Psychology Is a Way of Thinking

THINKING BACK TO YOUR introductory psychology course, what do you remember learning? You might remember that dogs can be trained to salivate at the sound of a bell or that people in a group fail to call for help when the room fills up with smoke. Or perhaps you recall studies in which people administered increasingly stronger electric shocks to an innocent man although he seemed to be in distress. You may have learned what your brain does while you sleep or that you can't always trust your memories. But how come you didn't learn that "we use only 10% of our brain" or that "hitting a punching bag can make your anger go away"?

The reason you learned some principles, and not others, is because psychological science is based on studies—on research—by psychologists. Like other scientists, psychologists are empiricists. Being an empiricist means basing one's conclusions on systematic observations. Psychologists do not simply think intuitively about behavior, cognition, and emotion; they know what they know because they have conducted studies on people and animals acting in their natural environments or in specially designed situations. Research is what tells us that most people will administer electric shock to an innocent man in certain situations, and it also tells us that people's brains are usually fully engaged—not just 10%.

If you are to think like a psychologist, then you must think like a researcher, and taking a course in research methods is crucial to your understanding of psychology.

This book explains the types of studies psychologists conduct, as well as the potential strengths and limitations of each type of study. You will learn not only how to plan your own studies but...
also how to find research, read about it, and ask questions about it. While gaining a greater appreciation for the rigorous standards psychologists maintain in their research, you’ll find out how to be a systematic and critical consumer of psychological science.

RESEARCH PRODUCERS, RESEARCH CONSUMERS

Some psychology students are fascinated by the research process and intend to become producers of research. Perhaps they hope to get a job studying brain anatomy, documenting the behavior of dolphins or monkeys, administering personality questionnaires, observing children in a school setting, or analyzing data. They may want to write up their results and present them at research meetings. These students may dream about working as research scientists or professors.

Other psychology students may not want to work in a lab, but they do enjoy reading about the structure of the brain, the behavior of dolphins or monkeys, the personalities of their fellow students, or the behavior of children in a school setting. They are interested in being consumers of research information—reading about research so they can later apply it to their work, hobbies, relationships, or personal growth. These students might pursue careers as family therapists, teachers, entrepreneurs, guidance counselors, or police officers, and they expect psychology courses to help them in these roles.

In practice, many psychologists engage in both roles. When they are planning their research and creating new knowledge, they study the work of others who have gone before them. Furthermore, psychologists in both roles require a curiosity about behavior, emotion, and cognition. Research producers and consumers also share a commitment to the practice of empiricism—to answer psychological questions with direct, formal observations, and to communicate with others about what they have learned.

Why the Producer Role Is Important

For your future coursework in psychology, it is important to know how to be a producer of research. Of course, students who decide to go to graduate school for psychology will need to know all about research methods. But even if you do not plan to do graduate work in psychology, you will probably have to write a paper following the style guidelines of the American Psychological Association (APA) before you graduate, and you may be required to do research as part of a course lab section. To succeed, you will need to know how to randomly assign people to groups, how to measure attitudes accurately, or how to interpret results from a graph. The skills you acquire by conducting research can teach you how psychological scientists ask questions and how they think about their discipline.

As part of your psychology studies, you might even work in a research lab as an undergraduate (Figure 1.1). Many psychology professors are active researchers, and if you are offered the opportunity to get involved in their laboratories, take it! Your faculty supervisor may ask you to code behaviors, assign participants to different groups, graph an outcome, or write a report. Doing so will give you your first taste of being a research producer. Although you will be supervised closely, you will be expected to know the basics of conducting research. This book will help you understand why you have to protect the anonymity of your participants, use a coding book, or flip a coin to decide who goes in which group. By participating as a research producer, you can expect to deepen your understanding of psychological inquiry.

Why the Consumer Role Is Important

Although it is important to understand the psychologist’s role as a producer of research, most psychology majors do not eventually become researchers. Regardless of the career you choose, however, becoming a savvy consumer of information is essential. In your psychology courses, you will read studies published by psychologists in scientific journals. You will need to develop the ability to read about research with curiosity—to understand it, learn from it, and ask appropriate questions about it.

Think about how often you encounter news stories or look up information on the Internet. Much of the time, the stories you read and the websites you visit will present information based on research. For example, during an election year, Americans may come across polling information in the media almost every day. Many online newspapers have science sections that include stories on the latest research. Entire websites are dedicated to psychology-related topics, such as treatments for autism, subliminal learning tapes, or advice for married couples. Magazines such as Scientific American, Men’s Health, and Parents summarize research for their readers. While some of the research—whether online or printed—is accurate and useful, some of it is dubious, and some is just plain wrong. How can you tell the good research information from the bad? Understanding research methods enables you to ask the appropriate questions so you can evaluate information correctly. Research methods skills apply not only to research studies but also to much of the other types of information you are likely to encounter in daily life.
Finally, being a smart consumer of research could be crucial to your future career. Even if you do not plan to be a researcher—if your goal is to be a social worker, a teacher, a sales representative, a human resources professional, an entrepreneur, or a parent—you will need to know how to interpret published research with a critical eye. Clinical psychologists, social workers, and family therapists must read research to know which therapies are the most effective.

In fact, licensure in these helping professions requires knowing the research behind evidence-based treatments—that is, therapies that are supported by research. Teachers also use research to find out which teaching methods work best. And the business world runs on quantitative information. Research is used to predict what sales will be like in the future, what consumers will buy, and whether investors will take risks or lie low. Once you learn how to be a consumer of information—psychological or otherwise—you will use these skills constantly, no matter what job you have.

In this book, you will often see the phrase “interrogating information.” A consumer of research needs to know how to ask the right questions, determine the answers, and evaluate a study on the basis of those answers. This book will teach you systematic rules for interrogating research information.

The Benefits of Being a Good Consumer

What do you gain by being a critical consumer of information? Imagine, for example, that you are a correctional officer at a juvenile detention center, and you watch a TV documentary about a crime-prevention program called Scared Straight. The program arranges for teenagers involved in the criminal justice system to visit prisons, where selected prisoners describe the stark, violent realities of prison life (Figure 1.2). The idea is that when teens hear about how tough it is in prison, they will be scared into the "straight," law-abiding life. The program makes a lot of sense to you. You are considering starting a partnership between the residents of your detention center and the state prison system.

However, before starting the partnership, you decide to investigate the efficacy of the program by reviewing some research that has been conducted about it. You learn that despite the intuitive appeal of the Scared Straight approach, the program doesn't work—in fact, it might even cause criminal activity to get worse! Several published articles have reported the results of randomized, controlled studies in which young adults were assigned to either a Scared Straight program or a control program. The researchers then collected criminal records for 6–12 months. None of the studies showed that Scared Straight attendees committed fewer crimes, and most studies found an increase in crime among participants in the Scared Straight program compared to the controls (Petrosino, Turpin-Petrosino, & Finkenauer, 2000). In one case, Scared Straight attendees had committed 20% more crimes than the control group.

