts and ignored warning signs, without intending to harm people, the environment, or their company’s reputation. *After* an explosion killed 11 employees and caused the largest ever marine oil spill, with the benefit of hindsight, the foolishness of those judgments became obvious.



## Overconfidence

We humans also tend to be *overconfident*—we think we know more than we do. Consider the solutions beside these three word puzzles (called anagrams), which people like you were asked to unscramble in one study (Goranson, 1978).

WREAT → WATER

ETRYN → ENTRY

GRABE → BARGE

About how many seconds do you think it would have taken you to unscramble each anagram? Knowing the answer makes us overconfident. Surely the solution would take only 10 seconds or so? In reality, the average problem solver spends 3 minutes, as you also might, given a similar puzzle without the solution: OCHSA. (When you're ready, check your answer against the footnote below.<sup>5</sup>)

Fun anagram solutions from Wordsmith (wordsmith.org):

Snooze alarms = Alas! No more z's

Dormitory = dirty room

Slot machines = cash lost in 'em

Are we any better at predicting our social behavior? At the beginning of the school year, one study had students predict their own behavior (Vallone et al., 1990). Would they drop a course, vote in an upcoming election, call their parents regularly (and so forth)? On average, the students felt 84 percent sure of their self-predictions. But later quizzes about their actual behavior showed their predictions were correct only 71 percent of the time. It turns out that only about 2 percent of people do an excellent job predicting social behavior. Psychologist Philip Tetlock (1998, 2005) and science writer Dan Gardner (2016) call them “superforecasters.” What is a superforecaster’s defining feature? A lack of overconfidence. Faced with a difficult prediction, a superforecaster “gathers facts, balances clashing arguments, and settles on an answer.”

<sup>5</sup> The solution to the OCHSA anagram is CHAOS.

## IMPROVE YOUR EVERYDAY LIFE

Do you have a hard time believing you may be overconfident? Could overconfidence be at work in that self-assessment? How can reading this section about overconfidence help reduce your tendency to be overconfident?

## Perceiving Order in Random Events

We have a built-in eagerness to make sense of our world. People see a face on the Moon, hear Satanic messages in music, or perceive the Virgin Mary’s image on a grilled cheese sandwich. Even in random, unrelated data we often find patterns, because *random sequences often don’t look random* (Falk et al., 2009; Nickerson, 2002, 2005). Flip a coin 50 times and you may be surprised at the streaks of heads or tails—much like supposed “hot” and “cold” streaks in sports. In actual random sequences, patterns and streaks (such as repeating numbers) occur more often than people expect (Oskarsson et al., 2009). When embezzlers try to generate random-like sequences when specifying how much to steal, their non-random patterns can alert fraud experts (Poundstone, 2014).

Why are people prone to patterned behaviors? For most people, a random, unpredictable world is uncomfortable (Tullett et al., 2015). Making sense of our world is a stress-buster (Ma et al., 2017). It helps us stay calm and get on with daily living.


Some happenings, such as winning the lottery twice, seem so amazing that we struggle to believe they are due to chance. But as statisticians have noted, “with a large enough sample, any outrageous thing is likely to happen” (Diaconis & Mosteller, 1989). An event that happens to but 1 in 1 billion people every day occurs about 7 times a day, more than 2500 times a year.

*The point to remember:* We trust our gut feelings more than we should. Our commonsense thinking is flawed by three powerful tendencies—hindsight bias, overconfidence, and perceiving patterns in random events. But scientific thinking can help us sift reality from illusion.

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

8. Why, after friends start dating, do we often feel that we *knew* they were meant to be together?

 **LaunchPad** Play the role of a researcher using scientific inquiry to think smarter about random hot streaks in sports. Engage online with the activity *How Would You Know If There Is a “Hot Hand” in Basketball?*

## PSYCHOLOGICAL SCIENCE IN A POST-TRUTH WORLD

**LOQ 1-10** Why is it so easy to believe untruths?

In 2017, when the Oxford English Dictionary’s word of the year was *post-truth*, it seemed like many people’s emotions and personal beliefs tended to override their acceptance of objective facts. “Never,” said psychology and law professor Dan Kahan (2015), “have human societies *known so much . . . but agreed so little* about what they collectively know.”

Consider two examples of widely shared misinformation in the United States:

**Belief:** *The U.S. crime rate is rising.* Every recent year, 7 in 10 Americans have told Gallup that there is more crime “than there was a year ago” (Swift, 2016).

**Fact:** For several decades, both violent and property crime rates have been *falling*. In 2015, the violent crime rate was less than half the 1990 rate (BJS, 2017; Statista, 2017).

**Belief:** *Many immigrants are criminals.* Memorable incidents feed this narrative. Stories of an immigrant murdering, burglarizing, or lying spread through social networks and news outlets.

**Fact:** Most immigrants are *not* criminals. Compared with native-born Americans, immigrants are 44 percent less likely to be imprisoned (CATO, 2017).

**hindsight bias** the tendency to believe, after learning an outcome, that we could have predicted it. (Also known as the *I-knew-it-all-along phenomenon*.)





"I'm sorry, Jeannie, your answer was correct, but Kevin shouted his incorrect answer over yours, so he gets the points."

Political party bias has also distorted Americans' thinking. Indeed, psychologist Peter Ditto and his colleagues (2015) reported that researchers have found "partisan bias in both liberals and conservatives, and at virtually identical levels." One study found that American Democrats discriminated against Republican candidates for college scholarships as much as Republicans discriminated against identically qualified Democratic candidates (Iyengar & Westwood, 2015). So, no American can smugly think, "Yes but that doesn't apply to me."

U.S. Democrats and Republicans share concern about failures to separate fact from fiction. In his farewell address, President Barack Obama (2017) warned that without a "common baseline of facts," democracy is threatened. Then "we start accepting only information, whether it's true or not, that fits our opinions, instead of basing our opinions on the evidence that is out there." Republican Senator John McCain (2017) similarly expressed alarm about "the growing inability, and even unwillingness, to separate truth from lies."

So why do post-truth era people so often, in the words of psychologist Tom Gilovich (1991), "know what isn't so?"

**False news** Some false news gets fed to us intentionally. It's "lies in the guise of news" (Kristof, 2017). And false news persists. In one analysis of 126,000 stories tweeted by 3 million

people, falsehoods—especially false political news—spread "significantly farther, faster, deeper, and more broadly than the truth" (Vosoughi et al., 2018).

**Repetition** In experiments, statements become more believable when they are repeated (Dechêne et al., 2010). What we hear over and over—perhaps a made-up smear of a political opponent—gets remembered and comes to seem true (Fazio et al., 2015).

**Availability of powerful examples** In the media, "if it bleeds it leads." Gruesome violence—a horrific murder, a mass killing, a plane crash—gets reported, with vivid images that implant in our memory and color our judgments. No wonder Americans grossly overestimate their risk of being victimized by crime, terror, and plane crashes.

**Group identity and the echo chamber of the like-minded** Our social identities matter. Feeling good about our groups helps us feel good about ourselves. On social media we tend to friend people who think as we do. We often read news sources that support our views and criticize news sources that do not.

The good news is that we can build a real-truth world by embracing critical thinking and a scientific mindset. By actively seeking information with *curiosity*, *skepticism*, and *humility*, we can usually know what really is so.

"We have . . . become sloppier than ever: Tweet first, research later. Post first, rescind later. Guess first, confirm later." —Luvvie Ajayi, *I'm Judging You: The Do-Better Manual*, 2016

 **LaunchPad** To experience my [DM's] animated walk through some important, scientific thinking strategies, view the 4-minute *Video: Thinking Critically in a "Post-Truth" World*.

## How Do Psychologists Ask and Answer Questions?

As we've noted, the basis of all science, including psychology, is the scientific attitude, which has three essential ingredients: curiosity, skepticism, and humility. Psychologists arm their scientific attitude with the *scientific method*. They observe events, form theories, and then refine their theories in the light of new observations.

### THE SCIENTIFIC METHOD

**LOQ 1-11** How do theories advance psychological science?

Chatting with friends and family, we often use *theory* to mean "mere hunch." In science, a **theory** explains behaviors or events by offering ideas that *organize* what we have observed. By using deeper principles to organize isolated facts, a theory summarizes and simplifies. It connects the observed dots so that a clear picture emerges.

A theory of how sleep affects memory, for example, helps us organize countless sleep-related observations into a short list of principles. Imagine that we observe over and over that people with good sleep habits tend to answer questions correctly in class, and they do well at test time. We might therefore theorize that sleep improves memory. So far so good: Our principle neatly summarizes a list of observations about the effects of a good night's sleep.

Yet no matter how reasonable a theory may sound—and it does seem reasonable to suggest that sleep boosts memory—we must put it to the test. A good theory produces testable *predictions*, called **hypotheses**. Such predictions specify what results would support the theory and what results would not.

