

1

The Science of Psychology

Ask & Answer

1.1 What Is Psychological Science? 4

1.2 What Are the Scientific Foundations of Psychology? 12

1.3 What Are the Latest Developments in Psychology? 21

FIGURE 1.1
Digital Interaction

People stay wired to their digital media, even in social situations.



THINK OF THE ADVANTAGES THAT DIGITAL MEDIA have brought to so many lives over the past few decades. Thirty years ago, if you wanted to contact someone far away, you most likely wrote a letter. Phoning could be expensive, and email was largely unavailable. Now you might email, text, Skype, tweet, or blog. Twenty years ago, if you wanted a piece of information that was not available in your home, you might have traveled to a library. Now you would probably go straight to the Internet.

Around the world, billions of people now spend much of their time interacting through digital media (**FIGURE 1.1**). In fact, many people, especially young people, feel panicky to be away from their 24/7 connection to the electronic universe. When was the last time you willingly went a week without your phone or computer? A day? Some of you probably cannot last more than a few hours, or you become anxious when your instructor insists that cell phones be turned off in the classroom.

You might think, therefore, that our more frequent communications with others would bring many benefits to our social lives. Early proponents of social media, such as the creators of Facebook, envisioned a flatter world—that is, a world with fewer obstacles between people. In their view, technology would make us more connected and give us stronger social ties. We would stay in touch with old friends while easily making new ones. Our new friends would be people who

shared our interests, whether they lived on the next street or on some tiny island thousands of miles away.

Facebook now has over a billion users. Many Facebook users visit the site several times a day. None of these people are sad and lonely, right? All of them have become happier through social media?

On the contrary, there is evidence that the more people use Facebook, the less happy they are in their daily lives. In 2013, at the University of Michigan, the psychologist Ethan Kross and his colleagues performed a study concerning Facebook use. The researchers texted the study participants five times a day for two weeks. In those texts, they asked the participants how much they had used Facebook and how they were feeling. The researchers found that the more the participants had used Facebook at one time they were asked, the worse those people felt the next time they were asked. The more the participants used Facebook over the full two weeks, the less satisfied they were with their lives. If you are a Facebook member, would knowing these results make you quit? What if you knew that most of the study participants were college students?

Before acting on this information, you have to react to it—emotionally, mentally, or both. Your first reaction is probably to want to know more about the study. You might want details about how the study was conducted. Or you might wonder about the results. Why did the participants report feeling less happy? Is it because people who are interacting on Facebook are interacting less with others face to face? Is it because many people brag on Facebook, and other people's accomplishments can make us feel inadequate? Is it because many people look passively at Facebook without actively interacting with other users? Maybe sad and lonely people spend more time on Facebook because they have trouble making friends in real life. And how might the ages of the participants have affected their happiness? You might even wonder how the researchers measured "happiness."

The researchers address many of these issues in their paper. They do so because, like much research in psychology, this study raises questions that we want answers for. To get good answers to questions, researchers need to conduct good scientific studies and think carefully about the results. In other words, they need to perform psychological science.

Learning Objectives

- Define psychological science.
- Define critical thinking, and describe what it means to be a critical thinker.
- Identify the eight major biases in thinking, and explain why these biases result in errors in reasoning.

1.1 What Is Psychological Science?

Psychology involves the study of mental activity and behavior. The term *psychologist* is used broadly to describe someone whose career involves understanding mental life or predicting behavior. We humans are intuitive psychologists. That is, we try to understand and predict others' behavior. For example, defensive drivers rely on their intuitive sense of when other drivers are likely to make mistakes. People choose relationship partners they expect will best meet their emotional, sexual, and support needs. People try to predict whether others are kind, are trustworthy, will make good caretakers, will make good teachers, and so on. But people too often rely on apparent common sense or their gut feelings. They cannot intuitively know if many of

the claims related to psychology are fact or fiction. For example, will taking certain herbs increase memory? Will playing music to newborns make them more intelligent? Does mental illness result from too much or too little of a certain brain chemical?

The science of psychology is not simply about intuitions or common sense. **Psychological science** is the study, through research, of mind, brain, and behavior. But what exactly does each of these terms mean, and how are they all related?

Mind refers to mental activity. Examples of the mind in action include the perceptual experiences (sights, smells, tastes, sounds, and touches) we have while interacting with the world. The mind is also responsible for memories, thoughts, and feelings. Mental activity results from biological processes within the *brain*.

Behavior describes the totality of observable human (or animal) actions. These actions range from the subtle to the complex. Some occur exclusively in humans, such as debating philosophy or performing surgery. Others occur in all animals, such as eating, drinking, and mating. For many years, psychologists focused on behavior rather than on mental states. They did so largely because they had few objective techniques for assessing the mind. The advent of technology to observe the working brain in action has enabled psychologists to study mental states and has led to a fuller understanding of human behavior. Although psychologists make important contributions to understanding and treating mental disorders, most psychological science has little to do with therapeutic clichés such as couches and dreams. Instead, psychologists generally seek to understand mental activity (both normal and abnormal), the biological basis of that activity, how people change as they grow older, how people vary in response to social settings, and how people acquire healthy and unhealthy behaviors.

Psychological Science Teaches Critical Thinking

One of this textbook's most important goals is to provide a basic, state-of-the-art education about the methods of psychological science. Even if your only exposure to psychology is through the introductory course for which *Psychological Science* is the textbook, you will become psychologically literate. With a good understanding of the field's major issues, theories, and controversies, you will also avoid common misunderstandings about psychology. You will learn how to separate the believable from the incredible. You will learn to spot poorly designed experiments, and you will develop the skills necessary to critically evaluate claims made in the popular media.

The media love a good story, and findings from psychological research are often provocative (FIGURE 1.2). Unfortunately, media reports can be distorted or even flat-out wrong. Throughout your life, as a consumer of psychological science, you will need to be skeptical of overblown media reports of "brand-new" findings obtained by "ground-breaking" research (FIGURE 1.3). With the rapid expansion of the Internet and thousands of new research findings available for searches on just about any topic, you need to be able to sort through and evaluate the information you find in order to gain a correct understanding of the phenomenon (observable thing) you are trying to investigate.

One of the hallmarks of a good scientist—or a savvy consumer of scientific research—is *amiable skepticism*. This trait combines openness and wariness. An amiable skeptic remains open to new ideas but is wary of new "scientific findings" when good evidence and sound reasoning do not seem to support them. An amiable

Psychology Today

Home Find a Therapist Topic Streams Get Help Magazine Tests Psych Basics

The Motivated Brain

Understanding the Pursuit of Goals
by Elliot Berkman, Ph.D.

Does Brain-Training Work?

Don't believe the hype—there's a catch to mental skills training programs.
Published on December 31, 2013 by Dr. Elliot T. Berkman in The Motivated Brain

The recent proliferation of commercial online "brain-training" services that promise to enhance intelligence and other cognitive abilities is understandable: Who wouldn't want to be smarter and have greater working memory and inhibitory control? Seeing the potential for low-cost and reliable measurement of performance, some corporations have begun using similar tools to assess potential hires and evaluate employees ("people analytics"). No doubt there is some amount of benefit to be gained on both fronts. After all, people have an amazing capacity to develop expertise with practice in a huge range of skills (think video games, driving, or crosswords), and it is an open secret that qualitative interviews, the dominant tool currently used for evaluating new hires, are subject to bias and don't predict job performance in the first place.

Related Articles

- Brain Plasticity in Action: Getting smarter and happier
- Super Bowl: Battle of the Quarterback Brains
- A Simple Ritual That Will Make Your Goals "Stick"
- The Joy of Effort
- Is Your Brain Asleep on the Job?

Despite this potential, independent studies on brain-training services provide (at best) equivocal support for their effectiveness. This is true for a number of their claims, but particularly the implicit understanding that performance gains earned on the training tasks will generalize to untrained tasks (so-called "transfer effects"). It's one thing to get better at a particular task, but a more rigorous standard is whether users improve on other ones. Does practicing Tetris make you better at Pac-Man? The best work debunking studies claiming to produce training effects has been done by Randall Engel, Zach Shipstead, and their colleagues at Georgia Tech, who find that practice indeed improves skills at the trained tasks, but doesn't transfer to untrained tasks when adequate control groups are used. They also raise concerns about the durability of the training over longer periods of time used in the research (usually 3 or 6 months).

FIGURE 1.2 Psychology in the News

Psychological research is often in the news because the findings are intriguing and relevant to people's lives.

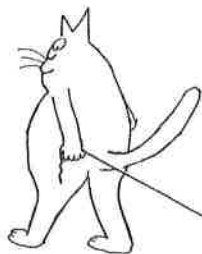
psychological science

The study, through research, of mind, brain, and behavior.



FIGURE 1.3 "Brand-New" Findings

Media reports seek to grab attention. Their claims can be based on science, but they can also be hype—or worse.



S. GROSS

"For God's sake, think! Why is he being so nice to you?"

skeptic develops the habit of carefully weighing the facts when deciding what to believe. The ability to think in this way—to systematically question and evaluate information using well-supported evidence—is called **critical thinking**.

Being a critical thinker involves looking for holes in evidence, using logic and reasoning to see whether the information makes sense, and considering alternative explanations. It also requires considering whether the information might be biased, such as by personal or political agendas. Critical thinking demands healthy questioning and keeping an open mind. Most people are quick to question information that does not fit with their beliefs. But as an educated person, you need to think critically about all information. Even when you "know" something, you need to keep refreshing that information in your mind. Ask yourself: Is my belief still true? What led me to believe it? What facts support it? Has science produced new findings that require us to reevaluate and update our beliefs? This exercise is important because you may be least motivated to think critically about information that verifies your preconceptions. In Chapter 2, you will learn much more about how critical thinking helps our scientific understanding of psychological phenomena.

Psychological Reasoning Examines How People Typically Think

Critical thinking is useful in every aspect of your life. It is also important in all fields of study throughout the humanities and the sciences. The integration of critical thinking in psychological science adds to our understanding of how people typically think when they encounter information. Many decades of psychological research have shown that people's intuitions are often wrong. Intuitions also tend to be wrong in predictable ways. Indeed, human thought is often biased in ways that make critical thinking very difficult. Through scientific study, psychologists have discovered types of situations in which common sense fails and biases influence people's judgments. In psychology, the term *reasoning* refers to using evidence to draw conclusions. In this book, the term *psychological reasoning* refers to using psychological research to examine how people typically think, to understand when and why they are likely to draw erroneous conclusions.

Does eating too much sugar cause children to become hyperactive? Many people believe this connection has been established scientifically, but in fact a review of the scientific literature reveals that the relationship between sugar consumption and hyperactivity is essentially nonexistent (Wolraich, Wilson, & White, 1995). Some people will argue that they have seen with their own eyes what happens when children eat large amounts of sweets. But consider the contexts of such firsthand observations. Might the children have eaten lots of sweets when they were at parties with many other children? Might the gatherings, rather than the sweets, have caused the children to be very excited and active? People often let their beliefs and their biases determine what they "see." The children's highly active behavior, viewed in connection with eating sweets, is interpreted as sugar-induced hyperactivity. This example actually shows many of the ways that learning to use psychological reasoning can help people become better critical thinkers.

Psychological scientists have catalogued a number of ways that noncritical thinking can lead to erroneous conclusions (Gilovich, 1991; Hines, 2003; Kida, 2006; Stanovich, 2013). These errors and biases do not occur because people lack intelligence or motivation. Just the opposite is true. Most of these biases occur *because* people are motivated to use their intelligence. They want to make sense of events that involve them and happen around them. The human brain is highly efficient at

critical thinking

Systematically questioning and evaluating information using well-supported evidence.

finding patterns and making connections between things. By using these abilities, people can make errors but can also make new discoveries and advance society (Gilovich, 1991).

Our minds are constantly analyzing all the information we receive and trying to make sense of that information. These attempts generally result in relevant and correct conclusions. But sometimes we get things wrong. Sometimes we see patterns that do not really exist. We look at the clouds and see images in them—clowns, faces, horses, what have you. We play recorded music backward and hear satanic messages. We believe that events, such as the deaths of celebrities, happen in threes (**FIGURE 1.4**).