At first, people considering such a program might think: If this program helps even one person, it's worth it. However, we always need empirical evidence to test the efficacy of our interventions. A well-intentioned program that seems to make sense might actually be doing harm. In fact, if you investigate further, you'll find that the U.S. Department of Justice officially warns that such programs are ineffective and can harm youth, and the Juvenile Justice and Delinquency Prevention Act of 1974 was amended to prohibit youth in the criminal justice system from interactions with adult inmates in jails and prisons.

Being a skilled consumer of information can inform you about other programs that might work. For example, in your quest to become a better student, suppose you see this headline: "Mindfulness may improve test scores." The practice of mindfulness involves attending to the present moment, on purpose, with a nonjudgmental frame of mind (Kabat-Zinn, 2013). In a mindful state, people simply observe and let go of thoughts rather than elaborating on them. Could the practice of mindfulness really improve test scores? A study conducted by Michael Mrazek and his colleagues assigned people to take either a 2-week mindfulness training course or a 2-week nutrition course (Mrazek, Franklin, Philips, Baird, & Schooner, 2013). At the end of the training, only the people who had practiced mindfulness showed improved GRE scores (compared to their scores beforehand). Mrazek’s group hypothesized that mindfulness training helps people attend to an academic task without being distracted. They were better, it seemed, at controlling their minds from wandering. The research evidence you read about here appears to support the use of mindfulness for improving test scores.

By understanding the research methods and results of this study, you might be convinced to take a mindfulness-training course similar to the one used by Mrazek and his colleagues. And if you were a teacher or tutor, you might consider advising your students to practice some of the focusing techniques. (Chapter 10 returns to this example and explains why the Mrazek study stands up to interrogation.) Your skills in research methods will help you become a better consumer of research.
studies like this one, so you can decide when the research supports some programs (such as mindfulness for study skills) but not others (such as Scared Straight for criminal behavior).

CHECK YOUR UNDERSTANDING

1. Explain what the consumer of research and producer of research roles have in common, and describe how they differ.

2. What kinds of jobs would use consumer-of-research skills? What kinds of jobs would use producer-of-research skills?

HOW SCIENTISTS APPROACH THEIR WORK

Psychological scientists are identified not by advanced degrees or white lab coats; they are defined by what they do and how they think. The rest of this chapter will explain the fundamental ways psychologists approach their work. First, they act as empiricists in their investigations, meaning that they systematically observe the world. Second, they test theories through research and, in turn, revise their theories based on the resulting data. Third, they take an empirical approach to both applied research, which directly targets real-world problems, and basic research, which is intended to contribute to the general body of knowledge. Fourth, they go further: Once they have discovered an effect, scientists plan further research to test why, when, or for whom an effect works. Fifth, psychologists make their work public: They submit their results to journals for review and respond to the opinions of other scientists. Another aspect of making work public involves sharing findings of psychological research with the popular media, who may or may not get the story right.

Scientists Are Empiricists

Empiricists do not base conclusions on intuition, on casual observations of their own experience, or on what other people say. Empiricism, also referred to as the empirical method or empirical research, involves using evidence from the senses (sight, hearing, touch) or from instruments that assist the senses (such as thermometers, timers, photographs, weight scales, and questionnaires) as the basis for conclusions. Empiricists aim to be systematic, rigorous, and to make their work independently verifiable by other observers or scientists. In Chapter 2, you will learn more about why empiricism is considered the most reliable basis for conclusions when compared with other forms of reasoning, such as experience or intuition. For now, we'll focus on some of the practices in which empiricists engage.

Scientists Test Theories: The Theory-Data Cycle

In the theory-data cycle, scientists collect data to test, change, or update their theories. Even if you have never been in a formal research situation, you have probably tested ideas and hunches of your own by asking specific questions that are grounded in theory, making predictions, and reflecting on data.

For example, let's say you need to take your bike to work later, so you check the weather forecast on your tablet (Figure 1.3). The application opens, but you see a blank screen. What could be wrong? Maybe your entire device is on the blink: Do the other apps work? When you test them, you find your calculator is working, but not your e-mail. In fact, it looks as if only the apps that need wireless are not working. Your wireless indicator looks low, so you ask your roommate, sitting nearby, "Are you having wifi problems?" If she says no, you might try resetting your device's wireless connection.

Notice the series of steps in this process. First, you asked a particular set of questions, all of which were guided by your theory about how such devices work. The questions (Is it the tablet as a whole? Is it only the wifi?) reflected your theory that the weather app requires a working electronic device as well as a wireless connection. Because you were operating under this theory, you chose not to ask other kinds of questions (Has a warlock cursed my tablet? Does my device have a bacterial infection?). Your theory set you up to ask certain questions and not others. Next, your questions led you to specific predictions, which you tested by collecting data. You tested your first idea about the problem (My device can't run any apps) by making a specific prediction (If I test any application, it won't work). Then you set up a situation to test your prediction (Does the calculator work?). The data (The calculator does work) told you your initial prediction was wrong. You used that outcome to change your idea about the problem (It's only the wireless-based apps that aren't working). And so on. When you take systematic steps to solve a problem, you are participating in something similar to what scientists do in the theory-data cycle.

THE CUPBOARD THEORY VS. THE CONTACT COMFORT THEORY

A classic example from the psychological study of attachment can illustrate the way researchers similarly use data to test their theories. You've probably observed that animals form strong attachments to their caregivers. If you have a dog, you know he's extremely happy to see you when you come home, wagging his tail and jumping all over you. Human babies, once they are able to crawl, may follow their parents or caregivers around, keeping close to them. Baby monkeys exhibit similar behavior, spending hours clinging tightly to the mother's fur. Why do animals form such strong attachments to their caregivers?
One theory, referred to as the cupboard theory of mother-infant attachment, is that a mother is valuable to a baby mammal because she is a source of food. The baby animal gets hungry, gets food from the mother by nursing, and experiences a pleasant feeling (reduced hunger). Over time, the sight of the mother is associated with pleasure. In other words, the mother acquires positive value for the baby because she is the "cupboard" from which food comes. If you've ever assumed your dog loves you only because you feed it, your beliefs are consistent with the cupboard theory.

An alternative theory, proposed by psychologist Harry Harlow (1958), is that hunger has little to do with why a baby monkey likes to cling to the warm, fuzzy fur of its mother. Instead, babies are attached to their mothers because of the comfort of cozy touch. This is the contact comfort theory. (In addition, it provides a less cynical view of why your dog is so happy to see you!)