To test our theory about the sleep effects on memory, we might hypothesize that when sleep deprived, people will remember less from the day before. To test that hypothesis, we might measure how well people remember course materials they studied either before a good night's sleep or before a shortened night's sleep (FIGURE 1.1). The results will either support our theory or lead us to revise or reject it.

Our theories can bias our observations. The urge to see what we expect to see is strong, both inside and outside the laboratory. Having theorized that better memory springs from more sleep, we may see what we expect: We may perceive sleepy people's comments as less accurate.

As a check on their own biases, psychologists, when reporting their studies, use precise, measurable **operational definitions** of research procedures and concepts. *Sleep deprived*, for example, may be defined as "2 or more hours less" than the person's natural sleep. These exact descriptions will allow anyone to **replicate** (repeat) the research. Other

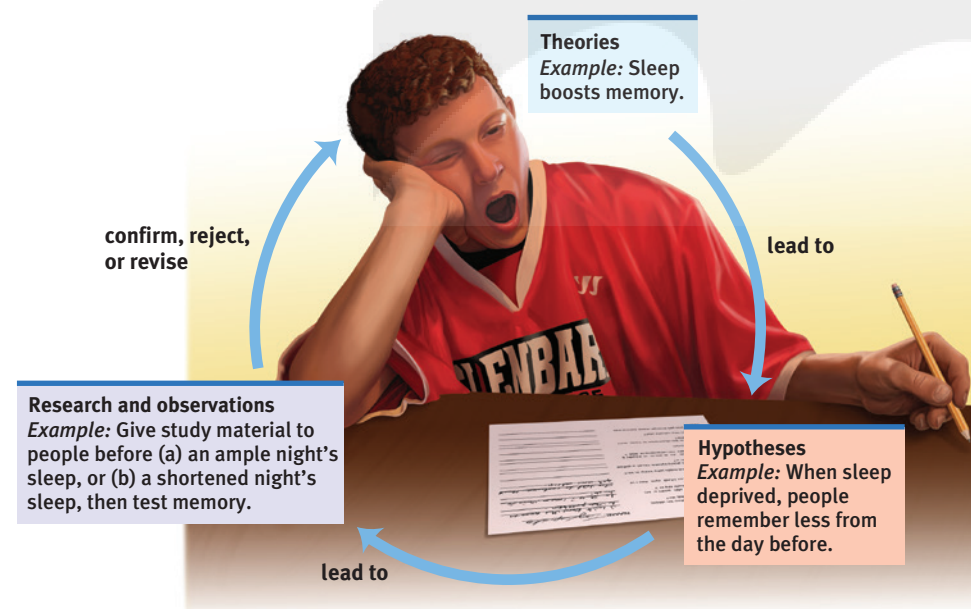
people can then re-create the study with different participants and in different situations. If they get similar results, we can be more confident that the findings are reliable. Replication is confirmation.

Replication is an essential part of good science. In psychology, replication efforts have produced mixed results. One cluster of replications brought encouraging news: All but 2 of 13 experiments replicated (Klein et al., 2014). But when 270 psychologists recently worked together to redo 100 psychological studies, the results made news: Only 36 percent of the results were replicated (Open Science Collaboration, 2015). But then another team of scientists found most of the failed replications flawed (inaccurate re-creations of the original studies). This team argued that "the reproducibility of psychological science" is "quite high" (Gilbert et al., 2016). A subsequent replication effort yielded slightly more promising results, with 62 percent of the results replicating (Camerer et al., 2018). (None of the nonreproducible findings in these replication efforts appear in this text.) Despite the differing findings, it's

clear that psychological science benefits from more replications and from more sharing of research methods and data (Gilmore & Adolph, 2017; Nosek et al., 2015; Open Science Collaboration, 2017). More and more psychologists use **preregistration** to publicly communicate their planned study design, hypotheses, data collection, and analyses (Nosek et al., 2018). Preregistration benefits psychological science by encouraging openness and transparency (Nelson et al., 2018).

Psychology is not alone in its quest for reproducible research. Other fields, including genetics, behavioral neuroscience, and brain imaging, also have non-replicated findings (Baxter & Burwell, 2017; Carter et al., 2017; Eklund et al., 2016). Especially when based on a small sample, a single failure to replicate can itself need replication (Maxwell et al., 2015). In all scientific fields, replications either confirm findings, or enable us to revise our understanding.

"Failure to replicate is not a bug; it is a feature. It is what leads us along the path—the wonderfully twisty path—of scientific discovery." —Lisa Feldman Barrett, "Psychology Is Not in Crisis," 2015



**FIGURE 1.1 The scientific method** A self-correcting process for asking questions and observing nature's answers.

**theory** an explanation using principles that organize observations and predict behaviors or events.

**hypothesis** a testable prediction, often implied by a theory.

**operational definition** a carefully worded statement of the exact procedures (operations) used in a research study. For example, *human intelligence* may be operationally defined as what an intelligence test measures.

**replication** repeating the essence of a research study, usually with different participants in different situations, to see whether the basic finding can be reproduced.

**preregistration** publicly communicating planned study design, hypotheses, data collection, and analyses.

Let's summarize. A good theory

- effectively **organizes** observations.
- leads to clear **predictions** that anyone can use to check the theory or to create practical applications of it.
- often stimulates **replications** and more research that supports the theory (as happened with sleep and memory studies, as you'll see in Chapter 2), or leads to a revised theory that better organizes and predicts what we observe.

We can test our hypotheses and refine our theories in several ways.

- **Descriptive** methods describe behaviors, often by using (as we will see) case studies, naturalistic observations, or surveys.
- **Correlational** methods associate different factors. (You'll see the word **factor** often in descriptions of research. It refers to anything that contributes to a result.)
- **Experimental** methods manipulate, or vary, factors to discover their effects.

To think critically about popular psychology claims, we need to understand the strengths and weaknesses of these methods. (For more information about some of the statistical methods that psychological scientists use in their work, see Appendix A, Statistical Reasoning in Everyday Life.)

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

- ▶ 9. What does a good theory do?
- ▶ 10. Why is replication important?

## DESCRIPTION

**LOQ 1-12** How do psychologists use case studies, naturalistic observations, and surveys to observe and describe behavior, and why is random sampling important?

In daily life, we all observe and describe other people, trying to understand why they think, feel, and act as they do. Psychologists do much the same, though objectively and systematically, using

- **case studies** (in-depth analyses of individuals or groups).
- **naturalistic observations** (recording the natural behavior of many individuals).
- **surveys** and interviews (asking people questions).

## The Case Study

A **case study** examines one individual or group in depth, in the hope of revealing things true of us all. Some examples: Medical case studies of people who lost specific abilities after damage to certain brain regions gave us much of our early knowledge about the brain. Jean Piaget taught us about children's thinking after he carefully watched and questioned just a few children. Studies of various animals, including only a few chimpanzees, have revealed their capacity for understanding and communicating.

Intensive case studies are sometimes very revealing. They often suggest directions for further study, and they show us what can happen. But individual cases may also mislead us. The individual being studied may be *atypical* (unlike the larger population). Viewing such cases as general truths can lead to false conclusions. Indeed, anytime a researcher mentions a finding (*Smokers die younger: 95 percent of men over 85 are nonsmokers*), someone is sure to offer an exception (*Well, I have an uncle who smoked two packs a day and lived to be 89*). These vivid stories, dramatic tales, and personal experiences command attention and are easily remembered. Stories move us, but stories—even when they are psychological case examples—can mislead. A single story of someone who supposedly changed from gay to straight is *not* evidence that sexual orientation is a choice. As psychologist Gordon Allport (1954, p. 9) said, "Given a thimbleful of [dramatic] facts we rush to make generalizations as large as a tub."

*The point to remember:* Individual cases can suggest fruitful ideas. What is true of all of us can be seen in any one of us. But just because something is true of

one of us (the atypical uncle), we should not assume it is true of all of us (most long-term smokers *do* suffer ill health and early death). To find those general truths, we must look to methods beyond the case study.

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

- ▶ 11. We cannot assume that case studies always reveal general principles that apply to all of us. Why not?