Often, we see what we expect to see and fail to notice things that do not fit with our expectations. We expect that kids who consume sugar will become hyper, and then we interpret their behavior in ways that confirm our expectations. Likewise, our stereotypes about people shape our expectations about them, and we interpret their behavior in ways that confirm these stereotypes.

Why is it important to care about errors and biases in thinking? The psychologist Thomas Gilovich answers this question insightfully in his book *How We Know What Isn't So: The Fallibility of Human Reason in Everyday Life* (1991). He points out that more Americans believe in extrasensory perception (ESP) than in evolution and that there are twenty times more astrologers than astronomers. Followers of ESP and astrology may base important life decisions on beliefs that are wrong. False beliefs can sometimes lead to dangerous actions. Some people hunt endangered animals because they believe the animals' body parts provide magical cures. Some people rely on fringe therapies to provide what they think is real medical or psychological treatment.

Knowing about psychological reasoning will also help you do better in your classes, including this one. Before they have taken a psychology course, many students have false beliefs, or misconceptions, about psychological phenomena. The psychologists Patricia Kowalski and Annette Kujawski Taylor (2004) found that students who employ critical thinking skills complete an introductory course with a more accurate understanding of psychology than students who complete the same course but do not employ critical thinking skills. As you read this book, you will benefit from the critical thinking skills that are discussed. You can apply these skills in your other classes, your workplace, and your everyday life.

Each chapter of the book draws your attention to at least one major example of psychological reasoning, in a feature called "What to Believe? Using Psychological Reasoning." Following are some of the major biases you will encounter.

- **Ignoring evidence (confirmation bias): Don't believe everything you think.**

People show a strong tendency to place great importance on evidence that supports their beliefs. They tend to downplay evidence that does not match what they believe. When people hear about a study that is consistent with their beliefs, they generally believe the study has merit. When they hear about a study that contradicts those beliefs, they look for flaws or other problems. Think back to the Facebook study described at the beginning of this chapter. Did the study seem to have merit? Your judgment was probably influenced by your feelings about Facebook.

One factor that contributes to confirmation bias is the selective sampling of information. For instance, people with certain political beliefs may visit only Web sites that are consistent with those beliefs. However, if we restrict ourselves to evidence that supports our views, then of course we will believe we are right. Similarly, people show selective memory, tending to better remember information that supports their existing beliefs.



FIGURE 1.4
Patterns That Do Not Exist
People often think they see faces in objects. When the owner claimed to see the face of the Virgin Mary on this grilled cheese sandwich, the sandwich sold to a casino for \$28,000 on eBay.



FIGURE 1.5
Actors as "Experts"

Advertisements that feature people portraying medical professionals are successful because they create the illusion that such people have expertise.

▪ **Failing to accurately judge source credibility: Who can you trust?** Every day, we are besieged with new information. Particularly when we are not sure what to believe, we are faced with the issue of *whom* to believe. You can probably assume that your psychology professor is much more credible in describing the factors that influence dating success than your cousin Vinny is. But as a critical thinker, you know that sources, even experts, need to be able to justify their claims. Your professor can tell you about actual research studies. Vinny probably relies on his personal experience. At the same time, you should be wary of *appeals to authority*, such as when sources refer to their expertise rather than to the evidence. Advertisers can try to exploit our tendencies to rely on expertise. An advertisement using a person who appears to be a physician is likely to be more successful in promoting sales of a drug than one that uses a representative of the drug company (**FIGURE 1.5**). Critical thinking requires us to examine the sources of the information we receive.

▪ **Misunderstanding or not using statistics: Going with your gut.** People generally fail to understand or use statistics in their efforts to interpret events around them. Gamblers believe that a roulette ball that has landed on red five times in a row is now more likely to land on black. Basketball fans watch players go through hot streaks where they seem never to miss. In fact, these "patterns" do not happen more frequently than would be expected by chance. Suppose you hear that there is a strong relationship between smoking and developing cancer. You might think of your ancient aunt who has smoked for 40 years and is fine. Because of that observation, you might conclude that the relationship is untrue. But the relationship between smoking and cancer is simply that smokers are more likely to get cancer, not that every smoker will get cancer. As you will learn in Chapter 2, statistics help scientists understand the likelihood that events happen simply by chance.

▪ **Seeing relationships that do not exist: Making something out of nothing.** An extremely common reasoning error is the misperception that two events that happen at the same time must somehow be related. In our desire to find predictability in the world, we sometimes see order that does not exist. Believing that events are related when they are not can lead to superstitious behavior. For example, an athlete thinks she must eat a certain meal before a game in order to win, or a fan believes that wearing his favorite team's jersey helps the team win. But many times events that appear related are just coincidence. Consider a humorous example. Over the last 200 years, the mean global temperature has increased. During that same period, the number of pirates on the high seas has decreased. Would you argue that the demise of

pirates has led to increased global warming (**FIGURE 1.6**)?

▪ **Using relative comparisons: Now that you put it that way.** When people are asked to guess the result of multiplying $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$, the average guess is around 2250. But when people are asked to guess the result of multiplying $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$, the average is only 512 (Tversky & Kahneman, 1974). The real answer is 40,320. Why would starting with a larger number lead to a higher guess and starting with a smaller number lead to a lower guess? Information that comes first has a strong influence on how people make relative comparisons. How a question is framed, or presented, also changes how people answer the question. For example, people tend to prefer information that is presented positively rather

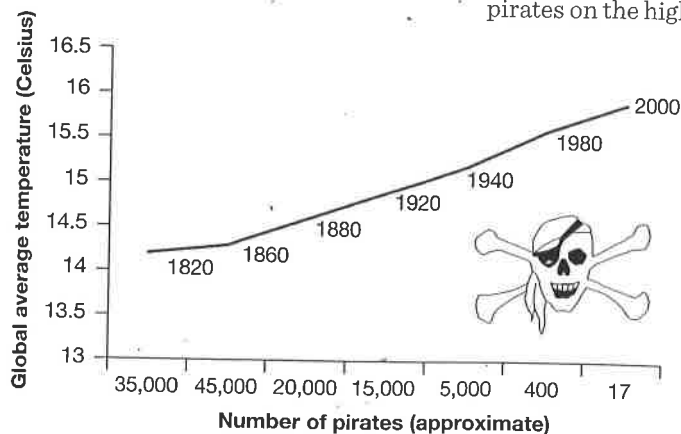


FIGURE 1.6 A Humorous Example
Sometimes things that appear related are not.

than negatively. Consider a medical treatment. People will generally feel more enthusiastic about a treatment if they are told how many lives the treatment can save. People are less enthusiastic if they are told how many people will not be saved by the same treatment. Whichever way the treatment is looked at, the outcome is the same. The framing determines people's relative comparisons.

- **Accepting after-the-fact explanations: I can explain!** Because people expect the world to make sense, they often come up with explanations for why events happen. They do so even when they have incomplete information. One form of this reasoning bias is known as *hindsight bias*. We are wonderful at explaining why things happened, but we are much less successful at predicting future events. Think about the fatal shootings in 2012 at Sandy Hook Elementary School, in Newtown, Connecticut. In hindsight, we know that there were warning signs that the shooter, Adam Lanza, might become violent (**FIGURE 1.7**). Yet none of these warning signs prompted anyone to take action. People saw the signs but failed to predict the tragic outcome. More generally, once we know the outcome, we interpret and reinterpret old evidence to make sense of that outcome. Likewise, when political pundits predict an election outcome and get it wrong, they later come out with all sorts of explanations for the election result. If they had really seen those factors as important before the election, they should have made a different prediction. We need to be wary of after-the-fact explanations because they tend to distort the evidence.

- **Taking mental shortcuts: Keeping it simple.** People often follow simple rules, called heuristics, to make decisions. These mental shortcuts are valuable because they often produce reasonably good decisions without too much effort (Kida, 2006). Unfortunately, many heuristics can lead to inaccurate judgments and biased outcomes. One example of this problem occurs when things that come most easily to mind guide our thinking. After hearing a series of news reports about child abductions, people overestimate how often such abductions happen. Parents become overly concerned about their children being abducted. As a result, people may underestimate other dangers facing children, such as bicycle accidents, food poisoning, or drowning. Child abductions are much more likely to be reported in the news than these much more common dangers. The vivid nature of the abduction reports makes them easy to remember. Similar processes lead people to drive rather than fly even though the chances of injury or death from passenger vehicles are much greater than the chances of dying in a plane crash. In Chapter 8, we will consider a number of heuristic biases.

- **Failing to see our own inadequacies (self-serving bias): Everyone is better than average.** People are motivated to feel good about themselves, and this motivation affects how they think (Kunda, 1990). For example, many people believe they are better than average on any number of dimensions. More than 90 percent of people think they are better-than-average drivers, but this percentage is illogical because only 50 percent can be above average on any dimension. People use various strategies to support their positive views, such as crediting personal strengths for their successes and blaming outside forces for their failures. In general, people interpret information in ways that support their positive beliefs about themselves. One factor that promotes overconfidence is that people often have difficulty recognizing their own weaknesses. This factor is described further in "What to Believe? Using Psychological Reasoning," on the next page.



FIGURE 1.7
Sandy Hook Shootings

In hindsight, there were warning signs that the Newtown shooter, Adam Lanza, was troubled. But it is very difficult to predict violent behavior in advance.

What to Believe? Using Psychological Reasoning

Failing to See Our Own Inadequacies: Why Are People Unaware of Their Weaknesses?

You are watching an audition on *American Idol*, and the singer, while passionate, is just awful (**FIGURE 1.8**). Everyone in the audience is laughing or holding back laughter out of politeness. When the judges proclaim, "You can't be serious! That was horrible!" the performer is crushed and cannot believe the verdict. "But everyone says I am a great singer," he argues. "Singing is my life!" You sit there thinking, *How does he not know how bad he is?*

Such moments make us cringe. We feel deeply uncomfortable about them, even as we tune in to watch them. The German language has a word for how we feel, *Fremdschämen*. This term refers to times when we experience embarrassment for other people in part because they do not realize that they should be embarrassed for themselves. Television comedies such as *The Office* owe much of their success to giving us this feeling of *Fremdschämen*.

How is it that people who are tone-deaf can believe their singing talents

merit participating in a national singing competition? The social psychologists David Dunning and Justin Kruger have an explanation: People are often blissfully unaware of their weaknesses because they cannot judge those weaknesses at all (Dunning et al., 2003; Kruger & Dunning, 1999). How does this limitation come about?

People are often blissfully unaware of their weaknesses because they cannot judge those weaknesses at all.

To judge whether someone is a good singer, you need to be able to tell the difference between good and bad singing. You need to know the difference



FIGURE 1.8
Judging a Performance
Judges on *American Idol* react to an audition.

even if you are judging your own singing. The same is true for most other activities. A lack of skill not only prevents people from producing good results, it also prevents those people from knowing what good results are. As noted by these researchers, "Thus, if people lack the skills to produce correct answers, they are also cursed with an inability to know when their answers, or anyone else's, are right or wrong" (Dunning et al., 2003, p. 85).