In the natural world, a mother provides both food and contact comfort at once, so when the baby clings to her, it is impossible to tell why. To test the alternative theories, Harlow had to separate the two influences—food and contact comfort. The only way he could do so was to create "mothers" of his own. He built two monkey foster "mothers"—the only mothers his lab-reared baby monkeys ever had. One of the mothers was made of bare wire mesh with a bottle of milk built in. This wire mother offered food, but not comfort. The other mother was covered with fuzzy terrycloth and was warmed by a lightbulb suspended inside, but she had no milk. This cloth mother offered comfort, but not food.

Note that this experiment sets up three possible outcomes. The contact comfort theory would be supported if the babies spent most of their time clinging to the cloth mother. The cupboard theory would be supported if the babies spent most of their time clinging to the wire mother. Neither theory would be supported if monkeys divided their time equally between the two mothers.

When Harlow put the baby monkeys in the cages with the two mothers, the evidence in favor of the contact comfort theory was overwhelming. Harlow's data showed that the little monkeys would cling to the cloth mother for 12-18 hours a day (Figure 1.4). When they were hungry, they would climb down, nurse from the wire mother, and then at once go back to the warm, cozy cloth mother. In short, Harlow tested the two theories to make two specific predictions about how the monkeys would interact with each mother. Then he used the data he recorded (how much time the monkeys spent on each mother) to support only one of the theories. The theory-data cycle in action!

The theory, hypothesis, and data

A theory is a set of statements that describes general principles about how variables relate to one another. For example, Harlow's theory, which he developed in light of extensive observations of primate babies and mothers, was about the overwhelming importance of bodily contact (as opposed to simple nourishment) in forming attachments. Contact comfort, not food, was the primary basis for a baby's attachment to its mother. This theory led Harlow to investigate particular kinds of questions—he chose to pit contact comfort against food in his research. The theory meant that Harlow also chose not to study unrelated questions, such as the babies' food preferences or sleeping habits.

The theory not only led to the questions; it also led to specific hypotheses about the answers. A hypothesis, or prediction, is the specific outcome the researcher expects to observe in a study if the theory is accurate. Harlow's hypothesis related to the way the baby monkeys would interact with two kinds of mothers he created for the study. He predicted that the babies would spend more time on the cozy mother than the wire mother. Notably, a single theory can lead to a large number of hypotheses because a single study is not sufficient to test the entire theory—it is intended to test only part of it. Most researchers test their theories with a series of empirical studies, each designed to test an individual hypothesis.

Data are a set of observations. (Harlow's data were the amount of time the baby monkeys stayed on each mother.) Depending on whether the data are consistent with hypotheses based on a theory, the data may either support or challenge the theory. Data that match the theory's hypotheses strengthen the researcher's confidence in the theory. When the data do not match the theory's hypotheses, however, those results indicate that the theory needs to be revised or the research design needs to be improved. Figure 1.5 shows how these steps work as a cycle.

Theory leads researchers to pose particular research questions, which lead to an appropriate research design. Researchers then formulate hypotheses. Researchers then collect and analyze data, which feed back into the cycle.
FEATURES OF GOOD SCIENTIFIC THEORIES

In scientific practice, some theories are better than others. The best theories are supported by data from studies, are falsifiable, and are parsimonious.

**Good Theories Are Supported by Data.** The most important feature of a scientific theory is that it is supported by data from research studies. In this respect, the contact comfort theory of infant attachment turned out to be better than the cupboard theory because it was supported by the data. Clearly, primate babies need food, but food is not the source of their emotional attachments to their mothers. In this way, good theories, like Harlow’s, are consistent with our observations of the world. More importantly, scientists need to conduct multiple studies, using a variety of methods, to address different aspects of their theories. A theory that is supported by a large quantity and variety of evidence is a good theory.

**Good Theories Are Falsifiable.** A second important feature of a good scientific theory is **falsifiability.** A theory must lead to hypotheses that, when tested, could actually fail to support the theory. Harlow’s theory was falsifiable. If the monkeys had spent more time on the wire mother than the cloth mother, the contact-comfort theory would have been shown to be incorrect. Similarly, Mrazek’s mindfulness study could have falsified the researchers’ theory: If students in the mindfulness training group had shown lower GRE scores than those in the nutrition group, their theory of mindfulness and attention would not have been supported.

In contrast, some dubious therapeutic techniques have been based on theories that are not falsifiable. Here’s an example. Some therapists practice facilitated communication (FC), believing they can help people with developmental disorders communicate by gently guiding their clients’ hands over a special keyboard. In simple but rigorous empirical tests, the facilitated messages have been shown to come from the therapist, not the client (Twachtman-Cullen, 1997). Such studies demonstrated FC to be ineffective. However, FC’s supporters don’t accept these results. The empirical method introduces skepticism, which, the supporters say, breaks down trust between the therapist and client and shows a lack of faith in people with disabilities. Therefore, these supporters hold a belief about FC that is not falsifiable. To be truly scientific, researchers must take risks, including being prepared to accept data indicating their theory is not supported. Even practitioners must be open to such risk, so they can use techniques that actually work. For another example of an unfalsifiable claim, see **Figure 1.6.**

**Good Theories Have Parsimony.** A third important feature of a good scientific theory is that it exhibits **parsimony.** Theories are supposed to be simple. If two theories explain the data equally well, most scientists will opt for the simpler, more parsimonious theory.

Parsimony sets a standard for the theory-data cycle. As long as a simple theory predicts the data well, there should be no need to make the theory more complex. Harlow’s theory was parsimonious because it posed a simple explanation for infant attachment: Contact comfort drives attachment more than food does. As long as the data continue to support the simple theory, the simple theory stands. However, when the data contradict the theory, the theory has to change in order to accommodate the data. For example, over the years, psychologists have collected data showing that baby monkeys do not always form an attachment to a soft, cozy mother. If monkeys are reared in complete social isolation during their first, critical months, they seem to have problems forming attachments to anyone or anything. Thus, the contact comfort theory had to change a bit to emphasize the importance of contact comfort for attachment especially in the early months of life. The theory is slightly less parsimonious now, but it does a better job of accommodating the data.

**THEORIES DON’T PROVE ANYTHING**

The word prove is not used in science. Researchers never say they have proved their theories. At most, they will say that some data **support or are consistent with** a theory, or they might say that some data are **inconsistent with** or **complicate** a theory. But no single confirming finding can prove a theory (**Figure 1.7**). New information might require researchers, tomorrow or the next day, to change and improve current ideas. Similarly, a single, disconfirming finding does not lead researchers to scrap a theory entirely. The disconfirming study may itself have been designed poorly. Or perhaps the theory needs to be modified, not discarded. Rather than thinking of a theory as proved or disproved by a single study, scientists evaluate their theories based on the **weight of the evidence.** For and against. Harlow’s theory of attachment could not be “proved” by the single study involving wire and cloth mothers. His laboratory conducted dozens of individual studies to rule out alternative explanations and test the theory’s limits.