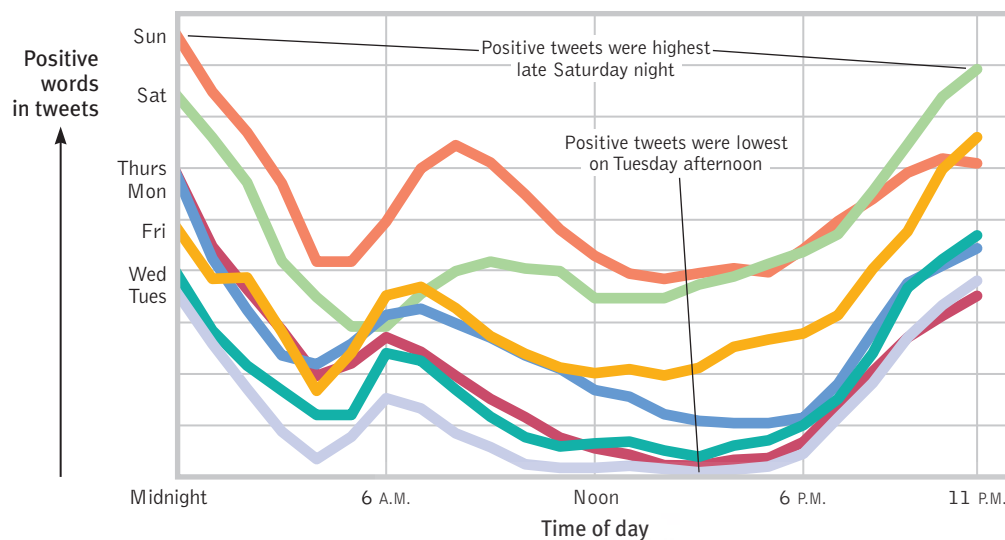
 **LaunchPad** See the *Video: Case Studies* for an animated tutorial.

## Naturalistic Observation

A second descriptive method records responses in natural environments. These **naturalistic observations** may be used to describe cultural differences in parenting, student lunchroom self-seating patterns, or chimpanzee family structures.

Until recently, naturalistic observation was mostly "small science"—possible with pen and paper rather than fancy equipment and a big budget (Provine, 2012). But today's digital technologies have transformed naturalistic observations into big science. Want to keep track of how often people go to the gym, a café, or the library? All you need is access to their phone's global positioning system (GPS) (Harari et al., 2016). The billions of people entering personal information online have created a huge opportunity for "big data" observations. To track the ups and downs of human moods, one study counted positive and negative words in 504 million Twitter messages from 84 countries (Golder & Macy, 2011). As **FIGURE 1.2** shows, people seemed happier on weekends, shortly after waking, and in the evenings. (Are late Saturday evenings often a happy time for you, too?) Another study found that negative emotion words (especially anger-related words) in 148 million tweets from 1347 U.S. counties predicted the counties' heart





**FIGURE 1.2 Twitter message moods, by time and by day** This graph illustrates how, without knowing anyone's identity, researchers can use big data to study human behavior on a massive scale. It now is also possible to associate people's moods with, for example, their locations or with the weather, and to study the spread of ideas through social networks. (Data from Golder & Macy, 2011.)

disease rates better than smoking and obesity rates (Eichstaedt et al., 2015). Google data—on the words people search and the questions they ask—can pinpoint a geographical area's level of racism and depression (Stephens-Davidowitz, 2017).

Like the case study method, naturalistic observation does not explain behavior. It describes it. Nevertheless, descriptions can be revealing: The starting point of any science is description.

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

- 12. Using tools such as smart-phone apps and body-worn sensors, researchers are able to sample naturally occurring slices of daily life. What are the advantages and disadvantages of this kind of naturalistic observation?

**LaunchPad** See the *Video: Naturalistic Observation* for a helpful tutorial animation.

## The Survey

A **survey** looks at many cases, asking people to report their own behavior or opinions. Questions about everything from sexual practices to political opinions are

put to the public. Here are some recent survey findings:

- Compared with those born in the 1960s and 1970s, twice as many millennials born in the 1990s reported having no sexual partners since age 18 (Twenge et al., 2017).
- 1 in 2 people across 24 countries reported believing in the “existence of intelligent alien civilizations in the universe” (Glocalities, 2017).
- 68 percent of all humans—some 4.6 billion people—say that religion is important in their daily lives (from Gallup World Poll data analyzed by Diener et al., 2011).

But asking questions is tricky, and the answers often depend on the way you word your questions and on who answers them.

**Wording Effects** Even subtle changes in the wording of questions can have major effects. Should violence be allowed to appear in children's television programs? People are much more likely to approve “not allowing” such things than “forbidding” or “censoring” them. In one national survey, only 27 percent of Americans approved of “government

censorship” of media sex and violence, though 66 percent approved of “more restrictions on what is shown on television” (Lacayo, 1995). People are much more approving of “gun safety” laws than of “gun control” laws, and of “revenue enhancers” than of “taxes.” Wording is a delicate matter, and some words can trigger positive or negative reactions. Critical thinkers will reflect on how a question's phrasing might affect the opinions people express.

**Random Sampling** For an accurate picture of a group's experiences and attitudes, there's only one game in town. In a *representative sample*, a smaller group can accurately reflect the larger **population** you want to study and describe.

So how do you obtain a representative sample? Say you want to survey the total student population to get your peers' reaction to an upcoming tuition increase. To be sure your sample represents the whole student population, you would want to choose a **random sample**, in which every person in the entire population has an equal chance of being picked. You would not want to ask for volunteers, because the students

**case study** a descriptive technique in which one individual or group is studied in depth in the hope of revealing universal principles.

**naturalistic observation** a descriptive technique of observing and recording behavior in naturally occurring situations without trying to change or control the situation.

**survey** a descriptive technique for obtaining the self-reported attitudes or behaviors of a group, usually by questioning a representative, *random sample* of that group.

**population** all those in a group being studied, from which random samples may be drawn. (*Note:* Except for national studies, this does *not* refer to a country's whole population.)

**random sample** a sample that fairly represents a population because each member has an equal chance of inclusion.

who step forward to help would not be a random sample of all the students. But you could assign each student a number, and then use a random-number generator to select a sample.

With very large samples, estimates become quite reliable. *E* is estimated to represent 12.7 percent of the letters in written English. *E*, in fact, is 12.3 percent of the 925,141 letters in Melville's *Moby-Dick*, 12.4 percent of the 586,747 letters in Dickens' *A Tale of Two Cities*, and 12.1 percent of the 3,901,021 letters in 12 of Mark Twain's works (*Chance News*, 1997).

Time and money will affect the size of your sample, but you would try to involve as many people as possible. Why? Because large representative samples are better than small ones. (But a smaller representative sample of 100 is better than a larger *unrepresentative* sample of 500.)

Political pollsters sample voters in national election surveys just this way. Using only 1500 randomly sampled people, drawn from all areas of a country, they can provide a remarkably accurate snapshot of the nation's opinions. Without random sampling, large samples—including call-in phone samples and TV or website polls—often give misleading results. And it's worth remembering that even with the best-designed poll there can still sometimes be surprising results, as we saw in the result of the 2016 U.S. presidential election.

*The point to remember:* Before accepting survey findings, think critically. Consider the wording of the questions and the sample. The best basis for generalizing is from a representative, random sample of a population.

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

13. What is an unrepresentative sample, and how do researchers avoid it?

## CORRELATION

**LOQ 1-13** What does it mean when we say two things are correlated, and what are positive and negative correlations?

Describing behavior is a first step toward predicting it. Naturalistic observations and surveys often show us that one trait or behavior tends to happen together with another. In such cases, we say the two **correlate**. A statistical measure (the *correlation coefficient*) helps us figure out how closely two things vary together, and thus how well either one *predicts* the other. Knowing how much aptitude tests *correlate* with school success tells us how well the scores *predict* school success.

- A **positive correlation** (above 0 to +1.00) indicates a *direct* relationship, meaning that two things increase together or decrease together. Across people, height correlates positively with weight.
- A **negative correlation** (below 0 to -1.00) indicates an *inverse* relationship: As one thing increases, the other decreases. The number of hours spent watching videos each week correlates negatively with grades. Negative correlations can go as low as -1.00. This means that, like children on opposite ends of a seesaw, one set of scores goes down precisely as the other goes up.
- A coefficient near zero is a weak correlation, indicating little or no relationship.

Though informative, psychology's correlations usually explain only part of the variation among individuals. As we will see, there is a positive correlation between parents' abusiveness and their children's later abusiveness when they become parents. But this does not mean that most abused children become abusive. The correlation simply indicates a statistical relationship: Most abused children do *not* grow into abusers. But nonabused children are even less likely to become abusive. Correlations point us

**correlation** a measure of the extent to which two factors vary together, and thus of how well either one predicts the other. The *correlation coefficient* is the mathematical expression of the relationship, ranging from -1.00 to +1.00, with 0 indicating no relationship.

toward predictions, but usually imperfect ones.

Other times correlations can lead us astray. Just because two things vary together doesn't mean they *cause* each other. Consider the strong positive correlation between chocolate consumption in 23 countries and their number of Nobel laureates (Messerli, 2012). Eating more chocolate will not cause a country to have more Nobel laureates! But for whatever reason, chocolate-loving countries have knowledge-loving Nobel laureates.

*The point to remember:* A correlation coefficient helps us see the world more clearly by revealing the extent to which two things relate. Just remember that revealing relationships does not mean *explaining* them. (See Thinking Critically About: Correlation and Causation.)