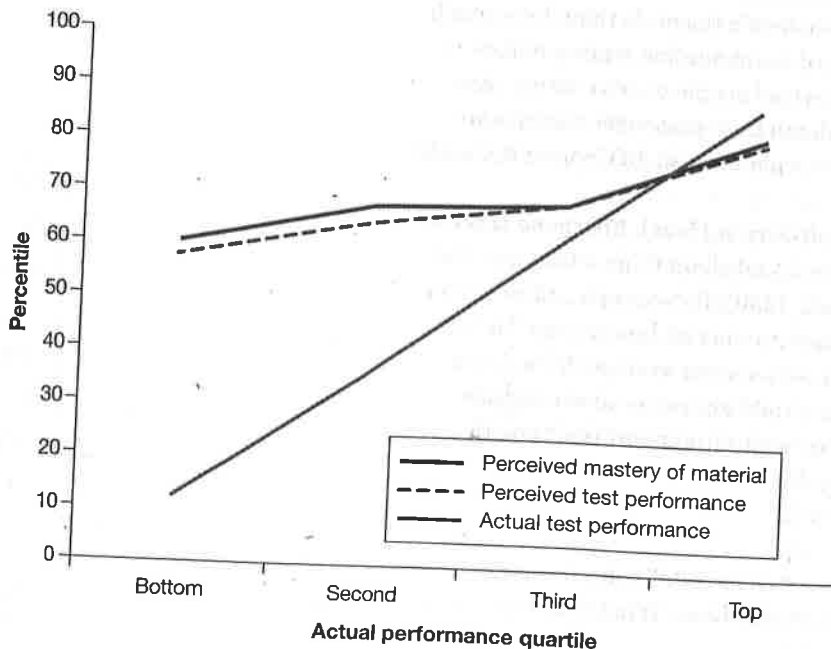


FIGURE 1.9
Personal Ratings Versus Actual Performance

Students rated their mastery of course material and test performance. Points on the Y-axis reflect how the students perceived their percentile rankings (value on a scale of 100). Points on the X-axis reflect these students' actual performance rank (*quartile* here means that people are divided into four groups). The top students' predictions were close to their actual results. By contrast, the bottom students' predictions were far off.

In studies of college students, Dunning and Kruger found that people with the lowest grades rate their mastery of academic skills much higher than is warranted by their performance (**FIGURE 1.9**). A student who receives a grade of C may protest to the instructor, "My work is as good as my roommate's, but she got an A." The protest may simply show that the student lacks the ability to evaluate performance in those areas where she is weakest. To make matters worse, people who are unaware of their weaknesses fail to

make any efforts at self-improvements to overcome those weaknesses. They do not try to get better because they already believe they are performing well.

Kruger and Dunning (1999) have shown that teaching people specific skills helps them to be more accurate in judging their performance. This finding implies that people might need help in identifying their weaknesses before they can fix those weaknesses. But why are people so inaccurate in the first place? The likely answer is that they

generally start with extremely positive views about their abilities. In Chapter 12, you will learn more about why most people believe they are better than average in many things. Such beliefs influence how people judge their talents and skills across multiple areas. Knowing about these beliefs helps us understand the driver who claims to be very skilled in spite of numerous car accidents and the singer who brags about an awesome vocal ability in spite of a train-wreck performance on national television.

Summing Up

What Is Psychological Science?

- Psychological science is the study, through research, of mind, brain, and behavior.
- Most of us function as intuitive psychologists, but many of our intuitions and beliefs are wrong.
- To improve the accuracy of our own ideas, we need to think critically about them.
- We also need to think critically about research findings, and doing so means understanding the research methods that psychologists use.
- Psychological science has established typical errors that people make in reasoning about the world around them. Such errors include ignoring evidence that does not support one's beliefs (confirmation bias), failing to accurately judge source credibility, misunderstanding or not using statistics, seeing relationships that do not exist, making relative comparisons, accepting after-the-fact explanations, taking mental shortcuts, and failing to see one's own inadequacies (self-serving bias).

Measuring Up

1. Critical thinking is
 - a. criticizing the way other people think.
 - b. systematically assessing information to reach conclusions supported by evidence.
 - c. questioning everything you read or hear and refusing to believe anything you have not seen for yourself.
 - d. becoming an authority on everything so you never have to rely on other people's judgments.
2. Match each example with the psychological reasoning skill it describes: misunderstanding or not using statistics, failing to accurately judge source credibility, self-serving bias, and taking mental shortcuts.
 - a. A blackjack player wins three hands in a row and lowers her bet, assuming the next hand must be a loser.
 - b. A person takes an herbal treatment to improve sleep because the package says the treatment is effective 100 percent of the time.
 - c. A student thinks he deserves an A on a paper on which he received a D.
 - d. Your roommate insists on going to Florida for spring break because it is the first place that comes to mind.

ANSWERS: (1) b. systematically assessing information to reach conclusions supported by evidence. (2) a. misunderstanding or not using statistics; b. failing to accurately judge source credibility; c. self-serving bias; d. taking mental shortcuts.

Learning Objectives

- Trace the development of psychology since its formal inception in 1879.
- Define the nature/nurture debate and the mind/body problem.
- Identify the major schools of thought that have characterized the history of experimental psychology.

culture

The beliefs, values, rules, and customs that exist within a group of people who share a common language and environment.

nature/nurture debate

The arguments concerning whether psychological characteristics are biologically innate or acquired through education, experience, and culture.

mind/body problem

A fundamental psychological issue: Are mind and body separate and distinct, or is the mind simply the physical brain's subjective experience?



FIGURE 1.10
Confucius

Ancient philosophers such as Confucius studied topics that remain important in contemporary psychology.

1.2 What Are the Scientific Foundations of Psychology?

Psychology originated in philosophy, as the great thinkers sought to understand human nature. For example, the ancient Chinese philosopher Confucius emphasized human development, education, and interpersonal relations, all of which remain contemporary topics in psychology around the world (Higgins & Zheng, 2002; **FIGURE 1.10**).

In nineteenth-century Europe, psychology developed into a discipline. As that discipline spread throughout the world and developed into a vital field of science and a vibrant profession, different ways of thinking about the content of psychology emerged. These ways of thinking are called *schools of thought*. As is true in every science, one school of thought would dominate the field for a while. There would be a backlash. Then a new school of thought would take over the field. The following sections consider the major themes and schools of thought in the history of psychology.

The Nature/Nurture Debate Has a Long History

Since at least the times of ancient Greece, people have wondered why humans think and act in certain ways. Greek philosophers such as Aristotle and Plato debated whether an individual's psychology is attributable more to *nature* or to *nurture*. That is, are psychological characteristics biologically innate? Or are they acquired through education, experience, and **culture** (the beliefs, values, rules, norms, and customs existing within a group of people who share a common language and environment)?

The **nature/nurture debate** has taken one form or another throughout psychology's history. Psychologists now widely recognize that both nature and nurture dynamically interact in human psychological development. For example, psychologists study the ways that nature and nurture influence each other in shaping mind, brain, and behavior. In examples throughout this book, nature and nurture are so enmeshed that they cannot be separated.

The Mind/Body Problem Also Has Ancient Roots

The **mind/body problem** was perhaps the quintessential psychological issue: Are the mind and body separate and distinct, or is the mind simply the subjective experience of ongoing brain activity?

Throughout history, the mind has been viewed as residing in many organs of the body, including the liver and the heart. The ancient Egyptians, for example, elaborately embalmed each dead person's heart, which was to be weighed in the afterlife to determine the person's fate. They simply threw away the brain. In the following centuries, especially among the Greeks and Romans, recognition grew that the brain was essential for normal mental functioning. Much of this change came from observing people with brain injuries. At least since the time of the Roman gladiators, it was clear that a blow to the head often produced disturbances in mental activity, such as unconsciousness or the loss of speech.

Nonetheless, scholars continued to believe that the mind was separate from and in control of the body. They held this belief partly because of the strong theological belief

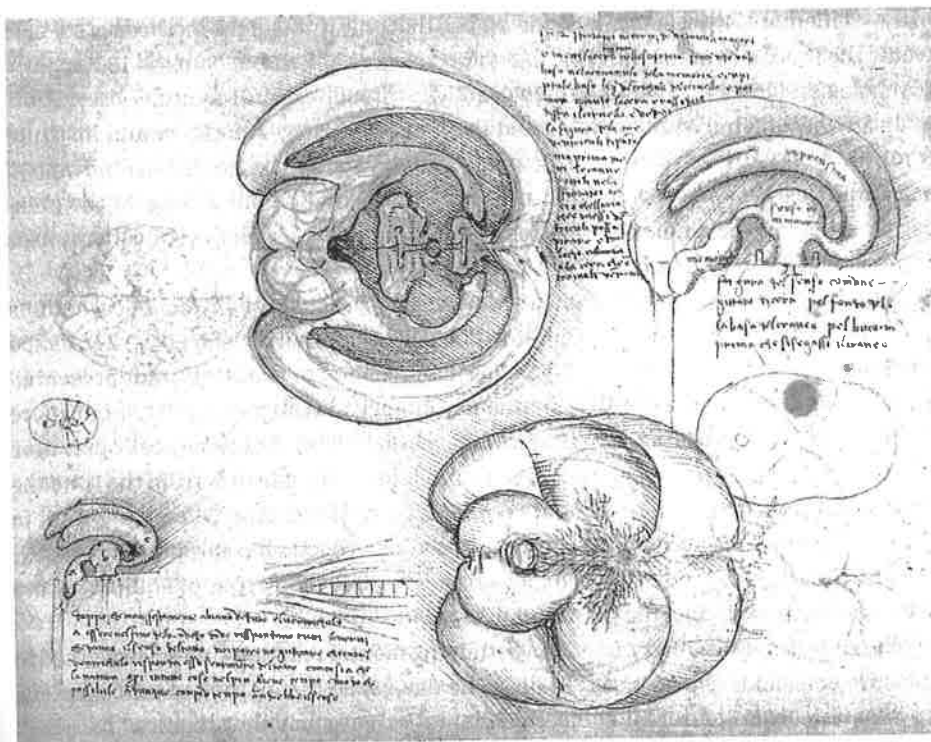


FIGURE 1.11

Da Vinci and the Brain

This drawing by Leonardo da Vinci dates from around 1506. Da Vinci used a wax cast to study the brain. He believed that sensory images arrived in the middle region of the brain. He called this region the *sensus communis*.

that a divine and immortal soul separates humans from nonhuman animals. Around 1500, the artist Leonardo da Vinci challenged this doctrine when he dissected human bodies to make his anatomical drawings more accurate. Da Vinci's dissections led him to many conclusions about the brain's workings. For example, da Vinci theorized that all sensory messages (vision, touch, smell, etc.) arrived at one location in the brain. He called that region the *sensus communis*, and he believed it to be the home of thought and judgment; its name may be the root of the modern term *common sense* (Blake-more, 1983). Da Vinci's specific conclusions about brain functions were not accurate, but his work represents an early and important attempt to link the brain's anatomy to psychological functions (**FIGURE 1.11**).

In the 1600s, the philosopher René Descartes promoted the influential theory of *dualism*. This term refers to the idea that the mind and the body are separate yet intertwined (**FIGURE 1.12**). In earlier views of dualism, mental functions had been considered the mind's sovereign domain, separate from body functions. Descartes proposed a somewhat different view. The body, he argued, was nothing more than an organic machine governed by "reflex." Many mental functions—such as memory and imagination—resulted from body functions. Deliberate action, however, was controlled by the rational mind. And in keeping with the prevailing religious beliefs, Descartes concluded that the rational mind was divine and separate from the body. Nowadays, psychologists reject dualism. In their view, the mind arises from brain activity. It does not exist separately.

Experimental Psychology Began with Introspection

In the mid-1800s in Europe, psychology arose as a field of study built on the experimental method. In *A System of Logic* (1843), the philosopher John Stuart Mill declared that psychology should leave the realms of philosophy and of speculation and become a science of observation and of experiment. Indeed, he defined psychology as "the science



FIGURE 1.12

René Descartes

According to Descartes, the mind and the body are separate yet intertwined. As discussed throughout this book, psychologists now reject such dualism.



FIGURE 1.13
Wilhelm Wundt

Wundt founded modern experimental psychology.

Introspection

A systematic examination of subjective mental experiences that requires people to inspect and report on the content of their thoughts.

Structuralism

An approach to psychology based on the idea that conscious experience can be broken down into its basic underlying components.