**Figure 1.7** Scientists don’t say “prove.” When you see the word prove in a headline, be skeptical. No single study can prove a theory once and for all. A more scientifically accurate headline would be: “Study Supports the Hypothesis that Hiking Improves Mental Health.” (Source: Nettburn, LATimes.com, 2015.)
Scientists Tackle Applied and Basic Problems

The empirical method can be used for both applied and basic research questions. **Applied research** is done with a practical problem in mind; the researchers conduct their work in a particular real-world context. An applied research study might ask, for example, if a school district's new method of teaching language arts is working better than the former one. It might test the efficacy of a treatment for depression in a sample of trauma survivors. Applied researchers might be looking for better ways to identify those who are likely to do well at a particular job, and so on.

**Basic research**, in contrast, is not intended to address a specific, practical problem; the goal is to enhance the general body of knowledge. Basic researchers might want to understand the structure of the visual system, the capacity of human memory, the motivations of a depressed person, or the limitations of the infant attachment system. Basic researchers do not just gather facts at random; in fact, the knowledge they generate may be applied to real-world issues later on.

**Translational research** is the use of lessons from basic research to develop and test applications to health care, psychotherapy, or other forms of treatment and intervention. Translational research represents a dynamic bridge from basic to applied research. For example, basic research on the biochemistry of cell membranes might be translated into a new drug for schizophrenia. Or basic research on how mindfulness changes people's patterns of attention might be translated into a study skills intervention. **Figure 1.8** shows the interrelationship of the three types of research.

Scientists Dig Deeper

Psychological scientists rarely conduct a single investigation and then stop. Instead, each study leads them to ask a new question. Scientists might start with a simple effect, such as the effect of comfort on attachment, and then ask, "Why does this occur?" "When does this happen the most?" "For whom does this apply?" "What are the limits?"

Mrazek and his team did not stop after only one study of mindfulness training and GRE performance. They dug deeper. They also asked whether mindfulness training was especially helpful for people whose minds wander the most. In other studies, they investigated if mindfulness training influenced skills such as people's insight about their own memory (Baird, Mrazek, Phillips, & Schooler, 2014). And they have contrasted mindfulness with mind-wandering, attempting to find both the benefits and the costs of mind-wandering (Baird et al., 2013). This research team has conducted many related studies of how people can and cannot control their own attention.

Scientists Make It Public: The Publication Process

When scientists want to tell the scientific world about the results of their research, they write a paper and submit it to a scientific **journal**. Like magazines, journals usually come out every month and contain articles written by various qualified contributors. But unlike popular newsstand magazines, the articles in a scientific journal are peer-reviewed. The journal editor sends the submission to three or four experts on the subject. The experts tell the editor about the work's virtues and flaws, and the editor, considering these reviews, decides whether the paper deserves to be published in the journal.

The peer-review process in the field of psychology is rigorous. Peer reviewers are kept anonymous, so even if they know the author of the article professionally or personally, they can feel free to give an honest assessment of the research. They comment on how interesting the work is, how novel it is, how well the research was done, and how clear the results are. Ultimately, peer reviewers are supposed to ensure that the articles published in scientific journals contain innovative, well-done studies. When the peer-review process works, research with major flaws does not get published. However, the process continues even after a study is published. Other scientists can cite an article and do further work on the same subject. Moreover, scientists who find flaws in the research (perhaps overlooked by the peer reviewers) can publish letters, commentaries, or competing studies. Through publishing their work, scientists make the process of their research transparent, and the scientific community evaluates it.

Scientists Talk to the World: From Journal to Journalism

One goal of this textbook is to teach you how to interrogate information about psychological science that you find not only in scientific journals, but also in more mainstream sources that you encounter in daily life. Psychology's scientific journals are read
primarily by other scientists and by psychology students; the general public almost never reads them. *Journalism*, in contrast, includes the kinds of news and commentary that most of us read or hear on television, in magazines and newspapers, and on Internet sites—articles in *Psychology Today* and *Men’s Health*, topical blogs, relationship advice columns, and so on. These sources are usually written by journalists or laypeople, not scientists, and they are meant to reach the general public; they are easy to access, and understanding their content does not require specialized education.

How does the news media find out about the latest scientific findings? A journalist might become interested in a particular study by reading the current issue of a scientific journal or by hearing scientists talk about their work at a conference. The journalist turns the research into a news story by summarizing it for a popular audience, giving it an interesting headline, and writing about it using nontechnical terms. For example, the journal article by Mrazek and his colleagues on the effect of a scent on memory was summarized by a journalist in *Scientific American* (Nicholson, 2013).

**BENEFITS AND RISKS OF JOURNALISM COVERAGE**

Psychologists can benefit when journalists publicize their research. By reading about psychological research in the newspaper, the general public can learn what psychologists really do. Those who read or hear the story might also pick up important tips for living: They might understand their children or themselves better; they might set different goals or change their habits. These important benefits of science writing depend on two things, however. First, journalists need to report on the most important scientific stories, and second, they must describe the research accurately.

**Is the Story Important?** When journalists report on a study, have they chosen research that has been conducted rigorously, that tests an important question, and that has been peer-reviewed? Or have they chosen a study simply because it is cute or eye-catching? Sometimes journalists do follow important stories, especially when covering research that has already been published in a selective, peer-reviewed journal. But sometimes journalists choose the sensational story over the important one.

For example, one spring, headlines such as “Your dog hates hugs” and “You need to stop hugging your dog, study finds” began popping up in newsfeeds. Of course, this topic is clickbait, and dozens of news outlets shocked readers and listeners with these claims. However, the original claim had been made by a psychology professor who had merely reported some data in a blog post. The study he conducted had not been peer-reviewed or published in an empirical journal. The author had simply coded some Internet photographs of people hugging their dogs; according to the author, 82% of the dogs in the sample were showing signs of stress (Coren, 2016). Journalists should not have run with this story before it had been peer-reviewed. Scientific peer reviewers might have criticized the study because it didn’t include a comparison group of photos of dogs that weren’t being hugged.

The author also left out important details, such as how the photographs were selected and whether the dogs’ behavior actually meant they were stressed. In this case, journalists were quick to publish a headline that was sensational, but not necessarily important.

**Is the Story Accurate?** Even when journalists report on reliable, important research, they don’t always get the story right. Some science writers do an excellent, accurate job of summarizing the research, but not all of them do (Figure 1.9). Perhaps the journalist does not have the scientific training, the motivation, or the time before deadline to understand the original science very well. Maybe the journalist dumbs down the details of a study to make it more accessible to a general audience. And sometimes a journalist wraps up the details of a study with a more dramatic headline than the research can support.