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

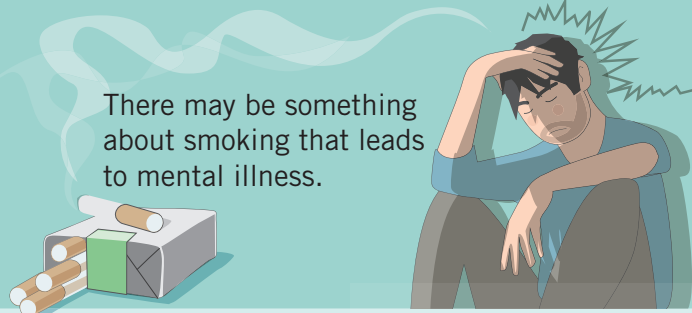
14. Indicate whether each of the following statements describes a positive correlation or a negative correlation.
- The more husbands viewed internet pornography, the worse their marital relationships (Muusses et al., 2015). \_\_\_\_\_
  - The less sexual content teens saw on TV, the less likely they were to have sex (Collins et al., 2004). \_\_\_\_\_
  - The longer children were breast-fed, the greater their later academic achievement (Horwood & Fergusson, 1998). \_\_\_\_\_
  - The more income rose among a sample of poor families, the fewer symptoms of mental illness their children experienced (Costello et al., 2003). \_\_\_\_\_



## Thinking Critically About: Correlation and Causation

**LOQ 1-14** Why do correlations enable prediction but not cause-effect explanation?

Mental illness *correlates* with smoking—meaning that those who experience mental illness are also more likely to be smokers.<sup>1</sup> Does this tell us anything about what *causes* mental illness or smoking? **NO.**




There may be something about smoking that leads to mental illness.

Those with mental illness may be more likely to smoke.

**OR**


There may be some *third variable*, such as a stressful home life, for example, that triggers *both* smoking and mental illness.



So, then, how would you interpret these recent findings:  
a) sexual hook-ups correlate with college women's experiencing depression, and  
b) *delaying* sexual intimacy correlates with positive outcomes such as greater relationship satisfaction and stability?<sup>2</sup>

**Possible explanations:**

1. Sexual restraint	→	Better mental health and stronger relationships
2. Depression	→	People being more likely to hook up
3. Some third factor, such as lower impulsivity	→	Sexual restraint, psychological well-being, and better relationships



Correlations do help us predict. Consider: Self-esteem correlates negatively with (and therefore predicts) depression. The lower people's self-esteem, the greater their risk for depression.

### Possible interpretations:

- |   |   |                                     |
|---|---|-------------------------------------|
| 1. Low self-esteem  | → | Depression                          |
| 2. Depression   | → | Low self-esteem                     |
| 3. Some third factor, such as distressing events or biological predisposition | → | Both low self-esteem and depression |

### You try it!

A survey of over 12,000 adolescents found that the more teens feel loved by their parents, the less likely they are to behave in unhealthy ways—having early sex, smoking, abusing alcohol and drugs, exhibiting violence.<sup>3</sup> What are three possible ways we could interpret that finding?<sup>4</sup>



**The point to remember: *Correlation does not prove causation.***  
Correlation suggests a possible cause-effect relationship but does not prove it. Remember this principle and you will be wiser as you read and hear news of scientific studies.

1. Belluck, 2013. 2. Fielder et al., 2013; Willoughby et al., 2014. 3. Resnick et al., 1997. 4. **ANSWERS:** A. Parental love may produce healthy teens. B. Well-behaved teens may feel more parental love and approval. C. Some third factor, such as income or neighborhood, may influence both parental love AND teen behaviors.

## RETRIEVE &amp; REMEMBER

ANSWERS IN APPENDIX E

15. Length of marriage positively correlates with hair loss in men. Does this mean that marriage causes men to lose their hair (or that balding men make better husbands)?



Nancy Brown/Getty Images

**LaunchPad** For an animated tutorial on correlations, engage online with *Concept Practice: Positive and Negative Correlations*. See also the *Video: Correlational Studies* for another helpful tutorial animation.

## EXPERIMENTATION

**LOQ 1-15** How do experiments clarify or reveal cause-effect relationships?

Descriptions, even with big data, don't prove causation. Correlations don't prove causation. To isolate cause and effect, psychologists have to simplify. In our everyday lives, many things affect our actions and influence our thoughts. Psychologists sort out this complexity by using **experiments**. With experiments, researchers can focus on the possible effects of one or more factors by

- manipulating the factors of interest.
- holding constant ("controlling") other factors.

Let's consider a few experiments to see how this works.

### Random Assignment: Minimizing Differences

Researchers have compared infants who are breast-fed with those who are bottle-fed with formula. The results are mixed. Some studies, but not others,

show that children's intelligence test scores are a tad higher if they were breast-fed (Horta et al., 2015; von Stumm & Plomin, 2015; Walfisch et al., 2014; Yang et al., 2018). Others have found that the longer they were breast-fed, the higher their later intelligence test scores (Jedrychowski et al., 2012; Victora et al., 2015). So should we say that mother's milk may *correlate* modestly but positively with later intelligence? If so, do smarter mothers have smarter children? Or do the nutrients in mother's milk contribute to brain development? Even big data from a million or a billion mothers and their offspring wouldn't tell us.

To find the answer, we would have to isolate the effects of mother's milk from the effects of other factors, such as mother's age, education, and intelligence. How might we do that? By experimenting. With parental permission, one British research team directly experimented with breast milk. They **randomly assigned** 424 hospitalized premature infants either to formula feedings or to breast-milk feedings (Lucas et al., 1992). By doing this, they created two otherwise similar groups:

- an **experimental group**, in which babies received the treatment (breast milk).
- a contrasting **control group** without the treatment.

Random assignment (whether by means of a random-number generator



Lane Oatley/Getty Images

or by the flip of a coin) minimizes any preexisting differences between the two groups. If one-third of the volunteers for an experiment can wiggle their ears, then about one-third of the people in each group will be ear wigglers. So, too, with age, intelligence, attitudes, and other characteristics, which will be similar in the experimental and control groups. When groups are formed by random assignment, and they differ at the experiment's end, we can assume the treatment had an effect. (Note the difference between *random sampling*—which in surveys creates a representative survey sample—and *random assignment*, which in experiments equalizes the experimental and control groups.)

Is breast best? The British experiment found that, at least for premature infants, breast milk is indeed best for developing intelligence. On intelligence tests taken at age 8, those nourished with breast milk scored significantly higher than those who had been formula-fed.

*The point to remember:* Unlike correlational studies, which uncover *naturally occurring* relationships, an experiment *manipulates* (varies) a factor to determine its effect.

**LaunchPad** See the *Video: Random Assignment* for a tutorial animation.

### The Double-Blind Procedure: Eliminating Bias

In the breast-milk experiment, babies didn't have expectations that could affect the experiment's outcome. Adults, however, do have expectations.

Consider: Three days into a cold, many of us start taking zinc tablets. If we find our cold symptoms lessening, we may credit the pills. But after a few days, most colds are naturally on their way out. Was the zinc cure truly effective? To find out, we could experiment.

And that is precisely how new drugs and new methods of psychotherapy are evaluated (Chapter 14). Researchers use random assignment to form the groups. An experimental group



receives the treatment, such as an antidepressant medication. A control group receives a **placebo** (an inactive substance—perhaps a look-alike pill with no drug in it). Often, the people who take part in these studies are *blind* (uninformed) about which treatment, if any, they are receiving.

Many studies use a **double-blind procedure**—neither those taking part in the study nor those collecting the data know which group is receiving the treatment. In such studies, researchers can check a treatment's actual effects apart from the participants' belief in its healing powers and the staff's enthusiasm for its potential. Just *thinking* you are getting a treatment can boost your spirits, relax your body, and relieve your symptoms. This **placebo effect** is well documented in reducing pain, depression, anxiety, and, in schizophrenia, sound-based hallucinations (Dollfus et al., 2016; Kirsch, 2010). Athletes have run faster when given a fake performance-enhancing drug (McClung & Collins, 2007). Decaf-coffee drinkers have reported increased vigor and alertness—when they thought their brew had caffeine in it (Dawkins et al., 2011). People have felt better after receiving a phony mood-enhancing drug (Michael et al., 2012). And the more expensive the placebo, the more “real” it seems—a fake pill that cost \$2.50 worked better than one costing 10 cents (Waber et al., 2008). To know how effective a therapy really is, researchers must control for a possible placebo effect.



“If I don't think it's going to work, will it still work?”

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

- ▶ 16. What measures do researchers use to prevent the *placebo effect* from confusing their results?

## Variables

Here is an even more potent experiment example: The drug Viagra was approved for use after 21 clinical trials. One trial was an experiment in which researchers randomly assigned 329 men with erectile disorder to either an experimental group (Viagra takers) or a control group (placebo takers). The pills looked identical, and the procedure was double-blind—neither the men taking the pills nor the people giving them knew who received the placebo. The result: At peak doses, 69 percent of Viagra-assisted attempts at intercourse were successful, compared with 22 percent for men receiving the placebo (Goldstein et al., 1998). Viagra performed.