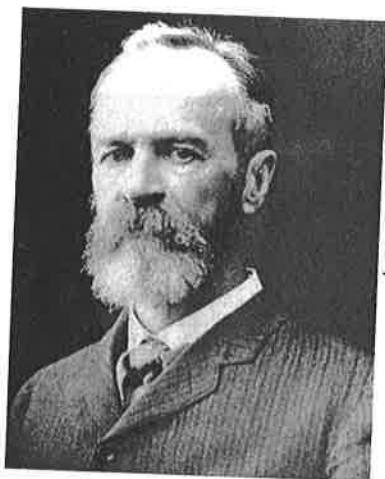


FIGURE 1.14
William James

In 1890, James published the first major overview of psychology. Many of his ideas have passed the test of time. In theorizing about how the mind works, he moved psychology beyond structuralism and into functionalism.

of the elementary laws of the mind" and argued that only through the methods of science would the processes of the mind be understood. As a result, throughout the 1800s, early psychologists increasingly studied mental activity through careful scientific observation.

In 1879, Wilhelm Wundt established the first psychology laboratory and institute (**FIGURE 1.13**). At this facility, in Leipzig, Germany, students could earn advanced academic degrees in psychology for the first time. Wundt trained many of the great early psychologists, a number of whom then established psychological laboratories throughout Europe, Canada, and the United States.

Wundt realized that psychological processes, the products of physiological actions in the brain, take time to occur. Therefore, he used a method developed earlier, called *reaction time*, to assess how quickly people can respond to events. Wundt presented each research participant with a simple psychological task and a related but more complex one. He timed each task. He then performed a mathematical operation: subtracting the time a participant took to complete the simple task from the time the participant took to complete the more complex task. This method enabled Wundt to infer how much time a particular mental event took to occur. Researchers still widely use reaction time to study psychological processes, but their types of equipment are of course more sophisticated than Wundt's.

Wundt was not satisfied with simply studying mental reaction times. He wanted to measure conscious experiences. To do so, he developed the method of **introspection**, a systematic examination of subjective mental experiences that requires people to inspect and report on the content of their thoughts. Wundt asked people to use introspection in comparing their subjective experiences as they contemplated a series of objects—for example, by stating which one they found more pleasant.

Introspection and Other Methods Led to Structuralism

Edward Titchener, a student of Wundt's, used methods such as introspection to pioneer a school of thought that became known as **structuralism**. This school is based on the idea that conscious experience can be broken down into its basic underlying components, much as the periodic table breaks down chemical elements. Titchener believed that an understanding of the basic elements of conscious experience would provide the scientific basis for understanding the mind. He argued that one could take a stimulus such as a musical tone and, through introspection, analyze its "quality," "intensity," "duration," and "clarity." Wundt ultimately rejected such uses of introspection, but Titchener relied on the method throughout his career.

The general problem with introspection is that experience is subjective. Each person brings a unique perceptual system to introspection, and it is difficult for researchers to determine whether each participant in a study is employing introspection similarly. Additionally, the reporting of the experience changes the experience. Over time, psychologists largely abandoned introspection because it was not a reliable method for understanding psychological processes. Nonetheless, Wundt, Titchener, and other structuralists paved the way for developing a pure science of psychology with its own vocabulary and set of rules.

Functionalism Addressed the Purpose of Behavior

One critic of structuralism was William James, a brilliant scholar whose wide-ranging work has had an enormous, enduring impact on psychology (**FIGURE 1.14**).

In 1873, James abandoned a career in medicine to teach physiology at Harvard University. He was among the first professors at Harvard to openly welcome questions from students rather than have them listen silently to lectures. James also was an early supporter of women trying to break into the male-dominated sciences. He trained Mary Whiton Calkins, who was the first woman to set up a psychological laboratory and was the first woman president of the American Psychological Association (**FIGURE 1.15**).

James's personal interests were more philosophical than physiological. He was captivated by the nature of conscious experience. In 1875, he gave his first lecture on psychology. He later quipped that it was also the first lecture on psychology he had ever heard. To this day, psychologists find rich delight in reading James's penetrating analysis of the human mind, *Principles of Psychology* (1890). It was the most influential book in the early history of psychology, and many of its central ideas have held up over time.

In criticizing structuralism's failure to capture the most important aspects of mental experience, James argued that the mind is much more complex than its elements and therefore cannot be broken down. For instance, he noted that the mind consists of an ever-changing, continuous series of thoughts. This **stream of consciousness** cannot be frozen in time, according to James, so the structuralists' techniques were sterile and artificial. Psychologists who used the structural approach, he said, were like people trying to understand a house by studying each of its bricks individually. More important to James was that the bricks together form a house and that a house has a particular function. The mind's elements matter less than the mind's usefulness to people.

James argued that psychologists ought to examine the functions served by the mind—how the mind operates. According to his approach, which became known as **functionalism**, the mind came into existence over the course of human evolution. It works as it does because it is useful for preserving life and passing along genes to future generations. In other words, it helps humans *adapt* to environmental demands.

EVOLUTION, ADAPTATION, AND BEHAVIOR One of the major influences on functionalism was the work of the naturalist Charles Darwin (**FIGURE 1.16**). In 1859, Darwin published his revolutionary study *On the Origin of Species*, which introduced the world to **evolutionary theory**. By observing the variations in species and in individual members of species, Darwin reasoned that species change over time. Some of these changes—physical characteristics, skills, and abilities—increase individuals' chances of surviving and reproducing. Surviving and reproducing in turn ensure that these changes will be passed along to future generations. Changes passed along in this way are called **adaptations**.

Earlier philosophers and naturalists—including Darwin's grandfather, Erasmus Darwin—had discussed the possibility that species might evolve. But Charles Darwin first presented the mechanism of evolution. He called this mechanism **natural selection**: the process by which changes that are adaptive (i.e., that facilitate survival and reproduction) are passed along and those that are not adaptive (i.e., that hinder survival and reproduction) are not passed along. In other words, species struggle to survive. Those species that are better adapted to their environments will survive and reproduce, their offspring will survive and reproduce, and so on. This idea has come to be known as the *survival of the fittest*. In this sense, the term *fittest* has to do with reproductive success and survival and not merely strength.

Darwin's ideas have profoundly influenced science, philosophy, and society. Rather than being a specific area of scientific inquiry, evolutionary theory is a way of thinking that can be used to understand many aspects of mind and behavior (Buss, 1999).



FIGURE 1.15
Mary Whiton Calkins

Calkins was an important early contributor to psychological science and was the first woman president of the American Psychological Association.

stream of consciousness

A phrase coined by William James to describe each person's continuous series of ever-changing thoughts.

functionalism

An approach to psychology concerned with the adaptive purpose, or function, of mind and behavior.



FIGURE 1.16
Charles Darwin

Introduced in *On the Origin of Species*, Darwin's theory of evolution has had a huge impact on how psychologists think about the mind.

evolutionary theory

A theory presented by the naturalist Charles Darwin; it views the history of a species in terms of the inherited, adaptive value of physical characteristics, of mental activity, and of behavior.

adaptations

In evolutionary theory, the physical characteristics, skills, or abilities that increase the chances of reproduction or survival and are therefore likely to be passed along to future generations.

natural selection

In evolutionary theory, the idea that those who inherit characteristics that help them adapt to their particular environments have a selective advantage over those who do not.

Gestalt theory

A theory based on the idea that the whole of personal experience is different from the sum of its constituent elements.

Gestalt Psychology Emphasized Patterns and Context in Learning

Another school of thought that arose in opposition to structuralism was the *Gestalt* school. This way of thinking was founded by Max Wertheimer in 1912 and expanded by Wolfgang Köhler, among others. According to **Gestalt theory**, the whole of personal experience is not simply the sum of its constituent elements. In other words, *the whole is different from the sum of its parts*. So, for example, if a researcher shows people a triangle, they see a triangle—not three lines on a piece of paper, as would be the case for the introspective observations in one of Titchener's structural experiments. (When you look at **FIGURE 1.17**, do you see the parts or the whole?) In experimentally investigating subjective experience, the Gestalt psychologists did not rely on the reports of trained observers. They sought out ordinary people's observations.

The Gestalt movement reflected an important idea that was at the heart of criticisms of structuralism—namely, that the perception of objects is subjective and dependent on context. Two people can look at an object and see different things. Indeed, one person can look at an object and see it in completely different ways. (When you look at **FIGURE 1.18**, how many possible views do you see?) The Gestalt perspective has influenced many areas of psychology, including the study of vision and our understanding of human personality.

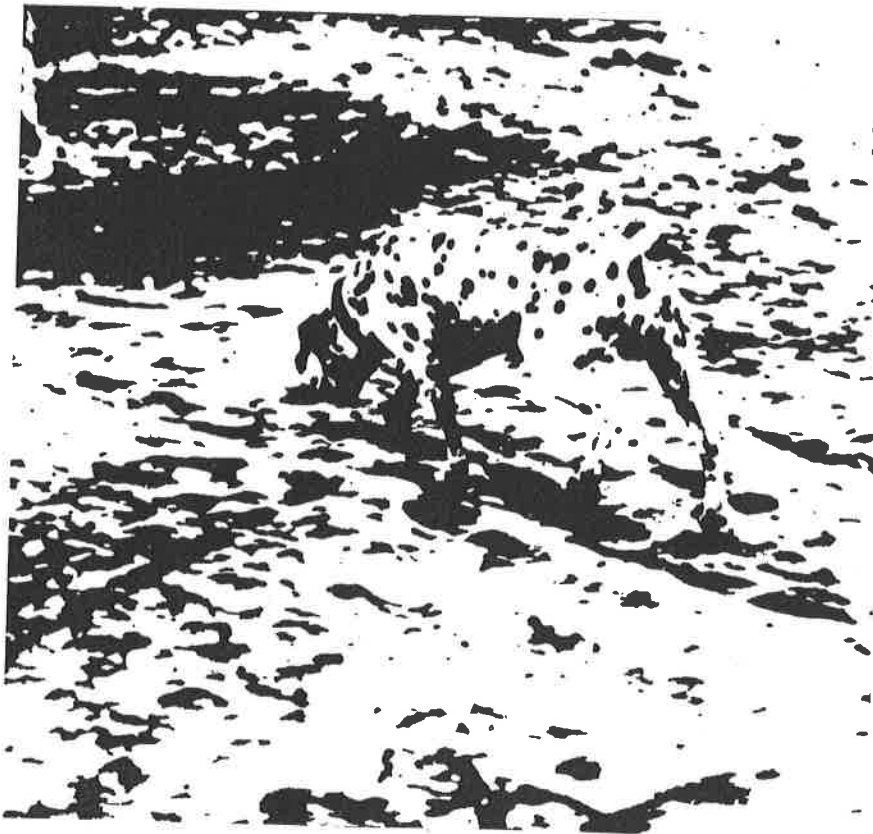


FIGURE 1.17 What Do You See?

These fragments make up a picture of a dog sniffing the ground. The mind organizes the picture's elements automatically to produce the perception of the dog. The picture is processed and experienced as a unified whole. Once you perceive the dog, you cannot choose to not see it.



FIGURE 1.18
How Many Do You See?

This drawing by the psychologist Roger Shepard can be viewed as either a face behind a candlestick or two separate profiles. The mind organizes the scene into one or another perceptual whole, so the picture looks a specific way each time it is viewed. It is difficult to see both the single face and two profiles at the same time.

Freud Emphasized Unconscious Conflicts

Twentieth-century psychology was profoundly influenced by one of its most famous thinkers, Sigmund Freud (**FIGURE 1.19**). Freud was trained in medicine, and he began his career working with people who had neurological disorders, such as paralysis of various body parts. He found that some of his patients had few medical reasons for their paralysis. Soon he came to believe their conditions were caused by psychological factors.

Psychology was in its infancy at the end of the nineteenth century, when Freud speculated that much of human behavior is determined by mental processes operating below the level of conscious awareness. This subconscious level is called the **unconscious**. Contrary to popular belief, Freud was not the first person to theorize the existence of an unconscious—Darwin's cousin Sir Francis Galton had earlier proposed the idea. However, Freud built on this basic idea. He believed that unconscious mental forces, often sexual and in conflict, produce psychological discomfort and in some cases even psychological disorders. According to Freudian thinking, many of these unconscious conflicts arise from troubling childhood experiences that the person is blocking from memory.