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**THE SCIENCE NEWS CYCLE**

The news cycle turns the research into a news story by summarizing it for a popular audience. And sometimes a journalist wraps up the details of a study with a more dramatic headline than the research can support.
Media coverage of a phenomenon called the “Mozart effect” provides an example of how journalists might misrepresent science when they write for a popular audience (Spiegel, 2010). In 1993, researcher Frances Rauscher found that when students heard Mozart music played for 10 minutes, they performed better on a subsequent spatial intelligence test when compared with students who had listened to silence or to a monotone speaking voice (Rauscher, Shaw, & Ky, 1993). Rauscher said in a radio interview, “What we found was that the students who had listened to the Mozart sonata scored significantly higher on the spatial temporal task.” However, Rauscher added, “It’s very important to note that we did not find effects for general intelligence... just for this one aspect of intelligence. It’s a small gain and it doesn’t last very long” (Spiegel, 2010). But despite the careful way the scientists described their results, the media that reported on the story exaggerated its importance:

The headlines in the papers were less subtle than her findings: “Mozart makes you smart” was the general idea. ... But worse, says Rauscher, was that her very modest finding started to be wildly distorted. “Generalizing these results to children is one of the first things that went wrong. Somehow or another the myth started exploding that children that listen to classical music from a young age will do better on the SAT, they’ll score better on intelligence tests in general, and so forth.” (Spiegel, 2010)

Perhaps because the media distorted the effects of that first study, a small industry sprang up, recording child-friendly sonatas for parents and teachers (Figure 1.10). However, according to research conducted since the first study was published, the effect of listening to Mozart on people's intelligence test scores is not very strong, and it applies to most music, not just Mozart (Pietschnig, Voracek, & Formann, 2010).

The journalist Ben Goldacre (2011) catalogs examples of how journalists and the general public misinterpret scientific data when they write about it for a popular audience. Some journalists create dramatic stories about employment statistics that show, for example, a 0.9% increase in unemployment claims. Journalists may conclude that these small increases show an upward trend—when in fact, they may simply reflect sampling error. Another example comes from a happiness survey of 5,000 people in the United Kingdom. Local journalists picked up on tiny city-to-city differences, creating headlines about, for instance, how the city of Edinburgh is the “most miserable place in the country.” But the differences the survey found between the various places were not statistically significant (Goldacre, 2008). Even though there were slight differences in happiness from Edinburgh to London, the differences were small enough to be caused by random variation. The researcher who conducted the study said, “It tried to explain issues of [statistical] significance to the journalists who interviewed me. Most did not want to know” (Goldacre, 2008).

How can you prevent being misled by a journalist's coverage of science? One idea is to find the original source, which you'll learn to do in Chapter 2. Reading the original scientific journal article is the best way to get the full story. Another approach is to maintain a skeptical mindset when it comes to popular sources. Chapter 3 explains how to ask the right questions before you allow yourself to accept the journalist's claim.
CHAPTER REVIEW

Summary
Thinking like a psychologist means thinking like a scientist, and thinking like a scientist involves thinking about the empirical basis for what we believe.

Research Producers, Research Consumers
• Some students need skills as producers of research; they develop the ability to work in research laborato­ries and make new discoveries.
• Some students need skills as consumers of research; they need to be able to find, read, and evaluate the research behind important policies, therapies, and workplace decisions.
• Having good consumer-of-research skills means being able to evaluate the evidence behind the claims of a salesperson, journalist, or researcher, and making better, more informed decisions by asking the right questions.

How Scientists Approach Their Work
• As scientists, psychologists are empiricists; they base their conclusions on systematic, unbiased observations of the world.
• Using the theory-data cycle, researchers propose theories, make hypotheses (predictions), and collect data. A good scientific theory is supported by data, is falsifiable, and is parsimonious. A researcher might say that a theory is well supported or well established, rather than proved, meaning that most of the data have confirmed the theory and very little data have disconfirmed it.
• Applied researchers address real-world problems, and basic researchers work for general understanding. Translational researchers attempt to translate the findings of basic research into applied areas.
• Scientists usually follow up an initial study with more questions about why, when, and for whom a phenomenon occurs.
• The publication process is part of worldwide scientific communication. Scientists publish their research in journals, following a peer-review process that leads to sharper thinking and improved communication. Even after publication, published work can be approved or criticized by the scientific community.
• Journalists are writers for the popular media who are skilled at transforming scientific studies for the general public, but they don't always get it right. Think critically about what you read online, and when in doubt, go directly to the original source—peer-reviewed research.

Key Terms
evidence-based treatment, p. 6 falsifiability, p. 14
translational research, p. 16
empiricism, p. 10
theory, p. 13
hypothesis, p. 13
weight of the evidence, p. 15
applied research, p. 16
basic research, p. 16
Journalism, p. 18

Learning Actively
1. To learn more about the theory-data cycle, look in the textbooks from your other psychology courses for examples of theories. In your introductory psychology book, you might look up the James Lange theory or the Cannon-Bard theory of emotion. You could look up Piaget’s theory of cognitive development, the Young-Helmholz theory of color vision, or the stage theory of memory. How do the data presented in your textbook show support for the theory? Does the textbook present any data that is reporting the results of a recently published study. Read the story, and ask: Has the research in the story been published yet? Does the journalist mention the name of a journal in which the results appeared? Or has the study only been presented at a research conference? Then, use the Internet to find examples of how other journalists have covered the same story. What variation do you notice in their stories?

4. Why is publication an important part of the empirical method?
   a. Because publication enables practitioners to read the research and use it in applied settings.
   b. Because publication contributes to making empirical observations independently verifiable.
   c. Because journalists can make the knowledge available to the general public.
   d. Because publication is the first step of the theory-data cycle.

5. Which of the following research questions best illustrates an example of basic research?
   a. Has our company’s new marketing campaign led to an increase in sales?
   b. How satisfied are our patients with the sensitivity of the nursing staff?
   c. Does wearing kinesio-tape reduce joint pain?
   d. Can 2-month-old human infants tell the difference between four objects and six objects?
Sources of Information: Why Research Is Best and How to Find It

HAVE YOU EVER LOOKED online for a stress-relief technique? You might have found aggressive games such as Kick the Buddy or downloaded an app such as Vent. Maybe you've considered a for-profit "rage room" that lets you destroy plates, computers, or teddy bears. Perhaps a friend has suggested posting your complaints publicly and anonymously on Yik Yak. But does venting anger really make people feel better? Does expressing aggression make aggression go away?

Many sources of information promote the idea that venting your frustrations works. You might try one of the venting apps yourself and feel good while you're using it. Or you may hear from guidance counselors, friends, or online sources that venting negative feelings is a healthy way to manage anger. But is it accurate to base your conclusions on what authorities—even well-meaning ones—say? Should you believe what everyone else believes? Does it make sense to base your convictions on your own personal experience?