A similar experiment on a drug approved to increase women's sexual arousal produced a result described as, um, anticlimactic—an additional “half of one satisfying sexual encounter a month” (Ness, 2016; Tavernise, 2016).

This simple experiment manipulated just one factor—the drug (Viagra versus no Viagra). We call the manipulated factor an **independent variable**: We can vary it *independently* of other factors, such as the men's age, weight, and personality. These other factors, which could influence a study's results, are called **confounding variables**. Thanks to random assignment, the confounding variables should be roughly equal in both groups.

Experiments examine the effect of one or more independent variables on some behavior or mental process that can be measured. We call this kind of affected behavior the **dependent variable** because it can vary *depending* on what takes place during the experiment. Experimenters

give both variables precise *operational definitions*. They specify exactly how the

- independent variable (in this study, the precise drug dosage and timing) is manipulated.
- dependent variable (in this study, the men's responses to questions about their sexual performance) is measured.

**experiment** a method in which researchers vary one or more factors (independent variables) to observe the effect on some behavior or mental process (the dependent variable). By *random assignment* of participants, researchers aim to control other factors.

**random assignment** assigning participants to experimental and control groups by chance, thus minimizing any preexisting differences between the groups.

**experimental group** in an experiment, the group exposed to the treatment, that is, to one version of the independent variable.

**control group** in an experiment, the group *not* exposed to the treatment; the control group serves as a comparison with the experimental group for judging the effect of the treatment.

**placebo** [pluh-SEE-bo; Latin for “I shall please”] an inactive substance or condition that is sometimes given to those in a control group in place of the treatment given to the experimental group.

**double-blind procedure** in an experiment, a procedure in which both the participants and the research staff are ignorant (blind) about who has received the treatment or a placebo.

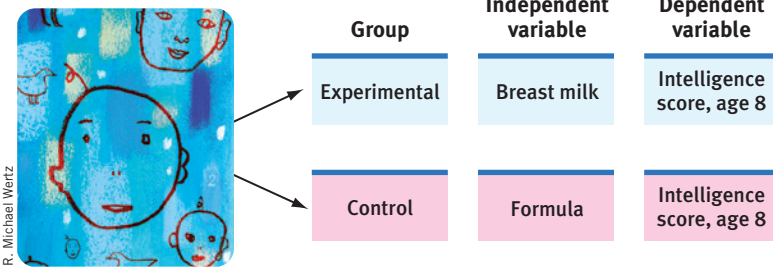
**placebo effect** results caused by expectations alone.

**independent variable** in an experiment, the factor that is manipulated; the variable whose effect is being studied.

**confounding variable** in an experiment, a factor other than the factor being studied that might influence a study's results.

**dependent variable** in an experiment, the factor that is measured; the variable that may change when the independent variable is manipulated.

**Random assignment**  
(controlling for confounding variables  
such as parental intelligence  
and environment)



**FIGURE 1.3 Experimentation** To study cause and effect, psychologists control for confounding variables by randomly assigning some participants to an experimental group, others to a control group. Measuring the dependent variable (intelligence test score in later childhood) will determine the effect of the independent variable (type of milk fed as babies).

Operational definitions answer the “What do you mean?” question with a level of precision that enables others to replicate (repeat) the study.

Let’s review these terms using the British breast-milk experiment (**FIGURE 1.3**). A *variable* is anything that can vary (infant nutrition, intelligence). Experiments aim to *manipulate* an *independent variable* (type of milk), *measure* a *dependent variable* (later intelligence test score), and *control confounding variables*. An experiment has at least two different groups: an *experimental group* (infants who received breast milk) and a *comparison or control group* (infants who did not receive breast milk). *Random assignment* works to *control* all other (confounding) variables by equating the groups before any manipulation begins. In this way, an experiment tests the effect of at least one independent variable (what we manipulate) on at least one dependent variable (the outcome we measure).

In another experiment, psychologists tested whether landlords’ perceptions of an applicant’s ethnicity would influence the availability of rental housing. The researchers sent identically worded emails to 1115 Los Angeles-area landlords (Carpusor & Loges, 2006). They varied the sender’s name to imply different ethnic groups: “Patrick McDougall,” “Said Al-Rahman,” and “Tyrell Jackson.” Then

they tracked the percentage of landlords’ positive replies. How many emails triggered invitations to view the apartment? For McDougall, 89 percent; for Al-Rahman, 66 percent; and for Jackson, 56 percent. In this experiment, what was the independent variable? What was the dependent variable?<sup>6</sup>

“[We must guard] against not just racial slurs, but . . . against the subtle impulse to call Johnny back for a job interview, but not Jamal.” —U.S. President Barack Obama, eulogy for state senator and church-shooting victim Clementa Pinckney, June 26, 2015

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

17. By using *random assignment*, researchers are able to control for \_\_\_\_\_, which are other factors besides the independent variable(s) that may influence research results.

**LaunchPad** See the *Videos: Experiments and Confounding Variables* for helpful tutorial animations.

<sup>6</sup> The independent variable, which the researchers manipulated, was the implied ethnicity of the applicants’ names. The dependent variable, which the researchers measured, was the rate of positive responses from the landlords.

## CHOOSING A RESEARCH DESIGN

**LOQ 1-16** How would you know which research design to use?

Throughout this book, you will read about amazing psychological science discoveries. But how do psychological scientists choose research methods and design their studies in ways that provide meaningful results? Understanding how research is done—how testable questions are developed and studied—is key to appreciating all of psychology.

**TABLE 1.2** compares the features of psychology’s main research methods. In later chapters, you will read about other research designs, including *twin studies* and *cross-sectional* and *longitudinal research* (Chapter 3).

In psychological research, no questions are off limits, except untestable (or unethical) ones. Does free will exist? Are people born evil? Is there an afterlife? Psychologists can’t test those questions, but they *can* test whether free will beliefs, aggressive personalities, and a belief in life after death influence how people think, feel, and act (Dechesne et al., 2003; Shariff et al., 2014; Webster et al., 2014).

Having chosen their question, psychologists then select the most appropriate research design—*experimental*, *correlational*, *case study*, *naturalistic observation*, *twin study*, *longitudinal*, or *cross-sectional*—and determine how to set it up most effectively. They consider how much money and time are available, ethical issues, and other limitations. For example, it wouldn’t be ethical for a researcher studying child development to use the experimental method and randomly assign children to loving versus punishing homes.

Next, psychological scientists decide how to measure the behavior or mental process being studied. For example, researchers studying aggressive behavior could measure participants’ willingness to blast a stranger with supposed intense noise.



TABLE 1.2 Comparing Research Methods

Research Method	Basic Purpose	How Conducted	What Is Manipulated	Weaknesses
Descriptive	To observe and record behavior	Do case studies, naturalistic observations, or surveys	Nothing	No control of variables; single cases may be misleading
Correlational	To detect naturally occurring relationships; to assess how well one variable predicts another	Collect data on two or more variables; no manipulation	Nothing	Cannot establish cause and effect
Experimental	To explore cause and effect	Manipulate one or more factors; use random assignment	The independent variable(s)	Sometimes not possible for practical or ethical reasons

To help you build your understanding, your critical thinking, and your *scientific literacy skills*, we created research activities in LaunchPad. In these “How Would You Know?” activities, you get to play the role of the researcher, making choices about the best ways to test interesting questions. Some examples: How Would You Know If Having Children Relates to Being Happier?, How Would You Know If a Cup of Coffee Can Warm Up Relationships?, and How Would You Know If People Can Learn to Reduce Anxiety?

Researchers want to have confidence in their findings, so they carefully consider confounding variables — factors other than those being studied that may affect their interpretation of results.

Psychological research is a fun and creative adventure. Researchers *design* each study, *measure* target behaviors, *interpret* results, and learn more about the fascinating world of behavior and mental processes along the way.

IN YOUR EVERYDAY LIFE

If you could conduct a study on any psychological question, which question would you choose? How would you design the study?

PREDICTING EVERYDAY BEHAVIOR

**LOQ 1-17** How can simplified laboratory experiments help us understand general principles of behavior?

When you see or hear about psychology research, do you ever wonder whether people’s behavior in a research laboratory

RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

- 18. Match the term on the left (i through iii) with the description on the right (a through c).
- i. Double-blind procedure

ii. Random sampling

iii. Random assignment
- a. helps researchers generalize from a small set of survey responses to a larger population

b. helps minimize preexisting differences between experimental and control groups

c. controls for the placebo effect; neither researchers nor participants know who receives the real treatment
- 19. Why, when testing a new drug to control blood pressure, would we learn more about its effectiveness from giving it to half the participants in a group of 1000 than to all 1000 participants?


will predict their behavior in real life? Does detecting the blink of a faint red light in a dark room say anything useful about flying an airplane at night? Or, suppose an experiment shows that a man aroused by viewing a violent, sexually explicit film will then be more willing to push buttons that he thinks will deliver a noise blast to a woman. Does that really say anything about whether viewing violent pornography makes men more likely to abuse women?