From his theories, Freud pioneered the clinical case study approach and developed **psychoanalysis**. In this therapeutic method, the therapist and the patient work together to bring the contents of the patient's unconscious into his or her conscious awareness. Once the patient's unconscious conflicts are revealed, the therapist helps the patient deal with them constructively. For example, Freud analyzed the apparent symbolic content in a patient's dreams in search of hidden conflicts. He also used *free association*, in which a patient would talk about whatever he or she wanted to for as long as he or she wanted to. Freud believed that through free association, a person eventually revealed the unconscious conflicts that caused the psychological problems.

Freud's influence was considerable. His work and his image helped shape the public's view of psychology. However, many of his ideas, such as the meaning of dreams, are impossible to test using the methods of science. Contemporary psychologists no longer accept much of Freudian theory, but Galton's original idea that mental processes occur below the level of conscious awareness is now widely accepted.

Behaviorism Studied Environmental Forces

In 1913, the psychologist John B. Watson challenged, as inherently unscientific, psychology's focus on conscious and unconscious mental processes (**FIGURE 1.20**). Watson believed that if psychology was to be a science, it had to stop trying to study mental events that could not be observed directly. Scorning methods such as introspection and free association, he developed **behaviorism**. This approach emphasizes environmental effects on observable behavior.

The intellectual issue most central to Watson and his followers was the nature/nurture question. For Watson and other behaviorists, nurture was all. Heavily influenced by the work of the physiologist Ivan Pavlov (discussed further in Chapter 6, "Learning"), Watson believed that animals—including humans—acquire, or learn, all behaviors through environmental experience. Therefore, we need to study the environmental *stimuli*, or triggers, in particular situations. By understanding the stimuli, we can predict the animals' behavioral *responses* in those situations. Psychologists greeted Watson's approach with great enthusiasm. Many had grown dissatisfied with the ambiguous methods used by those studying mental processes. They believed that psychologists would not be taken seriously as scientists until they studied observable behaviors.

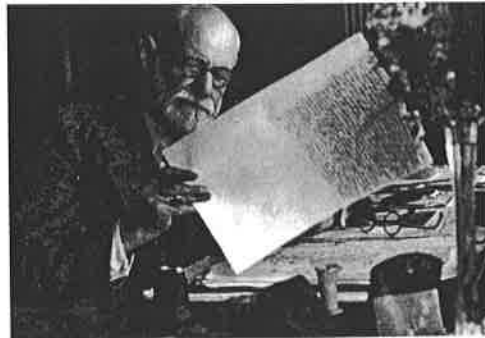


FIGURE 1.19
Sigmund Freud

Freud was the father of psychoanalytic theory. His work hugely influenced psychology in the twentieth century.

unconscious

The place where mental processes operate below the level of conscious awareness.

psychoanalysis

A method developed by Sigmund Freud that attempts to bring the contents of the unconscious into conscious awareness so that conflicts can be revealed.

behaviorism

A psychological approach that emphasizes the role of environmental forces in producing observable behavior.



FIGURE 1.20
John B. Watson

Watson developed and promoted behaviorism. His views were amplified by thousands of psychologists, including B. F. Skinner.



FIGURE 1.21
George A. Miller

In 1957, Miller launched the cognitive revolution by establishing the Center for Cognitive Science at Harvard University.

B. F. Skinner became the most famous and influential behaviorist. Like Watson, Skinner denied the importance of mental states. In his provocative book *Beyond Freedom and Dignity* (1971), Skinner argued that concepts about mental processes were of no scientific value in explaining behavior. He believed that mental states were simply another form of behavior, subject to the same behaviorist principles as publicly observable behavior. He wanted to understand how behaviors, whether occurring “inside the skin” or observable, are shaped or influenced by the events or consequences that follow them. For instance, an animal will learn to perform a behavior if doing so in the past led to a positive outcome, such as receiving food.

Behaviorism dominated psychological research well into the early 1960s. In many ways, these times were extremely productive for psychologists. Many of the basic principles established by behaviorists continue to be viewed as critical to understanding the mind, the brain, and behavior. At the same time, sufficient evidence has accumulated to show that thought processes influence outcomes. Few psychologists today describe themselves as strict behaviorists.

Cognitive Approaches Emphasized Mental Activity

During the first half of the twentieth century, psychology was largely focused on studying observable behavior. Evidence slowly emerged, however, that learning is not as simple as the behaviorists believed it to be. Perceptions of situations can influence behavior. Learning theorists were showing that animals could learn by observation. This finding made little sense according to behaviorist theory, because the animals were not being rewarded. The connections were all being made in their minds. Other research was being conducted on memory, language, and child development. These studies showed that the simple laws of behaviorism could not explain, for example, why culture influences how people remember a story, why grammar develops systematically, and why children interpret the world in different ways during different stages of development. All of these findings suggested that mental functions are important for understanding behavior—they demonstrated the limitations of a purely behavioral approach to psychology.

The psychologist George A. Miller began his career with a behavioristic bias. Shortly before 1957, he looked at the data concerning behavior and cognition. As a good scientist who used critical thinking, Miller changed his mind when the data did not support his theories. He and his colleagues launched the *cognitive revolution* in psychology (**FIGURE 1.21**). Ten years later, Ulric Neisser integrated a wide range of cognitive phenomena in his book *Cognitive Psychology*. This 1967 classic named and defined the field and fully embraced the mind, which Skinner had dismissed as the irrelevant “black box.”

Cognitive psychology is concerned with mental functions such as intelligence, thinking, language, memory, and decision making. Cognitive research has shown that the way people think about things influences their behavior.

The rise of computers and artificial intelligence influenced many cognitive psychologists, who focused exclusively on the “software” and ignored the “hardware.” That is, they studied the thought processes but had little interest in the specific brain mechanisms involved. However, some early cognitive psychologists recognized that the brain is important for cognition. In the early 1980s, cognitive psychologists joined forces with neuroscientists, computer scientists, and philosophers to develop an integrated view of mind and brain. During the next decade, **cognitive neuroscience** emerged. Researchers in this field study the neural mechanisms (mechanisms involving the brain, nerves, and nerve cells) that underlie thought, learning, perception, language, and memory.

cognitive psychology

The study of mental functions such as intelligence, thinking, language, memory, and decision making.

cognitive neuroscience

The study of the neural mechanisms underlying thought, learning, perception, language, and memory.

Social Psychology Studies How Situations Shape Behavior

During the mid-twentieth century, many psychologists came to appreciate that people's behaviors are affected by the presence of others. This shift occurred partly because people sought to understand the atrocities committed in Europe before and during World War II. Why had apparently normal Germans, Poles, and Austrians willingly participated in the murders of innocents—men, women, and children? Was evil an integral part of human nature? If so, why did some people in these countries resist and put their own lives at risk to save others?

Researchers focused on topics such as authority, obedience, and group behavior. Many of these psychologists were still influenced by Freudian ideas. For example, they believed that children absorb the values of authority figures as a result of unconscious processes. They concluded that certain types of people, especially those raised by unusually strict parents, displayed a slightly greater willingness to follow orders.

Almost everyone is strongly influenced by social situations, however. With this idea in mind, pioneering researchers such as Floyd Allport, Solomon Asch, and the Gestalt-trained Kurt Lewin rejected Freudian theorizing (**FIGURE 1.22**). Instead, they emphasized a scientific, experimental approach to understanding how people are influenced by others. The field that emerged from this work, **social psychology**, focuses on the power of the situation and on the way people are shaped through their interactions with others. People do differ in how much they are influenced by social situations. The related field of **personality psychology** involves the study of people's characteristic thoughts, emotions, and behaviors and how they vary across social situations, such as why some people are shy and others outgoing.

Science Informs Psychological Treatments

In the 1950s, psychologists such as Carl Rogers and Abraham Maslow pioneered a *humanistic* approach to the treatment of psychological disorders. This approach emphasized how people can come to know and accept themselves in order to reach their unique potentials. Some of the techniques developed by Rogers, such as specific ways of questioning and listening during therapy, are staples of modern treatment. Only in the last four decades, however, has a scientific approach to the study of psychological disorders emerged.

Throughout psychology's history, the methods developed to treat psychological disorders mirrored advances in psychological science. For instance, behaviorism's rise led to a group of treatments designed to modify behavior rather than address hypothetical underlying mental conflicts. Behavioral modification methods continue to be highly effective in a range of situations, from training those with intellectual impairments to treating patients who are especially anxious and fearful. The cognitive revolution in scientific thinking led therapists to recognize the important role of thought processes in psychological disorders. Pioneers such as Albert Ellis and Aaron T. Beck developed treatments to correct faulty cognitions (faulty beliefs about the world).

The nature/nurture debate is also central to the current understanding of psychological disorders. Psychologists now believe that many psychological disorders result as much from the brain's "wiring" (nature) as from how people are reared and treated (nurture). However, some psychological disorders are more likely to occur in certain environments, and this fact suggests that disorders can be affected by context. People's experiences change their brain structures, which in turn influence their experiences within their environments. Recent research also indicates that some people inherit genetic predispositions to developing certain psychological disorders



FIGURE 1.22
Kurt Lewin

Lewin pioneered the use of experimentation to test social psychological hypotheses about how people influence each other.

social psychology

The study of how people influence other people's thoughts, feelings, and actions.

personality psychology

The study of characteristic thoughts, emotions, and behaviors in people and how they vary across social situations.

in some situations—in this case, their environment (nurture) activates their genes (nature). The social environment also plays an important role in whether treatment for these and other disorders is successful. For example, family members' negative comments tend to decrease a treatment's effectiveness.

In short, rapid advancements in understanding the biological and environmental bases of psychological disorders are leading to effective treatments that allow people to live normal lives. Scientific research has made it clear that—contrary to the thinking of Freud, Skinner, and Rogers—no universal treatment or approach fits all psychological disorders (Kazdin, 2008).

Summing Up

What Are the Scientific Foundations of Psychology?

- Although people have pondered psychological questions for thousands of years, the formal discipline of psychology began in Wilhelm Wundt's laboratory in Germany in 1879.
- Wundt believed it necessary to reduce mental processes to their constituent, "structural" parts. His approach was known as structuralism. Edward Titchener was another famous structuralist.
- Functionalists such as William James argued that it is more important to understand the adaptive functions of the mind than to identify its constituent elements.
- Early research in psychology was largely aimed at understanding the subjective mind. For example, the Gestalt movement focused on people's perceptions, and Freud emphasized the unconscious mind.
- Behaviorism was advanced by John Watson and B. F. Skinner. The rise of behaviorism was due to the fact that the study of the mind had been too subjective and therefore unscientific. This view resulted in an emphasis on the study of observable behavior.
- The cognitive revolution in the 1960s, led by psychologists such as George Miller and Ulric Neisser, returned the mind to center stage. Research blossomed on mental processes such as memory, language, and decision making.
- The latter half of the twentieth century was also marked by an increased interest in the influence of social contexts on behavior and on mental activity. This approach was fostered by psychologists such as Solomon Asch and Kurt Lewin.
- The advances in psychological science over the last century have informed the treatment of psychological disorders.

Measuring Up

Identify the school of thought that each statement characterizes. The schools of thought represented here are behaviorism, cognitive psychology, functionalism, Gestalt psychology, psychoanalysis, social psychology, and structuralism.

- a. To be a respectable scientific discipline, psychology should be concerned with what people and other animals do—in other words, with observable actions.
- b. Psychology should be concerned with the way thoughts and behaviors help people adapt to their environments.
- c. Psychology should be concerned with the way in which people's thoughts affect their behavior.
- d. To understand behavior, psychologists need to understand the social contexts in which people act.
- e. Because the sum is different from the parts, psychologists should study the entirety of how we make sense of the world.
- f. Psychologists should study the "pieces" that make up the mind.
- g. To understand behavior, psychologists should study people's unconscious conflicts.

ANSWERS: a. behaviorism; b. functionalism; c. cognitive psychology; d. social psychology; e. Gestalt psychology; f. structuralism; g. psychoanalysis.