This chapter discusses three sources of evidence for people's beliefs—experience, intuition, and authority—and compares them to a superior source of evidence: empirical research. We will focus on evaluating a particular type of response to the question about handling anger: the idea of cathartically releasing bottled-up tension by hitting a punching bag.
In those days, a doctor who used the bleeding cure would have noticed that some of his patients recovered and some died; it was the doctor's personal experience. Every patient's recovery from yellow fever after bloodletting seemed to support Rush's theory that the treatment worked. But Dr. Rush never set up a systematic comparison because doctors in the 1700s were not collecting data on their treatments. To test the bleeding cure, doctors would have had to systematically count death rates among patients who were bled versus those who received some comparison treatment (or no treatment). How many people were bled and how many were not? Of each group, how many died and how many recovered? Putting all the records together, the doctors could have come to an empirically derived conclusion about the effectiveness of bloodletting.

Suppose, for example, Dr. Rush had kept records and found that 20 patients who were bled recovered, and 10 patients who refused the bleeding treatment recovered. At first, it might look like the bleeding cure worked; after all, twice as many bled patients as untreated patients improved. But you need to know all the numbers—the number of bled patients who died and the number of untreated patients who died, in addition to the number of patients in each group who recovered. Tables 2.1, 2.2, and 2.3 illustrate how we need all the data to draw the correct conclusion. In the first example (Table 2.1), there is no relationship at all between treatment and improvement. Although twice as many bled patients as untreated patients recovered, twice as many bled patients as untreated patients died, too. If you calculate the percentages, the recovery rate among people who were bled was 20%, and the recovery rate among people who were not treated was also 20%. The proportions are identical. (Remember, these data were invented for purposes of illustration.)

**TABLE 2.1** Baseline Comparisons

<table>
<thead>
<tr>
<th>Number of patients who recovered</th>
<th>BLED</th>
<th>NOT BLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of patients who died</th>
<th>BLED</th>
<th>NOT BLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Number recovered divided by total number of patients)</td>
<td>20/100</td>
<td>10/100</td>
</tr>
<tr>
<td>Percentage recovered</td>
<td>20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

**TABLE 2.2** One Value Decreased

<table>
<thead>
<tr>
<th>Number of patients who recovered</th>
<th>BLED</th>
<th>NOT BLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of patients who died</th>
<th>BLED</th>
<th>NOT BLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Number recovered divided by total number of patients)</td>
<td>20/100</td>
<td>10/11</td>
</tr>
<tr>
<td>Percentage recovered</td>
<td>20%</td>
<td>91%</td>
</tr>
</tbody>
</table>

**TABLE 2.3** One Value Increased

<table>
<thead>
<tr>
<th>Number of patients who recovered</th>
<th>BLED</th>
<th>NOT BLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>490</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of patients who died</th>
<th>BLED</th>
<th>NOT BLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Number recovered divided by total number of patients)</td>
<td>20/100</td>
<td>10/500</td>
</tr>
<tr>
<td>Percentage recovered</td>
<td>20%</td>
<td>2%</td>
</tr>
</tbody>
</table>
To reach the correct conclusion, we need to know all the values, including the number of untreated patients who died. Table 2.2 shows an example of what might happen if the value in only that cell changes. In this case, the number of untreated patients who died is much lower, so the treatment is shown to have a negative effect. Only 20% of the treated patients recovered, compared with 91% of the untreated patients. In contrast, if the number in the fourth cell were increased drastically, as in Table 2.3, the treatment would be shown to have a positive effect. The recovery rate among bled patients is still 20%, but the recovery rate among untreated patients is a mere 2%.

Notice that in all three tables, changing only one value leads to dramatically different results. Drawing conclusions about a treatment—bloodletting, ways of venting anger, or using stretchy tape—requires comparing data systematically from all four cells: the treated/improved cell, the treated/unimproved cell, the untreated/improved cell, and the untreated/unimproved cell. These comparisons show the relative rate of improvement when using the treatment, compared with no treatment.

Because Dr. Rush bled every patient, he never had the chance to see how many would recover without the bleeding treatment (Figure 2.3). Similarly, when you rely on personal experience to decide what is true, you usually don't have a systematic comparison group, because you're observing only one “patient”: yourself. The tape you've been using may seem to be working, but what would have happened to your knee pain without it? Maybe it would have felt fine anyway. Or perhaps you try an online brain-training course and get higher grades later that semester. But what kind of grades would you have gotten if you hadn't taken the course? Or you might think using the Kick the Buddy game makes you feel better when you’re angry, but would you have felt better anyway, even if you had played a nonviolent game? What if you had done nothing and just let a little time pass?

Basing conclusions on personal experience is problematic because daily life usually doesn’t include comparison experiences. In contrast, basing conclusions on systematic data collection has the simple but tremendous advantage of providing a comparison group. Only a systematic comparison can show you whether your knee improves when you use a special tape (compared with when you do not), or whether your anger goes away when you play a violent online game (compared with doing nothing).

Another problem with basing conclusions on personal experience is that in everyday life, too much is going on at once. Even if a change has occurred, we often can't be sure what caused it. When a patient treated by Dr. Rush got better, that patient might also have been stronger to begin with, or may have been eating special foods or drinking more fluids. Which one caused the improvement? When you notice a difference in your knee pain after using kinesio-tape, maybe you also took it easy that day or used a pain reliever. Which one caused your knee pain to improve? If you play Kick the Buddy, it provides violent content, but you might also be distracting yourself or increasing your heart rate. Is it these factors, or the game's violence that causes you to feel better after playing it?

In real-world situations, there are several possible explanations for an outcome. In research, these alternative explanations are called confounds. Confounded can also mean confused. Essentially, a confound occurs when you think one thing caused an outcome but in fact other things changed, too, so you are confused about what the cause really was. You might think online brain-training exercises are making your grades better than last year, but because you were also taking different classes and have gained experience as a student, you can’t determine which of these factors (or combination of factors) caused the improvement.

What can we do about confounds like these? For a personal experience, it is hard to isolate variables. Think about the last time you had an upset stomach. Which of the many things you ate that day made you sick? Or your allergies— which of the blossoming spring plants are you allergic to? In a research setting, though, scientists can use careful controls to be sure they are changing only one factor at a time.

Research Is Better Than Experience

What happens when scientists set up a systematic comparison that controls for potential confounds? For example, by using controlled, systematic comparisons, several groups of researchers have tested the hypothesis that venting anger is beneficial (e.g., Berkowitz, 1973; Bushman, Baumeister, & Phillips, 2001; Feshbach, 1956; Lohr, Olatunji, Baumeister, & Bushman, 2007). One such study was conducted by researcher Brad Bushman (2002). To examine the effect of venting, or catharsis, Bushman systematically compared the responses of angry people who were allowed to vent their anger with the responses of those who did not vent their anger.

First, Bushman needed to make people angry. He invited 600 undergraduates to arrive, one by one, to a laboratory setting, where each student wrote a political essay. Next, each essay was shown to another person, called Steve, who was actually a confederate, an actor playing a specific role for the experimenter. Steve insulted the writer by criticizing the essay, calling it “the worst essay I’ve ever read,” among
30 groups had the chance to blast Steve with loud noise. While thinking about exercise, and Group 3 hit a punching bag.