Before you answer, consider this. The experimenter *intends* to simplify reality—to create a mini-environment that imitates and controls important features of everyday life. Just as a wind tunnel lets airplane designers re-create airflow forces under controlled conditions, a laboratory experiment lets psychologists re-create psychological forces under controlled conditions.

An experiment’s purpose is not to re-create the exact behaviors of everyday

life, but to test *theoretical principles* (Mook, 1983). In aggression studies, deciding whether to push a button that delivers a shock may not be the same as slapping someone in the face, but the principle is the same. *It is the resulting principles—not the specific findings—that help explain everyday behaviors.* Many investigations show that principles derived in the laboratory do typically generalize to the everyday world (Mitchell, 2012).

*The point to remember:* Psychological science focuses less on specific behaviors than on revealing general principles that help explain many behaviors.


 **LaunchPad** To review and test your understanding of research methods, engage online with *Concept Practice: Psychology’s Research Methods and The Language of Experiments*, and the interactive *Topic Tutorial: PsychSim6, Understanding Psychological Research*. For a 9.5-minute video synopsis of psychology’s scientific research strategies, see the *Video: Research Methods*.

## Psychology's Research Ethics

**LOQ 1-18** Why do psychologists study animals, and what ethical guidelines safeguard human and animal research participants? How do psychologists' values influence what they study and how they apply their results?

We have reflected on how a scientific approach can restrain biases. We have seen how case studies, naturalistic observations, and surveys help us describe behavior. We have also noted that correlational studies assess the association between two factors, showing how well one predicts another. We have examined the logic underlying experiments, which use controls and random assignment to isolate the causal effects of independent variables on dependent variables.

Hopefully, you are now prepared to understand what lies ahead and to think critically about psychological matters. But before we plunge in, let's address some common questions about psychology's ethics and values.

 **LaunchPad** See the *Video: Research Ethics* for a helpful tutorial animation.

### STUDYING AND PROTECTING ANIMALS

Many psychologists study nonhuman animals because they find them fascinating. They want to understand how different species learn, think, and behave. Psychologists also study animals to learn about people. We humans are not *like* animals; we *are* animals, sharing a common biology. Animal experiments have therefore led to treatments for human diseases—insulin for diabetes, vaccines to prevent polio and rabies, transplants to replace defective organs.

Humans are more complex. But some of the same processes by which we learn

are present in other animals, even sea slugs and honeybees. The simplicity of the sea slug's nervous system is precisely what makes it so revealing of the neural mechanisms of learning. Ditto for the honeybee, which resembles humans in how it learns to cope with stress (Dinges et al., 2017).

"Rats are very similar to humans except that they are not stupid enough to purchase lottery tickets." —Dave Barry, July 2, 2002

Sharing such similarities, should we not respect our animal relatives? The animal protection movement protests the use of animals in psychological, biological, and medical research. Out of this heated debate, two issues emerge.

The basic question: Is it right to place the well-being of humans above that of other animals? In experiments on stress and cancer, is it right that mice get tumors in the hope that people might not? Humans raise and slaughter 56 billion animals a year (Worldwatch Institute, 2017). Is this use and consumption of other animals as natural as the behavior of carnivorous hawks, cats, and whales?

For those who give human life top priority, a second question emerges: What safeguards should protect the well-being of animals in research? One survey of animal researchers gave an answer. Some 98 percent supported government regulations protecting primates, dogs, and cats. And 74 percent also backed regulations providing for the humane care of rats and mice (Plous & Herzog, 2000). Many professional associations and funding agencies already have such guidelines. British Psychological Society (BPS) guidelines call for housing animals under reasonably natural living conditions, with companions for social animals (Lea, 2000). American Psychological Association (APA) guidelines state that researchers must provide "humane care and healthful conditions" and that testing should "minimize discomfort" (APA, 2012). The European Parliament also mandates standards for animal care and



MARY ALTAFFER/AP Images

#### Animal research benefiting animals

Psychologists have helped zoos enrich animal environments, for example by giving animals more choices to reduce the "learned helplessness" of captivity (Kurtcz, 2015; Weir, 2013). Thanks partly to research on the benefits of novelty, control, and stimulation, these gorillas are enjoying an improved quality of life in New York's Bronx Zoo.

housing (Vogel, 2010). Most universities screen research proposals, often through an animal care ethics committee, and laboratories are regulated and inspected.

Animals have themselves benefited from animal research. After measuring stress hormone levels in samples of millions of dogs brought each year to animal shelters, research psychologists devised handling and stroking methods to reduce stress and ease the dogs' move to adoptive homes (Tuber et al., 1999). Other studies have helped improve care and management in animals' natural habitats. By revealing our behavioral kinship with animals and the remarkable intelligence of chimpanzees, gorillas, and other animals, experiments have led to increased empathy and protection for other species. At its best, a psychology concerned for humans and sensitive to animals serves the welfare of both.

### STUDYING AND PROTECTING HUMANS

What about human participants? Does the image of white-coated scientists seeming to deliver electric shocks trouble you? Actually, most psychological



studies are free of such stress. Blinking lights, flashing words, and pleasant social interactions are more common. Moreover, psychology's experiments are mild compared with the stress and humiliation often inflicted in reality TV "experiments." In two episodes of *The Bachelor*, a man dumped his new fiancée—on camera—for a woman who earlier had been runner-up (Bonos, 2018; Collins, 2009).

Occasionally, researchers do temporarily stress or deceive people. This happens only when they believe it is unavoidable. Some experiments won't work if participants know everything beforehand. (Wanting to be helpful, the participants might try to confirm the researcher's predictions.)

The APA and Britain's BPS ethics codes urge researchers to

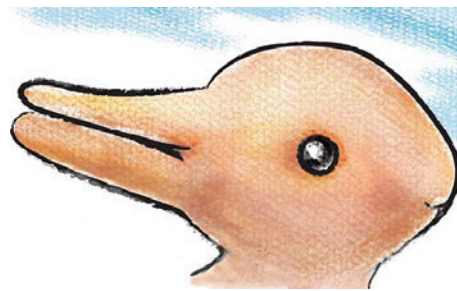
- obtain the potential participants' **informed consent** to take part.
- protect participants from out-of-the-ordinary harm and discomfort.
- keep information about individual participants confidential.
- fully **debrief** participants (explain the research afterward, including any temporary deception).

As with nonhuman animals, most university ethics committees have guidelines that screen research proposals and safeguard participants' well-being.

## VALUES IN PSYCHOLOGY

Values affect what we study, how we study it, and how we interpret results. Consider our choice of research topics. Should we study worker productivity or worker morale? Sex discrimination or gender differences? Conformity or independence? Values can also color "the facts"—our observations and interpretations. Sometimes we see what we want or expect to see (FIGURE 1.4).

Even the words we use to describe traits and tendencies can reflect our values. Labels describe and labels evaluate. One person's rigidity is another's



(a)

Rubberball/Mike Kemp/Getty Images



(b)

**FIGURE 1.4 What do you see?** Our expectations influence what we perceive in (a). Did you see a duck or a rabbit? Show some friends this image with the rabbit photo (b) covered up and see if they are more likely to perceive a duck. (Inspired by Shepard, 1990.)

consistency. One person's *undocumented worker* is another's *illegal alien*. One person's *faith* is another's *fanaticism*. One country's *enhanced interrogation techniques* is an enemy country's use of torture. Our words—*firm* or *stubborn*, *careful* or *picky*, *discreet* or *secretive*—reveal our attitudes.

Applied psychology also contains hidden values. If you defer to "professional" guidance—on raising children, achieving self-fulfillment, coping with sexual feelings, getting ahead at work—you are accepting value-laden advice. A science of behavior and mental processes can help us reach our goals, but it cannot decide what those goals should be.

Others have a different worry about psychology: that it is becoming dangerously powerful. Might psychology, they ask, be used to manipulate people? Knowledge, like all power, can be used for good or evil. Nuclear power has been used to light up cities—and to demolish them. Persuasive power has been used to educate people—and to deceive them. Although psychology does indeed have the power to deceive, its purpose is to enlighten. Every day, psychologists explore ways to enhance learning, creativity, and compassion. Psychology speaks to many of our world's great problems—war, inequality, climate change, prejudice, family crises, crime—all of which involve attitudes and behaviors. Psychology also

speaks to our deepest longings—for nourishment, for love, for happiness. And, as you have seen, one of the new developments in this field—positive psychology—has as its goal exploring and promoting human strengths. Many of life's questions are beyond psychology, but even a first psychology course can shine a bright light on some very important ones.