1.3 What Are the Latest Developments in Psychology?

In the just over 135 years since psychology was founded, researchers have made significant progress in understanding mind, brain, and behavior. This understanding has progressed incrementally. New knowledge accumulates through the systematic study of questions raised by what is already known. During various periods in the history of the field, psychologists became especially excited about new approaches, such as when the behaviorists objected to the subjective nature of introspection and the hidden unconscious processes favored by the Freudians. We do not know what approaches the future of psychology will bring, but this section outlines some of the developments that contemporary psychologists are most excited about.

Biology Is Increasingly Emphasized in Explaining Psychological Phenomena

The last four decades have seen remarkable growth in our understanding of the biological bases of mental activities (**FIGURE 1.23**). This section outlines three major advances that have helped further the scientific understanding of psychological phenomena: progress in understanding brain chemistry, developments in neuroscience, and advances in decoding the human genome.

BRAIN CHEMISTRY Tremendous progress has been made in understanding brain chemistry. It was long believed that only a handful of chemicals were involved in brain function, but in fact hundreds of substances play critical roles in mental activity and behavior. Why, for instance, do we have more-accurate memories for events that happened when we were aroused than for events that happened when we were calm? Brain chemistry is different when we are aroused than when we are calm, and those same chemicals influence the neural mechanisms involved in memory.

NEUROSCIENCE Since the late 1980s, researchers have been able to study the working brain as it performs its vital psychological functions. They are able to do so because of brain imaging methods, such as functional magnetic resonance imaging (fMRI). The progress in understanding the neural basis of mental life has been rapid and dramatic. Knowing where in the brain something happens does not by itself reveal much. However, when consistent patterns of brain activation are associated with specific mental tasks, the activation appears to be connected with the tasks. For over a century, scientists had disagreed about whether psychological processes are located in specific parts of the brain or are distributed throughout the brain. Research has made clear that there is some *localization* of function. That is, some areas are important for specific feelings, thoughts, and actions.

However, many brain regions have to work together to produce behavior and mental activity. One of the greatest contemporary scientific challenges is mapping out how various brain regions are connected and how they work together to produce mental activity. To achieve this mapping, the *Human Connectome Project* was launched in 2010 as a major international research effort involving collaborators at a number of universities. A greater understanding of brain connectivity may be especially useful for understanding how brain circuitry changes in psychological disorders.

Learning Objectives

- Identify recent developments in psychological science.
- Distinguish between subfields of psychology.

The screenshot shows a news article from Science Daily. The article title is "Brain Structure Shows Who Is Most Sensitive to Pain". The date is Jan. 14, 2014. The article mentions a study published in the journal *Pain* by scientists at Wake Forest Baptist Medical Center. The article discusses how the brain's structure is related to how intensely people perceive pain. It quotes Robert Coghill, Ph.D., professor of neurobiology and anatomy at Wake Forest Baptist, as the senior author of the study. The article also mentions that the brain is made up of both grey and white matter, and that grey matter processes information much like a computer, while white matter coordinates communications between the different regions of the brain. There are social media sharing buttons for Facebook, Twitter, Google+, and Email. A "Share This:" section shows 112 likes, 46 tweets, 5 Google+ shares, and 2 email shares. On the right side, there are "Related Topics" including Health & Medicine, Psychology Research, Nervous System, Pain Control, Mind & Brain, Neuroscience, Brain Injury, Brain-Computer Interfaces, Oxycodone & 15-Minute Re, and a link to www.fl.com.

FIGURE 1.23
Biological Bases

How much are psychological phenomena, such as sensitivity to pain, influenced or even determined by our biology?

THE HUMAN GENOME Scientists have made enormous progress in understanding the *human genome*: the basic *genetic code*, or blueprint, for the human body. For psychologists, this map represents the foundational knowledge for studying how specific genes—the basic units of hereditary transmission—affect thoughts, actions, feelings, and disorders. By identifying the genes involved in memory, for example, researchers soon may be able to develop treatments, based on genetic manipulation, that will assist people who have memory problems. Decades from now, at least some genetic defects might be corrected.

Meanwhile, the scientific study of genetic influences has made clear that very few single genes cause specific behaviors. Almost all biological and psychological activity is affected by the actions of multiple genes. Nonetheless, many physical and mental characteristics are inherited to some degree. In addition, scientists are beginning to understand the relationship between situations, genes, and behaviors. For example, the presence or absence of specific environmental factors can influence how genes are expressed. Gene expression, in turn, affects behavior.

Evolutionary Thinking Is Increasingly Influential

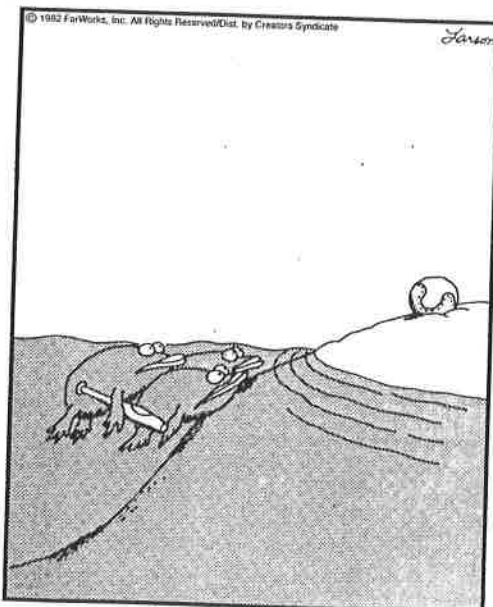
As William James and his fellow functionalists knew, the human mind has been shaped by evolution. Modern evolutionary theory has driven the field of biology for years, but it has only recently begun to inform psychology. From this perspective, the brain, its activity, and resulting behaviors have evolved over millions of years. The evolutionary changes in the brain have occurred in response to our ancestors' problems related to survival and reproduction. So some of our behaviors have their basis in the behaviors of our earliest ancestors, perhaps going back to the ancestor we share with nonhuman primates. Other human behaviors are unique to our species. Many human behaviors are universal, meaning that they are shared across cultures (D. E. Brown, 1991).

The field of evolutionary psychology attempts to explain mental traits as products of natural selection. In other words, functions such as memory, perception, and language are seen as adaptations. In addition, evidence is accumulating that the mind, the experience of the brain, also adapts. That is, while the brain adapts biologically, some of the contents of the mind adapt to cultural influences.

In this way, the mind helps individuals overcome their particular challenges, but it also provides a strong framework for shared social understandings of how the world works. Some of those understandings, of course, vary from place to place and from culture to culture. For instance, all people prefer particular types of food, but the preferences are influenced by culture. Likewise, all cultures have inequalities in terms of individual members' prestige, but what is considered prestigious varies among cultures.

SOLVING ADAPTIVE PROBLEMS Evolutionary theory is especially useful for considering whether behaviors and physical mechanisms are adaptive—in other words, whether they affect survival and reproduction. Through evolution, specialized mechanisms and adaptive behaviors have been built into our bodies and brains. For instance, a mechanism that produces calluses has evolved, protecting the skin from the abuses of physical labor. Likewise, specialized circuits have evolved in the brain; these structures solve adaptive problems, such as dealing with other people (Cosmides & Tooby, 1997). For example, people who lie, cheat, or steal may drain group resources and thereby decrease the chances of

THE FAR SIDE® BY GARY LARSON



Great moments in evolution

survival and reproduction for other group members. Some evolutionary psychologists believe humans have “cheater detectors” on the lookout for this sort of behavior in others (Cosmides & Tooby, 2000).

OUR EVOLUTIONARY HERITAGE Knowledge of the challenges our early ancestors faced helps us understand our current behavior. Humans began evolving about 5 million years ago, but modern humans (*Homo sapiens*) can be traced back only about 100,000 years, to the Pleistocene era. If the human brain slowly adapted to accommodate the needs of Pleistocene hunter-gatherers, scientists should try to understand how the brain works within the context of the environmental pressures humans faced during the Pleistocene era (**FIGURE 1.24**).

For instance, people like sweet foods, especially those high in fat. These foods are also high in calories. In prehistoric times, such foods were rare, and eating them had great survival value. In other words, a preference for sweet, fatty foods was adaptive. Today, many societies have an abundance of foods, many of them high in sugar and fat. We still enjoy them and eat them, sometimes to excess, and this behavior may now be maladaptive. That is, eating foods high in sugar and fat can make us obese when we expend less energy than we consume. Nonetheless, our evolutionary heritage encourages us to eat foods that had survival value when food was relatively scarce. Many of our current behaviors, of course, do not reflect our evolutionary heritage. Driving cars, sitting at a desk all day, using computers, texting, and exercising to intentionally offset calorie intake are among the human behaviors that we have displayed only recently. (Further complexities in the evolutionary process are discussed in Chapter 3, “Biology and Behavior.”)

Culture Provides Adaptive Solutions

For humans, many of the most demanding adaptive challenges involve dealing with other humans. These challenges include selecting mates, cooperating in hunting and in gathering, forming alliances, competing for scarce resources, and even warring with neighboring groups. This dependency on group living is not unique to humans, but the nature of interactions among and between ingroup and outgroup members is especially complex in human societies. The complexity of living in groups gives rise to culture, and culture’s various aspects are transmitted from one generation to the next through learning. For instance, musical preferences, some food preferences, subtle ways of expressing emotion, and tolerance of body odors are affected by the culture one is raised in. Many of a culture’s “rules” reflect adaptive solutions worked out by previous generations.

Human cultural evolution has occurred much faster than human biological evolution. The most dramatic cultural changes have come in the last few thousand years. Although humans have changed only modestly in physical terms in that time, they have changed profoundly in regard to how they live together. Even within the last century, dramatic changes have occurred in how human societies interact. The flow of people, commodities, and financial instruments among all regions of the world, often referred to as *globalization*, has increased in velocity and scale over the past century in ways that were previously unimaginable. Even more recently, the Internet has created a worldwide network of humans, essentially a new form of culture with its own rules, values, and customs.

Over the past decade, recognition has grown that culture plays a foundational role in shaping how people view and reason about the world around them—and that people from different cultures possess strikingly different minds. For example, the social psychologist Richard Nisbett and his colleagues (2001) have demonstrated that people from most European and North American countries are much more



FIGURE 1.24
Evolution in the Present
To understand who we are as individuals, we need to understand who we are as a species.

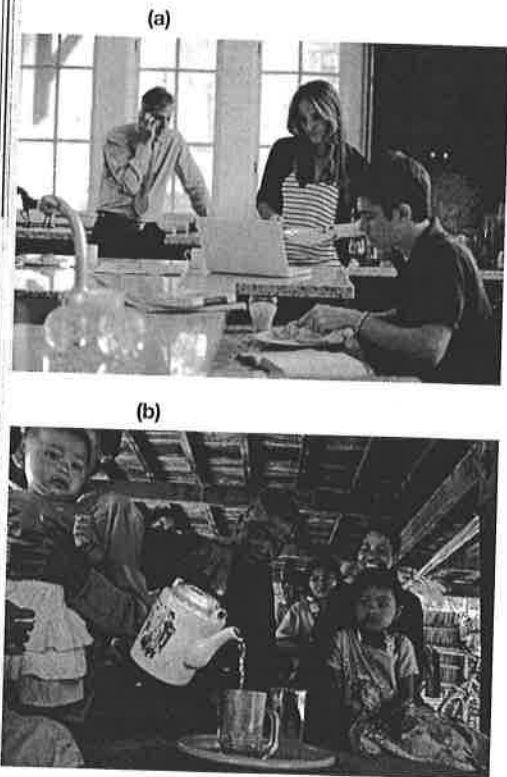


FIGURE 1.25

Cultural Differences

(a) Westerners tend to be "independent" and autonomous, stressing their individuality.

(b) Easterners—such as this Cambodian family—tend to be more "interdependent," stressing their sense of being part of a collective.

analytical than people from most Asian countries. Westerners break complex ideas into simpler components, categorize information, and use logic and rules to explain behavior. Easterners tend to be more holistic in their thinking, seeing everything in front of them as an inherently complicated whole, with all elements affecting all other elements (**FIGURE 1.25**).