In this study, after Steve (the confederate) insulted all the students, they were given a chance to get back at Steve. In the course of playing a quiz game with him, students had the chance to blast Steve's ears with a loud noise. (Because Steve was a confederate, he didn't actually hear the noises, but the students thought he did.)

Which group gave Steve the loudest, longest blasts of noise? The catharsis hypothesis predicts that Group 3 should have calmed down the most, and as a result, this group should not have blasted Steve with very much noise. This group, however, gave Steve the loudest noise blasts of all! Compared with the other two groups, those who vented their anger at Steve through the punching bag continued to punish him when they had the chance. In contrast, Group 2, those who hit the punching bag for exercise, subjected him to less noise (not as loud or as long). Those who sat quietly for 2 minutes punished Steve the least of all. So much for the catharsis hypothesis. When the researchers set up the comparison groups, they found the opposite result: People's anger subsided more quickly when they sat in a room quietly than if they tried to vent it. Figure 2.4 shows the study results in graph form.

Notice the power of systematic comparison here. In a controlled study, researchers can set up the conditions to include at least one comparison group. Contrast the researcher's larger view with the more subjective view, in which each person consults only his or her own experience. For example, if you had asked some of the students in the catharsis group whether using the punching bag helped their anger subside, they could only consider their own, idiosyncratic experiences. When Bushman looked at the pattern overall—taking into account all three groups—the results indicated that the catharsis group still felt the angriest. The researcher thus has a privileged view—the view from the outside, including all possible comparison groups. In contrast, when you are the one acting in the situation, yours is a view from the inside, and you only see one possible condition.

Researchers can also control for potential confounds. In Bushman's study, all three groups felt equally angry at first. Bushman even separated the effects of aggression alone (using the punching bag for exercise) from the effects of aggression toward the person who made the participant mad (using the punching bag as a stand-in for Steve). In real life, these two effects—exercise and the venting of anger—would usually occur at the same time.

Bushman's study is, of course, only one study on catharsis, and scientists always dig deeper. In other studies, researchers have made people angry, presented them with an opportunity to vent their anger (or not), and then watched their behavior. Research results have repeatedly indicated that people who physically express their anger at a target actually become more angry than when they started. Thus, practicing aggression only seems to teach people how to be more aggressive (Berkowitz, 1973; Bushman et al., 2001; Feshbach, 1956; Geen & Quanty, 1977; Lohr et al., 2007; Tavris, 1989).

The important point is that the results of a single study, such as Bushman's, are certainly better evidence than experience. In addition, consistent results from several similar studies mean that scientists can be confident in the findings. As more and more studies amass evidence on the subject, theories about how people can effectively regulate their anger gain increasing support. Finally, psychologist Todd Kashdan applied this research when he was interviewed for a story about the "rage room" concept, in which people pay to smash objects. He advised the journalist that "it just increases your arousal and thus makes you even more angry. What you really need is to reduce or learn to better manage that arousal" (Dart, 2016).

**Research Is Probabilistic**

Although research is usually more accurate than individual experience, sometimes our personal stories contradict the research results. Personal experience is powerful, and we often let a single experience distract us from the lessons of more rigorous research. Should you disagree with the results of a study when your own experience is different? Should you continue to play online games when you're angry because you believe they work for you? Should you disregard Consumer Reports because your cousin had a terrible experience with her Honda Fit?

At times, your experience (or your cousin's) may be an exception to what the research finds. In such cases, you may be tempted to conclude: The research must be wrong. However, behavioral research is probabilistic, which means that its findings are not expected to explain all cases all of the time. Instead, the conclusions of research are meant to explain a certain proportion (preferably a high proportion) of the possible cases. In practice, this means scientific
conclusions are based on patterns that emerge only when researchers set up comparison groups and test many people. Your own experience is only one point in that overall pattern. Thus, for instance, even though bloodletting does not cure illness, some sick patients did recover after being bled. Those exceptional patients who recovered do not change the conclusion derived from all of the data. And even though your cousin's Honda needed a lot of repairs, her case is only one out of 1,001 Fit owners, so it doesn't invalidate the general trend. Similarly, just because there is a strong general trend (that Honda Fits are reliable), it doesn't mean your Honda will be reliable too. The research may suggest there is a strong probability your Honda will be reliable, but the prediction is not perfect.

**CHECK YOUR UNDERSTANDING**

1. What are two general problems with basing beliefs on experience? How does empirical research work to correct these problems?
2. What does it mean to say that research is probabilistic?

**THE RESEARCH VS. YOUR INTUITION**

Personal experience is one way we might reach a conclusion. Another is intuition—using our hunches about what seems "natural," or attempting to think about things "logically." While we may believe our intuition is a good source of information, it can lead us to make less effective decisions.

**Ways That Intuition Is Biased**

Humans are not scientific thinkers. We might be aware of our potential to be biased, but we often are too busy, or not motivated enough, to correct and control for these biases. What's worse, most of us think we aren't biased at all! Fortunately, the formal processes of scientific research help prevent these biases from affecting our decisions. Here are five examples of biased reasoning.

**BEING SWAYED BY A GOOD STORY**

One example of a bias in our thinking is accepting a conclusion just because it makes sense or feels natural. We tend to believe good stories—even ones that contradict what your common sense tells you, be ready to adjust your beliefs on the basis of the research. Automatically believing a story that may seem to make sense can lead you astray.

**BEING PERSUADED BY WHAT COMES EASILY TO MIND**

Sometimes a good story will turn out to be accurate, of course, but it's important to be aware of the limitations of intuition. When empirical evidence contradicts what your common sense tells you, you need to adjust your beliefs on the basis of the research. Automatically believing a story that may seem to make sense can lead you astray.

**BEING SWAYED BY A GOOD STORY**

One example of a bias in our thinking is accepting a conclusion just because it makes sense or feels natural. We tend to believe good stories—even ones that are false. For example, to many people, bottling up negative emotions seems unhealthy, and expressing anger is sensible. As with a pimple or a boiling kettle of water, it might seem better to release the pressure. One of the early proponents of catharsis was the neurologist Sigmund Freud, whose models of mental distress focused on the harmful effects of suppressing one's feelings and the benefits of expressing them. Some biographers have speculated that Freud's ideas were influenced by the industrial technology of his day (Gay, 1989). Back then, engines used the power of steam to create vast amounts of energy. If the steam was too compressed, it could have devastating effects on a machine. Freud seems to have reasoned that the human psyche functions in the same way. Catharsis makes a good story, because it draws on a metaphor (pressure) that is familiar to most people.