Macmillan Learning



Macmillan Learning

**Psychology speaks** In making its historic 1954 school desegregation decision, the U.S. Supreme Court cited the expert testimony and research of psychologists Kenneth Clark and Mamie Phipps Clark (1947). The Clarks reported that, when given a choice between Black and White dolls, most African-American children chose the White doll. This choice indicated that the children had likely absorbed and accepted anti-Black prejudice.

**informed consent** giving people enough information about a study to enable them to decide whether they wish to participate.

**debriefing** after an experiment ends, explaining to participants the study's purpose and any deceptions researchers used.

## IN YOUR EVERYDAY LIFE

What other questions or concerns do you have about psychology?

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

20. How are animal and human research participants protected?

# Use Psychology to Improve Your Life and Become a Better Student

**LOQ 1-19** How can psychological principles help you to learn, remember, and thrive?

Psychology is not just about understanding others, but also about understanding ourselves. It is only through such learning that we can be—and show to the world—our very best selves. This book is all about how you can use psychology. You may do so in these three ways:

**Think:** Think critically, by examining sources and evidence before accepting arguments and conclusions.

**Consider:** Consider other voices and ideas by being open to diverse perspectives. By engaging with people who differ from you, your world will be enriched. As actor Angelina Jolie (2017) remarked, “What a dull and pointless life it would be if everyone was the same.”

**Improve:** Use psychology’s evidence-based principles—on relationships, achieving success, handling stress, finding meaning, and much more—to improve your everyday life.

Think, Consider, and Improve: These principles run through the entire book. In chapters to come, we will offer evidence-based suggestions that you can

use to live a happy, effective, flourishing life, including the following:

- **Manage your time to get a full night’s sleep.** Unlike sleep-deprived people, who live with fatigue and gloomy moods, well-rested people live with greater energy, happiness, and productivity.
- **Make space for exercise.** Aerobic activity not only increases health and energy, it also is an effective remedy for mild to moderate depression and anxiety.
- **Set long-term goals, with daily aims.** Flourishing, successful people take time each day to work toward their goals, such as exercising or sleeping more, or eating more healthfully. Over time, they often find that their daily practice becomes a habit.
- **Have a growth mindset.** Rather than seeing their abilities as fixed, successful people view their mental abilities as like a muscle—something that grows stronger with effortful use.
- **Prioritize relationships.** We humans are social animals. We flourish when connected in close relationships. We are both happier and healthier when supported by (and when supporting) caring friends.

Psychology’s research also shows how we can learn and retain information. Many students assume that the way to cement new learning is to reread. What helps more—and what this book therefore encourages—is *repeated self-testing and rehearsal* of previously studied material. Memory researchers call this the **testing effect** (Roediger & Karpicke, 2006). (This is also known as the *retrieval practice effect* or as *test-enhanced learning*.) In one study, English-speaking students who had been tested repeatedly recalled the meaning of 20 previously learned Lithuanian words better than those who had spent the same time restudying the 20 words (Ariel & Karpicke, 2018). Repetitive testing’s rewards also make it reinforcing: Students who used repetitive testing once found it helped, and more often

used it later when learning new material. Many other studies, including in college classrooms, confirm that *frequent quizzing and self-testing* boosts students’ retention (Cho et al., 2017; Foss & Pirozzolo, 2017; Trumbo et al., 2016).

We have designed this book to help you benefit from the testing effect and other memory research findings. As you will see in Chapter 7, to master information you must *actively process* it. In one digest of 225 studies, students who were learning actively scored highest in science, technology, engineering, and mathematics (the STEM fields) (Freeman et al., 2014). Likewise, when learning a new language, those who practice *speaking* it learn better than those who passively listen to it (Hopman & MacDonald, 2018). So don’t treat your mind like your stomach, something to be filled passively. Treat it more like a muscle that grows stronger with exercise. Countless experiments reveal that people learn and remember best when they put material into their own words, rehearse it, and then retrieve and review it again.

The **SQ3R** study method converts these principles into practice (McDaniel et al., 2009; Robinson, 1970). SQ3R is an acronym—an abbreviation formed from the first letter of each of its five steps: Survey, Question, Read, Retrieve,<sup>7</sup> Review.

To study a chapter, first *survey*, taking a bird’s-eye view. Scan the table of contents at the chapter’s opening to visually survey the upcoming content. Scan the headings, and notice how the chapter is organized.

Before you read each main section, try to answer its numbered Learning Objective Question (for this section: “How can psychological principles help you to learn, remember, and thrive?”). By testing your understanding *before* you read the section, you will discover what you don’t yet know.

Then *read*, actively searching for the answer to each question. At each sitting, read only as much of the chapter (usually a single main section) as you can absorb

<sup>7</sup> Also sometimes called “Recite.”



without tiring. Read actively and think critically. Ask your own questions. Take notes. Relate the ideas to your personal experiences and to your own life. *Does the idea support or challenge my assumptions? How convincing is the evidence?* Write out what you know. “Writing is often a tool for learning,” say researchers (Arnold et al., 2017).

Having read a section, *retrieve* its main ideas—“Active retrieval promotes meaningful learning” (Karpicke, 2012). So test yourself—even better, test yourself repeatedly. To get you started, we offer periodic Retrieve & Remember questions throughout each chapter (see, for example, the questions at the end of this section). After trying to answer these questions, check the answers in Appendix E, and reread the material as needed. Researchers have found that “trying and failing to retrieve the answer is actually helpful to learning” (Roediger & Finn, 2010). Testing yourself after you read will help you learn and retain the information more effectively.

Finally, *review*: Read over any notes you have taken, again with an eye on the chapter's organization, and quickly review the whole chapter. Write or say what a concept is before rereading the material to check your understanding.

*Survey, question, read, retrieve, review.* We have organized this book's chapters to help you use the SQ3R study system. Each chapter begins with a *survey* of the content to come. Headings and Learning Objective Questions suggest issues and concepts you should consider as you move through the section. The length of the sections is controlled so you can easily *read* them. The Retrieve & Remember questions will challenge you to *retrieve* what you have learned, and thus *retain* it better. The *In Your Everyday Life* and *Improve Your Everyday Life* questions appearing throughout the chapter will help make the chapter's concepts more personally meaningful, and therefore more memorable. The end-of-chapter Review is set up as a self-test, with the collected Learning Objective Questions and key terms listed, along with Chapter Test questions in a variety of formats. In the e-book, answer-checking is a click

away. In the printed text, answers may be found in Appendix D and Appendix E.

Four additional study tips may further boost your learning:

**Distribute your study time.** One of psychology's oldest findings is that *if you want to retain information, spaced practice is better than massed practice*. So space your time over several study periods—perhaps one hour a day, six days a week—rather than cramming it into one week-long or all-night study blitz. You'll remember material better if you read just one main section (not the whole chapter) in a single sitting. Then turn to something else.

Spacing your study sessions requires discipline and knowing how to manage your time. Richard O. Straub explains time management in a helpful preface at the beginning of this text.

**Learn to think critically.** We again mention critical thinking because it is so important. Whether you are reading or listening to class discussions, think smartly. Try to spot people's assumptions and values. Can you detect a bias underlying an argument? Weigh the evidence. Is it a personal story that might not represent the whole group? Or is it scientific evidence based on sound experiments? Assess conclusions. Are other explanations possible?

**Process class information actively.** Listen for a lecture's main ideas and sub-ideas. *Write them down.* Ask questions during and after class. In class, as in your own study, process the information actively and you will understand and retain it better. Make the information your own by making connections between what you read and what you already know. Engage with the “Your Everyday Life” questions found throughout each chapter to relate what you read to your own life. Tell someone else about it. (As any teacher will confirm, to teach is to remember.)

Also, take notes *by hand*. Handwritten notes, in your own words, typically engage more active processing, with better retention, than does word-for-word note taking on laptops (Mueller & Oppenheimer, 2014).

**Overlearn.** Psychology tells us that we tend to be overconfident—we overestimate how much we know. You may understand a chapter as you read it, but that feeling of familiarity can trick you. By using the Retrieve & Remember and Chapter Test questions as well as our other online learning opportunities, you can test your knowledge and *overlearn* in the process.

Memory experts offer simple, scientifically supported advice for how to improve your retention and your grades (Bjork & Bjork, 2011, p. 63):

Spend less time on the input side and more time on the output side, such as summarizing what you have read from memory or getting together with friends and asking each other questions. Any activities that involve testing yourself—that is, activities that require you to retrieve or generate information, rather than just representing information to yourself—will make your learning both more durable and flexible.

So go ahead and jump right in. Learn psychology. Learn it well. And discover how it can help you be the happiest, most effective, and most successful you.

## IMPROVE YOUR EVERYDAY LIFE

Of all of these helpful principles, which ones seem most relevant and important for improving your own life and studies? How will you add them to your usual routines?

## RETRIEVE & REMEMBER

ANSWERS IN APPENDIX E

- ▶ 21. The \_\_\_\_\_ describes the enhanced memory that results from repeated retrieval (as in self-testing) rather than from simple rereading of new information.
- ▶ 22. What does SQ3R stand for?