The culture in which people live shapes many aspects of their daily lives. Pause for a moment and think about the following questions: How do people decide what is most important in their lives? How do people relate to family members? to friends? to colleagues at work? How should people spend their leisure time? How do they define themselves in relationship to their own culture—or across cultures? For instance, the increased participation of women in the workforce has changed the nature of contemporary Western culture in numerous ways, from a fundamental change in how women are viewed to more practical changes, such as people marrying and having children later in life, a greater number of children in day care, and a greater reliance on convenient, fast foods.

Culture shapes beliefs and values, such as the extent to which people should emphasize their own interests versus the interests of the group. This effect is more apparent when we compare phenomena across cultures. Cultural rules are learned as *norms*, which specify how people ought to behave in different contexts. For example, norms tell us not to laugh uproariously at funerals and to keep quiet in libraries. Culture also has material aspects, such as media, technology, health care, and transportation. Many people find it hard to imagine life without computers, televisions, cell phones, and cars. We also recognize that each of these inventions has changed the fundamental ways in which people interact. Psychologists have played a significant role in our understanding of the complex relationship between culture and behavior.

Psychological Science Now Crosses Levels of Analysis

Throughout the history of psychology, studying a phenomenon at one level of analysis has been the favored approach. Researchers have recently started to explain behavior at several levels of analysis. By crossing levels in this way, psychologists are able to provide a more complete picture of mental and behavioral processes.

Four broadly defined levels of analysis reflect the most common research methods for studying mind and behavior (**FIGURE 1.26**). The *biological level of analysis* deals with how the physical body contributes to mind and behavior (as through the chemical and genetic processes that occur in the body). The *individual level of analysis* focuses on individual differences in personality and in the mental processes that affect how people perceive and know the world. The *social level of analysis* involves how group contexts affect the ways in which people interact and influence each other. The *cultural level of analysis* explores how people's thoughts, feelings, and actions are similar or different across cultures. Differences between cultures highlight the role that cultural experiences play in shaping psychological processes, whereas similarities between cultures reveal evidence for universal phenomena that emerge regardless of cultural experiences.

To understand how research is conducted at the different levels, consider the many ways psychologists have studied listening to music (Renfrow & Gosling, 2003). Why do you like some kinds of music and not others? Do you prefer some types of music when you are in a good mood and other types when you are in a bad mood? If you listen to music while you study, how does it affect how you learn? Music has many

important effects on the mind, brain, and behavior, and psychologists examine these effects using the methods of science. They examine how musical preferences vary among individuals and across cultures, how music affects emotional states and thought processes, and even how the brain perceives sound as music rather than noise.

At the biological level of analysis, for instance, researchers have studied the effects of musical training. They have shown that training can change not only how the brain functions but also its anatomy, such as changing brain structures associated with learning and memory (Herdener et al., 2010). Listening to pleasant music appears to increase the activation of brain regions associated with positive experiences (Koelsch, Offermanns, & Franzke, 2010). In other words, music does not affect the brain exactly the way other types of sounds, such as the spoken word, do. Instead, music recruits brain regions involved in a number of mental processes, such as those involved in mood and memory (Levitin & Menon, 2003; Peretz & Zatorre, 2005). Music appears to be treated by the brain as a special category of auditory information. For this reason, patients with certain types of brain injury become unable to perceive tones and melody but can understand speech and environmental sounds perfectly well.

In studies conducted at the individual level of analysis, researchers have used laboratory experiments to study music's effects on mood, memory, decision making, and various other mental states and processes (Levitin, 2006). In one study, music from participants' childhoods evoked specific memories from that period (Janata, 2009; **FIGURE 1.27**). Moreover, music affects emotions and thoughts. Listening to sad background music leads young children to interpret a story negatively, whereas listening to happy background music leads them to interpret the story much more positively (Ziv & Goshen, 2006). Our cognitive expectations also shape how we experience music (Collins, Tillmann, Barrett, Delbé, & Janata, 2014).

A study of music at the social level of analysis might compare the types of music people prefer when they are in groups with the types they prefer when alone. Psychologists have also sought to answer the question of whether certain types of music promote negative behaviors among listeners. For instance, researchers in Quebec found that certain types of rap music, but not hip-hop, were associated with more deviant behaviors, such as violence and drug use (Miranda & Claes, 2004). Of course, such associations do not mean that listening to music causes the behaviors studied. It could just as easily be that people practice the behaviors first and then develop these musical preferences. Listening to music with prosocial lyrics, however, led research participants to be more empathic and increased their helping behavior (Greitemeyer, 2009).

The cross-cultural study of music preferences has developed into a separate field, *ethnomusicology*. One finding from this field is that African music has rhythmic

	LEVEL	FOCUS	WHAT IS STUDIED?
	Biological	Brain systems Neurochemistry Genetics	Neuroanatomy, animal research, brain imaging Neurotransmitters and hormones, animal studies, drug studies Gene mechanisms, heritability, twin and adoption studies
	Individual	Individual differences Perception and cognition Behavior	Personality, gender, developmental age groups, self-concept Thinking, decision making, language, memory, seeing, hearing Observable actions, responses, physical movements
	Social	Interpersonal behavior Social cognition	Groups, relationships, persuasion, influence, workplace Attitudes, stereotypes, perceptions
	Cultural	Thoughts, actions, behaviors—in different societies and cultural groups	Norms, beliefs, values, symbols, ethnicity

FIGURE 1.26
Levels of Analysis

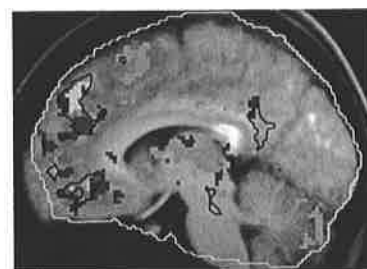


FIGURE 1.27
Your Brain on Music

The researcher Petr Janata played familiar and unfamiliar music to study participants. As shown here, many regions of the brain were activated by the music. Activity in green indicates familiarity with the music, activity in blue indicates emotional reactions to the music, and activity in red indicates memories from the past. The yellow section in the frontal lobe links together familiar music, emotions, and memories. This area is active, for example, if you have a fond memory of dancing to a particular song in junior high school.

structures different from those in Western music (Agawu, 1995), and these differences in turn may reflect the important role of dancing and drumming in African culture. Because cultures prefer different types of music, some psychologists have noted that attitudes about outgroup members can color perceptions of their musical styles. For example, researchers from the United States and the United Kingdom found that the societal attitudes toward rap and hip-hop music revealed subtle prejudicial attitudes against blacks and a greater willingness to discriminate against them (Reyna, Brandt, & Viki, 2009).

As these examples show, research at different levels of analysis is creating a greater understanding of the psychology of music. Adding to that understanding is innovative research combining two or more levels of analysis. More and more, psychological science emphasizes examining behavior across multiple levels in an integrated fashion. Often psychologists collaborate with researchers from other scientific fields, such as biology, computer science, physics, anthropology, and sociology. Such collaborations are called *interdisciplinary*. For example, psychologists interested in understanding the hormonal basis of obesity might work with geneticists exploring the heritability of obesity as well as with social psychologists studying human beliefs about eating. Crossing the levels of analysis usually provides more insights than working within only one level. The Gestalt psychologists were right in asserting that the whole is different from the sum of its parts. Throughout this book, you will see how this multilevel approach has led to breakthroughs in understanding psychological activity.

SUBFIELDS IN PSYCHOLOGY FOCUS ON DIFFERENT LEVELS OF ANALYSIS

Psychologists work in many different settings. The setting often depends on whether the psychologist's primary focus is on research, teaching, or applying scientific findings to improving the quality of daily living. Researchers who study the brain, the mind, and behavior may work in schools, businesses, universities, or clinics. There are also psychological practitioners, who apply the findings of psychological science to do things such as help people in need of psychological treatment, design safe and pleasant work environments, counsel people on career paths, or help teachers design better classroom curricula. The distinction between science and practice can be fuzzy, since many researchers are also practitioners. For example, many clinical psychologists both study people with psychological disorders and treat those people.

A scientist will choose to study at a particular level of analysis—or more than one level—based on his or her research interests, general theoretical approaches, and training. Because the subject matter of psychology is vast, most psychologists focus within relatively large subfields. Many of the subfields are represented by specific chapters of this book. Following are some of the most popular subfields.

Neuroscience/biological psychologists are particularly interested in examining how biological systems give rise to mental activity and behavior. For example, they may study how certain chemicals in the brain control sexual behavior, how damage to certain brain regions disrupts feeding, or how different environments lead different genes to be expressed.

Cognitive psychologists study cognition, perception, and action. They investigate processes such as thinking, perceiving, problem solving, decision making, using language, and learning. Today, many of these psychologists are *cognitive neuroscientists*, who study brain activity to understand how the brain accomplishes these processes.

Developmental psychologists study how people change across the life span, from infancy through old age. For example, they are interested in how children learn to

speak, how they become moral beings, how adolescents form their identities, and how older adults can maintain their mental abilities in the face of typical age-related declines in those abilities.

Personality psychologists seek to understand enduring characteristics that people display over time and across circumstances, such as why some people are shy whereas others are outgoing. They examine how genes, circumstances, and cultural context shape personality.

Social psychologists focus on how people are affected by the presence of others and how they form impressions of others. For instance, they might study what people believe about members of other groups, when people are influenced by others to behave in certain ways, or how people form or dissolve intimate relationships.

Cultural psychologists seek to understand how people are influenced by the societal rules that dictate behavior in the cultures in which they are raised. For example, they study how societal rules shape self-perception, how they influence interpersonal behavior, and whether they produce differences in perception, and whether they produce differences in cognition.

Clinical psychologists are interested in the factors that cause psychological disorders and the methods best used to treat them. For example, they might study the factors that lead people to feel depressed, the types of therapy that are most effective for alleviating depression, and ways in which the brain changes as a result of therapy.

Counseling psychologists overlap with clinical psychologists. They seek to improve people's daily lives, but they work more with people facing difficult circumstances than with those who have serious mental disorders. For example, they provide marital and family counseling, provide career advice, and help people manage stress.

School psychologists work in educational settings. They help students with problems that interfere with learning, design age-appropriate curricula, and conduct assessment and achievement testing.

Industrial and organizational psychologists are concerned with behavior and productivity in industry and the workplace. They develop programs to motivate workers by building morale and improving job satisfaction, design equipment and workspaces so that workers can easily perform their duties and avoid accidents, and assist with identifying and recruiting talented workers.

These are the major categories of psychology, but psychologists pursue many more specialties and research areas. For instance, *forensic psychologists* work in legal settings, perhaps helping choose juries or identifying dangerous offenders. *Sports psychologists* work with athletes to improve their performance, perhaps teaching athletes how to control their thoughts during pressure situations. Many psychologists follow an interdisciplinary approach that crosses these categories, such as those who use the methods of neuroscience to study topics traditionally examined by social psychologists. Another interdisciplinary approach is used by *health psychologists*, who study the factors that promote or interfere with physical health, such as how stress may cause disease.

A number of careers in psychology are predicted to grow substantially over the next decade. The growth areas include providing advice for programs that aim to tackle societal problems (e.g., the Bill and Melinda Gates Foundation); working with older adults, since they will make up an increasing proportion of the population; working with soldiers returning from conflicts in various parts of the world; working with homeland security to study terrorism; consulting with industry; and advising on legal matters based on courtroom expertise (DeAngelis, 2008). Because psychologists are concerned with nearly every aspect of human life, what they study is remarkably diverse, as you will soon discover in the following chapters.

Using Psychology in Your Life



Will Psychology
Benefit Me in
My Career?

Some students take introductory psychology courses because of a long-standing interest in people and the desire to learn more about what makes people, including themselves, tick. Others enroll because they wish to fulfill a general education requirement or because the class is a prerequisite for another course they are eager to take. Whatever your reason for being in this class, the things you will learn in this book will be highly relevant to multiple aspects of your life, including your chosen career.

Many careers involve interacting with coworkers, customers, clients, or patients (**FIGURE 1.28**). In these cases, understanding what motivates people, how to influence them, and how to support them is essential. For instance, a medical practitioner with interpersonal skills will create rapport with patients. That rapport may prompt the patients to be honest about their health behaviors, and the resulting disclosures may improve the practitioner's ability to accurately diagnose the patients' medical conditions. A rehabilitation nurse who understands the psychological challenges of complying with medical advice is better equipped to help patients respond to those challenges and thus improve. Given the many ways psychology is rele-

vant to the medical field, it is not surprising that the Medical College Admission Test (MCAT), the standardized test required for admission to medical school, now includes an extensive 95-minute section on the psychological, social, and biological foundations of behavior.

Of course, many people outside the medical field use psychology every day. Teachers manage their students' behavior and foster their students' motivation to learn. Police officers gather eyewitness reports, elicit confessions, and control the behavior of both individuals and crowds. People in sales, marketing, and branding craft messages, create campaigns, and help manufacturers increase the appeal of their products. Anyone who works on a team benefits from knowing how to play nice, to engage in effective problem solving, and to focus on the task at hand.

Other workers shape information or technology that will be used by consumers or the public. For the information or technology to be accessible and effective, these workers need to understand how people make sense of information and the psychological barriers to modifying existing beliefs or adopting new technologies. For example, an engineer who designs cockpits for airplanes benefits

Summing Up

What Are the Latest Developments in Psychology?

- Four themes characterize the latest developments in psychological science:
 1. Biology is increasingly emphasized in explaining psychological phenomena. A biological revolution has energized psychological research into how the brain enables the mind. Among the revolutionary developments are increasing knowledge of brain chemistry, the use of technologies that allow researchers to observe the brain in action, and the mapping of the human genome.
 2. Evolution is increasingly important. Psychological science has been influenced heavily by evolutionary psychology, which argues that the brain has evolved in response to our ancestors' problems of survival.
 3. Culture provides adaptive solutions. Contemporary psychology is characterized by an increasing interest in cultural norms and their influence on thought processes and behavior. Cultural norms reflect solutions to problems that were worked out by previous generations and transmitted to successive generations through learning.
 4. Psychological science now crosses levels of analysis. Psychologists share the goal of understanding mind, brain, and behavior. In approaching that goal, psychologists focus on the same problems at different levels of analysis: biological, individual, social, and cultural.
- Most problems in psychology require studies at each level. There are diverse subfields in psychology, and the subfields focus on different levels of analysis.

from knowing how human attention shifts during an emergency. A statistician who understands how people process visual cues is well equipped to create graphs that will help consumers make accurate impressions of the data.

What about someone who works with animals? A solid grasp of psychological topics, such as the biological basis of behavior, can help in the training and retraining of nonhuman creatures. For example, an animal trainer could use behavior modification techniques (discussed in Chapter 6) to motivate an injured animal to engage in physical therapy.

Psychology is even relevant to traditionally solo enterprises. Fiction writers create compelling characters, convey personalities, indicate psychological depth, depict relatable struggles, and evoke emotions in readers. A fire spotter, who sits alone high above the trees looking for smoke plumes, must notice and interpret environmental anomalies. And that fire spotter, like an explorer who treks through uninhabited lands, must navigate the psychological challenges of extreme isolation.

In fact, is there a single career in which an understanding of psychology

(a)



(b)



(c)



FIGURE 1.28
Studying Psychology Develops
Interpersonal Skills

Dealing with other people is an important part of most careers. (a) Medical professionals need to gauge people's moods and their motivations to recover. (b) Teachers need to understand people's behavior and how people learn. (c) To convince people to buy products, salespeople need to understand the relationship between motivation and emotion.

would not be at least a little bit helpful? Whatever your chosen field, understanding psychology will help you understand yourself and thus help you do your job.

Measuring Up

Match each example below with one of the following recent developments in psychological science: biology is increasingly emphasized in explaining psychological phenomena, evolutionary thinking is increasingly influential, culture provides adaptive solutions, and psychological science now crosses levels of analysis.

- In a study of prejudice, psychologists used an attitudes test and brain imaging when participants looked at pictures of African Americans' faces and of European Americans' faces.
- When psychologists study a disorder of the mind, they frequently look at genetic factors that might be involved in causing the disorder.
- To understand contemporary human behavior, psychologists often consider the environmental challenges that our ancestors faced.
- In a study of immigrants, psychologists examined the customs and practices that the immigrants adopted when they migrated to their new country.

ANSWERS: a. Psychological science now crosses levels of analysis; b. biology is increasingly emphasized in explaining psychological phenomena; c. evolutionary thinking is increasingly influential; d. culture provides adaptive solutions.

Your Chapter Review

Chapter Summary

1.1 What Is Psychological Science?

- **Psychological Science Teaches Critical Thinking:** The use of critical thinking skills improves how people think. Amiable skepticism, an important element of science, requires a careful examination of how well evidence supports a conclusion. Using critical thinking skills and understanding the methods of psychological science are important for evaluating research reported in the popular media.
- **Psychological Reasoning Examines How People Typically Think:** People engage in common errors in thinking, which probably evolved as a way to quickly categorize information to promote rapid decision making. However, these errors often result in faulty conclusions. Some common errors in thinking include ignoring evidence (confirmation bias), failing to accurately judge source credibility, misunderstanding or not using statistics, seeing relationships that do not exist, using relative comparisons, accepting after-the-fact explanations, taking mental shortcuts, and failing to see one's own inadequacies (self-serving bias). Using psychological reasoning can help people overcome these errors and biases in thinking.

1.2 What Are the Scientific Foundations of Psychology?

- **The Nature/Nurture Debate Has a Long History:** Nature and nurture depend on each other. Their influences often cannot be separated.
- **The Mind/Body Problem Also Has Ancient Roots:** Dualist notions about the separation of the brain and mind have been replaced with the idea that the (physical) brain enables the mind. Brain and mind are one.
- **Experimental Psychology Began with Introspection:** Psychology's intellectual history dates back thousands of years. As a formal discipline, psychology began in 1879, in Wilhelm Wundt's laboratory in Germany. Using the technique of introspection, scientists attempted to understand conscious experience.
- **Introspection and Other Methods Led to Structuralism:** Structuralists used introspection to identify the basic underlying components of conscious experience. Structuralists attempted to understand conscious experience by reducing it to its structural elements.
- **Functionalism Addressed the Purpose of Behavior:** According to functionalists, the mind is best understood by examining its functions and purpose, not its structure.
- **Gestalt Psychology Emphasized Patterns and Context in Learning:** Gestalt psychologists asserted that the whole experience (the gestalt) is different from the sum of its parts. As a result, they emphasized the subjective experience of perception.

- **Freud Emphasized Unconscious Conflicts:** Freud advanced the idea that unconscious processes are not readily available to awareness but nevertheless influence behavior. This understanding had an enormous impact on psychology.
- **Behaviorism Studied Environmental Forces:** Discoveries that behavior is changed by its consequences caused behaviorism to dominate psychology until the 1960s.
- **Cognitive Approaches Emphasized Mental Activity:** The cognitive revolution and the computer analogy of the brain led to an emphasis on mental activity. Cognitive neuroscience, which emerged in the 1980s, is concerned with the neural mechanisms (mechanisms involving the brain, nerves, and nerve cells) that underlie thought, learning, and memory.
- **Social Psychology Studies How Situations Shape Behavior:** Work in social psychology has highlighted how situations and other people are powerful forces in shaping behavior.
- **Science Informs Psychological Treatments:** Psychological disorders are influenced by both nature (biological factors) and nurture (environmental factors). Scientific research has taught psychologists that no universal treatment exists for psychological disorders. Instead, different treatments are effective for different disorders.

1.3 What Are the Latest Developments in Psychology?

- **Biology Is Increasingly Emphasized in Explaining Psychological Phenomena:** Tremendous advances in neuroscience have revealed the working brain. Mapping of the human genome has furthered the role of genetics in analyzing both behavior and disease. These advances are changing how we think about psychology.
- **Evolutionary Thinking Is Increasingly Influential:** Evolution of the brain has helped solve survival and reproductive problems and helped humans adapt to their environments. Many modern behaviors reflect adaptations to environmental pressures faced by our ancestors.
- **Culture Provides Adaptive Solutions:** Cultural norms specify how people should behave in different contexts. They reflect solutions to adaptive problems that have been worked out by a group of individuals, and they are transmitted through learning.
- **Psychological Science Now Crosses Levels of Analysis:** Psychologists examine behavior from various analytical levels: biological (brain systems, neurochemistry, genetics), individual (personality, perception, cognition), social (interpersonal behavior), and cultural (within a single culture, across several cultures). Psychology is characterized by numerous subfields. Within each subfield, psychologists may focus on one or more levels of analysis.

Key Terms

adaptations, p. 15
behaviorism, p. 17
cognitive neuroscience, p. 18
cognitive psychology, p. 18
critical thinking, p. 6
culture, p. 12
evolutionary theory, p. 15

functionalism, p. 15
Gestalt theory, p. 16
introspection, p. 14
mind/body problem, p. 12
natural selection, p. 15
nature/nurture debate, p. 12
personality psychology, p. 19

psychoanalysis, p. 17
psychological science, p. 5
social psychology, p. 19
stream of consciousness, p. 15
structuralism, p. 14
unconscious, p. 17

Practice Test

1. When you mention to your family that you enrolled in a psychology course, your family members share their understanding of the field. Which comment best reflects psychological science?
 - a. "You're going to learn how to get in touch with your feelings."
 - b. "The concept of 'psychological science' is such an oxymoron. It is impossible to measure and study what goes on in people's heads."
 - c. "I think you'll be surprised by the range of questions psychologists ask about the mind, the brain, and behavior, not to mention the scientific methods they use to answer these questions."
 - d. "By the end of the class, you'll be able to tell me why I am the way I am."
2. Match each definition with one or more of the following ideas from evolutionary theory: adaptations, natural selection, survival of the fittest.
 - a. Changes that endow physical characteristics, skills, and abilities can increase an organism's chances of survival and of reproduction.
 - b. Individuals better adapted to their environment will leave more offspring.
 - c. Organisms' adaptive changes are passed along, and changes that hinder both survival and reproduction are not.
3. Titles of recent research articles appear below. Indicate which of the four levels of analysis—cultural, social, individual, or biological—each article likely addresses.
 - a. Pals, problems, and personality: The moderating role of personality in the longitudinal association between adolescents' and best friends' delinquency (Yu, Branje, Keijsers, Koot, & Meeus, 2013)
 - b. The role of dynamic microglial alterations in stress-induced depression and suppressed neurogenesis (Kreisel et al., 2013)
 - c. Culture, gender, and school leadership: School leaders' self-perceptions in China (Law, 2013)
 - d. Anchoring bullying and victimization in children within a five-factor model-based person-centred framework (De Bolle & Tackett, 2013)
4. Several schools of thought in psychology are listed below. Match each of the following psychologists with the school he is most identified with: William James, Wolfgang Köhler, Kurt Lewin, George Miller, Ulrich Neisser, B. F. Skinner, Edward Titchener, John B. Watson, Max Wertheimer, Wilhelm Wundt.
 - a. structuralism
 - b. functionalism
 - c. Gestalt psychology
 - d. behaviorism
 - e. cognitive psychology
 - f. social psychology
5. Match each description with one of the following theoretical ideas: dualism, introspection, localization, stream of consciousness.
 - a. a systematic examination of subjective mental experience that requires people to inspect and report on the contents of their thoughts
 - b. the notion that the mind and the body are separate and distinct
 - c. some psychological processes are located in specific parts of the brain
 - d. a continuous series of ever-changing thoughts
6. Imagine you have decided to seek mental health counseling. You mention this to a few of your friends. Each friend shares an opinion with you. Based on your understanding of psychological science, which friend offers the strongest advice?
 - a. "I wouldn't bother if I were you. All therapy is a bunch of psychobabble."
 - b. "I know a therapist who uses this really cool method that can fix any problem. Seriously, she knows the secret!"
 - c. "That's great! Psychologists do research to figure out which interventions are most helpful for people with different concerns."
 - d. "Well, I guess if you like relaxing on couches and talking, you might get a lot out of therapy."

The answer key for the Practice Tests can be found at the back of the book.