**testing effect** enhanced memory after retrieving, rather than simply rereading, information. Also sometimes called the *retrieval practice effect* or *test-enhanced learning*.

**SQ3R** a study method incorporating five steps: Survey, Question, Read, Retrieve, Review.

## LEARNING OBJECTIVES

**TEST YOURSELF** Answer these repeated Learning Objective Questions on your own (before checking the answers in Appendix D) to improve your retention of the concepts (McDaniel et al., 2009, 2015).

**Psychology Is a Science**

- 1-1:** How is psychology a science? How does critical thinking feed a scientific attitude, and smarter thinking for everyday life?
- 1-2:** What are the three key elements of the scientific attitude, and how do they support scientific inquiry?
- 1-3:** How has psychology's focus changed over time?
- 1-4:** What are psychology's current perspectives, and what are some of its subfields?
- 1-5:** How do psychologists use the biopsychosocial approach, and how can it help us understand our diverse world?
- 1-6:** What are we learning about *dual processing* from psychological science?
- 1-7:** How is psychology also a helping profession?
- 1-8:** What is *positive psychology*?

**The Need for Psychological Science**

- 1-9:** How does our everyday thinking sometimes lead us to a wrong conclusion?
- 1-10:** Why is it so easy to believe untruths?

**How Do Psychologists Ask and Answer Questions?**

- 1-11:** How do theories advance psychological science?
- 1-12:** How do psychologists use case studies, naturalistic observations, and surveys to observe and describe behavior, and why is random sampling important?
- 1-13:** What does it mean when we say two things are correlated, and what are positive and negative correlations?
- 1-14:** Why do correlations enable prediction but not cause-effect explanation?
- 1-15:** How do experiments clarify or reveal cause-effect relationships?
- 1-16:** How would you know which research design to use?
- 1-17:** How can simplified laboratory experiments help us understand general principles of behavior?

**Psychology's Research Ethics**

- 1-18:** Why do psychologists study animals, and what ethical guidelines safeguard human and animal research participants? How do psychologists' values influence what they study and how they apply their results?

**Use Psychology to Improve Your Life and Become a Better Student**

- 1-19:** How can psychological principles help you to learn, remember, and thrive?

## TERMS AND CONCEPTS TO REMEMBER

**TEST YOURSELF** Write down the definition in your own words, then check your answer.

- |                                |                              |
|--------------------------------|------------------------------|
| critical thinking, p. 3        | nature–nurture issue, p. 9   |
| structuralism, p. 5            | dual processing, p. 11       |
| functionalism, p. 5            | counseling psychology, p. 11 |
| behaviorism, p. 5              | clinical psychology, p. 11   |
| humanistic psychology, p. 5    | psychiatry, p. 11            |
| cognitive psychology, p. 5     | community psychology, p. 11  |
| cognitive neuroscience, p. 7   | positive psychology, p. 11   |
| psychology, p. 7               | hindsight bias, p. 13        |
| biopsychosocial approach, p. 9 | theory, p. 15                |
| culture, p. 9                  |                              |

- hypothesis, p. 15
- operational definition, p. 15
- replication, p. 15
- preregistration, p. 15
- case study, p. 17
- naturalistic observation, p. 17
- survey, p. 17
- population, p. 17
- random sample, p. 17
- correlation, p. 18
- experiment, p. 21
- random assignment, p. 21

- experimental group, p. 21
- control group, p. 21
- placebo [pluh-SEE-bo], p. 21
- double-blind procedure, p. 21
- placebo effect, p. 21
- independent variable, p. 21
- confounding variable, p. 21
- dependent variable, p. 21
- informed consent, p. 25
- debriefing, p. 25
- testing effect, p. 27
- SQ3R, p. 27



## CHAPTER TEST

**TEST YOURSELF** Answer the following questions on your own first, then check your answers in Appendix E.

1. How can critical thinking help you evaluate claims in the media, even if you're not a scientific expert on the issue?
2. As scientists, psychologists
  - a. keep their methods private so others will not repeat their research.
  - b. assume the truth of articles published in leading scientific journals.
  - c. reject evidence that competes with traditional findings.
  - d. are willing to ask questions and to reject claims that cannot be verified by research.
3. In 1879, in psychology's first experiment, \_\_\_\_\_ and his students measured the time lag between hearing a ball hit a platform and pressing a key.
4. William James would be considered a(n) \_\_\_\_\_. Wilhelm Wundt would be considered a(n) \_\_\_\_\_.
  - a. functionalist; structuralist
  - b. structuralist; functionalist
  - c. evolutionary theorist; structuralist
  - d. functionalist; evolutionary theorist
5. In the early twentieth century, \_\_\_\_\_ redefined psychology as "the scientific study of observable behavior."
  - a. John B. Watson
  - b. Abraham Maslow
  - c. William James
  - d. Sigmund Freud
6. Nature is to nurture as
  - a. personality is to intelligence.
  - b. biology is to experience.
  - c. intelligence is to biology.
  - d. psychological traits are to behaviors.
7. "Nurture works on what nature provides." Describe what this means, using your own words.
8. Which of the following is true regarding gender differences and similarities?
  - a. Differences between the genders outweigh any similarities.
  - b. Despite some gender differences, the underlying processes of human behavior are the same.
  - c. Both similarities and differences between the genders depend more on biology than on environment.
  - d. Gender differences are so numerous that it is difficult to make meaningful comparisons.
9. \_\_\_\_\_ is the principle that our mind processes information on two tracks at the same time—one with our full awareness and the other outside of our awareness.
10. A psychologist treating emotionally troubled adolescents at a local mental health agency is most likely to be a(n)
  - a. research psychologist.
  - b. psychiatrist.
  - c. industrial-organizational psychologist.
  - d. clinical psychologist.
11. A mental health professional with a medical degree who can prescribe medication is a \_\_\_\_\_.
12. Martin Seligman and other researchers who explore various aspects of human flourishing refer to their field of study as \_\_\_\_\_.
13. \_\_\_\_\_ refers to our tendency to perceive events as predictable and obvious after the fact.
14. A theory-based prediction is called a(n) \_\_\_\_\_.
15. Which of the following is NOT one of the *descriptive* methods psychologists use to observe and describe behavior?
  - a. A case study
  - b. Naturalistic observation
  - c. Correlational research
  - d. A phone survey
16. For your survey, you need to establish a group of people who represent the country's entire adult population. To do this, you will need to question a \_\_\_\_\_ sample of the population.
17. A study finds that the more childbirth training classes women attend, the less pain medication they require during childbirth. This finding can be stated as a \_\_\_\_\_ (positive/negative) correlation.
18. Knowing that two events are correlated provides
  - a. a basis for prediction.
  - b. an explanation of why the events are related.
  - c. proof that as one increases, the other also increases.
  - d. an indication that an underlying third factor is at work.



19. Here are some recently reported correlations, with interpretations drawn by journalists. Knowing just these correlations, can you come up with other possible explanations for each of these?
- a. Alcohol use is associated with violence. (One interpretation: Drinking triggers, or unleashes, aggressive behavior.)
  - b. Educated people live longer, on average, than less-educated people. (One interpretation: Education lengthens life and improves health.)
  - c. Teens engaged in team sports are less likely to use drugs, smoke, have sex, carry weapons, and eat junk food than are teens who do not engage in team sports. (One interpretation: Team sports encourage healthy living.)
  - d. Adolescents who frequently see smoking in movies are more likely to smoke. (One interpretation: Movie stars' behavior influences impressionable teens.)
20. To explain behaviors and clarify cause and effect, psychologists use \_\_\_\_\_.
21. To test the effect of a new drug on depression, we randomly assign people to control and experimental groups. Those in the control group take a pill that contains no medication. This pill is a \_\_\_\_\_.
22. In a double-blind procedure,
- a. only the participants know whether they are in the control group or the experimental group.
  - b. experimental and control group members will be carefully matched for age, sex, income, and education level.
  - c. neither the participants nor the researchers know who is in the experimental group or control group.
  - d. someone separate from the researcher will ask people to volunteer for the experimental group or the control group.
23. A researcher wants to know whether noise level affects workers' blood pressure. In one group, she varies the level of noise in the environment and records participants' blood pressure. In this experiment, the level of noise is the \_\_\_\_\_.
24. The laboratory environment is designed to
- a. exactly re-create the events of everyday life.
  - b. re-create psychological forces under *controlled* conditions.
  - c. re-create psychological forces under *random* conditions.
  - d. reduce the use of animals and humans in psychological research.
25. In defending their experimental research with animals, psychologists have noted that
- a. animals' biology and behavior can tell us much about our own.
  - b. animal experimentation sometimes helps animals as well as humans.
  - c. animals are fascinating creatures and worthy of study.
  - d. all of these statements are correct.

Continue testing yourself with  **LearningCurve** or  **Achieve Read & Practice** to learn and remember most effectively.