The Scared Straight program is another commonsense story that turned out to be wrong. As you read in Chapter 1, such programs propose that when teenagers susceptible to criminal activity hear about the difficulties of prison from actual inmates, they will be scared away from committing crimes in the future. It certainly makes sense that impressionable young people would be frightened and deterred by such stories. However, research has consistently found that Scared Straight programs are ineffective; in fact, they sometimes even cause more crime. The intuitive appeal of such programs is strong (which accounts for why many communities still invest in them), but the research warns against them. One psychologist estimated that the widespread use of the program in New Jersey might have "caused 6,500 kids to commit crimes they otherwise would not have committed" (Wilson, 2011, p. 138). Faulty intuition can even be harmful.

Sometimes a good story will turn out to be accurate, of course, but it's important to be aware of the limitations of intuition. When empirical evidence contradicts what your common sense tells you, you need to adjust your beliefs on the basis of the research. Automatically believing a story that may seem to make sense can lead you astray.

**BEING PERSUADED BY WHAT COMES EASILY TO MIND**

Another bias in thinking is the availability heuristic, which states that things that pop up easily in our mind tend to guide our thinking (Tversky & Kahneman, 1974). When events or memories are vivid, recent, or memorable, they come to mind more easily, leading us to overestimate how often things happen. Here's a scary headline: "Woman dies in Australian shark attack." Dramatic news like this might prompt us to change our vacation plans. If we rely on our intuition, we might think shark attacks are truly common. However, a closer look at the frequency of reported shark attacks reveals that they are incredibly rare. Being killed by a shark (1 in 3.7 million) is less likely than dying from the flu (1 in 30), or in a bathtub (1 in 800,000; Ropeik, 2010).

Why do people make this mistake? Death by shark attack is certainly more memorable and vivid than getting the flu or taking a bath, so people talk about it...
more. It comes to mind easily, and we inflate the associated risk. In contrast, more common methods of dying don't get much press. Nevertheless, we are too busy (or too lazy) to think beyond the easy answer. We decide the answer that comes to mind easily must be the correct one. We avoid swimming in the ocean, but neglect to get the flu vaccine.

The availability heuristic might lead us to wrongly estimate the number of something or how often something happens. For example, if you visited my campus, you might see some women wearing a head covering (hijab), and conclude there are lots of Muslim women here. The availability heuristic could lead you to overestimate, simply because Muslim women stand out visually. People who practice many other religions do not stand out, so you may underestimate their frequency.

Our attention can be inordinately drawn to certain instances, leading to overestimation. A professor may complain that "everybody" uses a cell phone during his class, when in fact only one or two students do so; it's just that their annoying behavior stands out. You might overestimate how often your kid sister leaves her bike out in the rain, only because it's harder to notice the times she put it away. When driving, you may complain that you always hit the red lights, only because you spend more time at them; you don't notice the green lights you breeze through. What comes to mind easily can bias our conclusions about how often things happen (Figure 2.5).

Failing to Think About What We Cannot See

The availability heuristic leads us to overestimate events, such as how frequently people encounter red lights or die in shark attacks. A related problem prevents us from seeing the relationship between an event and its outcome. When deciding if an event happened, we tend to focus only on experiences that fall in the present/present cell, the instances in which catharsis was present and the desired outcome (feeling better) was present.

When thinking intuitively, we tend to focus only on experiences that fall in the present/present cell, the instances in which catharsis was present and the desired outcome (feeling better) was present. But the present/present bias plays a role in the present/present bias because instances in the "present/present" cell of a comparison stand out. But the present/present bias adds the tendency to ignore "absent" cells, which are essential for testing relationships. To avoid the present/present bias, scientists train themselves always to ask: Compared to what?

**TABLE 2.4**

The Present/Present Bias

<table>
<thead>
<tr>
<th>EXPRESSED FRUSTRATION (TREATMENT PRESENT)</th>
<th>DID NOTHING (TREATMENT ABSENT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felt better (outcome present)</td>
<td>5 Present/present</td>
</tr>
<tr>
<td>Felt worse (outcome absent)</td>
<td>10 Present/absent</td>
</tr>
</tbody>
</table>

Note: The number in each cell represents the number of times the two factors were both present or two events occurred at the same time (the red present/present cell), rather than on the full pattern of our experiences.
CHAPTER 2
Sources of Information: Why Research Is Best and How to Find It

FOCUSING ON THE EVIDENCE WE LIKE BEST

During an election season, you might check opinion polls for your favorite candidate. What if your candidate lags behind in the first opinion poll you see? If you're like most people, you will keep looking until you find a poll in which your candidate has the edge (Wolfers, 2014).

The tendency to look only at information that agrees with what we already believe is called the confirmation bias. We “cherry-pick” the information we take in—seeking and accepting only the evidence that supports what we already think. A lyric by the songwriter Paul Simon captures this well: “A man sees what he wants to see and disregards the rest.”

One study specifically showed how people select only their preferred evidence. The participants took an IQ test and then were told their IQ was either high or low. Shortly afterward, they all had a chance to look at some magazine articles about IQ tests. Those who were told their IQ was low spent more time looking at articles that criticized the validity of IQ tests, whereas those who were told their IQ was high spent more time looking at articles that supported IQ tests as valid measures of intelligence (Frey & Stahlberg, 1986). They all wanted to think they were smart, so they analyzed the available information in biased ways that supported this belief. People keep their beliefs intact (in this case, the belief that they are smart) by selecting only the kinds of evidence they want to see.

One way we enact the confirmation bias is by asking questions that are likely to give the desired or expected answers. Take, for example, a study in which the researchers asked students to interview fellow undergraduates (Snyder & Swann, 1978). Half the students were given the goal of deciding whether their target person was extroverted, and the other half were given the goal of deciding whether their target person was introverted.

Before the interview, the students selected their interview questions from a prepared list. As it turned out, when the students were trying to find out whether their target was extroverted, they chose questions such as “What would you do if you wanted to liven things up at a party?” and “What kind of situations do you seek out if you want to meet new people?” You can see these kinds of questions and the answers students gave that supported the expectations. The researchers asked some judges to listen in on what the targets said during the interviews. Regardless of their personality, the targets who were being tested for extroversion acted extroverted, and the targets who were being tested for introversion acted introverted.

Unlike the hypothesis-testing process in the theory-data cycle (see Chapter 1), confirmation bias operates in a way that is decidedly not scientific. If interviewers were testing the hypothesis that their target was an extrovert, they asked the questions that would confirm that hypothesis and did not ask questions that might disconfirm that hypothesis. Indeed, even though the students could have chosen neutral questions (such as “What do you think the good and bad points of acting friendly and open are?”), they hardly ever did. In follow-up studies, Snyder and Swann found that student interviewers chose hypothesis-confirming questions even if they were offered a big cash prize for being the most objective interviewer, suggesting that even when people are trying to be accurate, they cannot always be.

Without scientific training, we are not very rigorous in gathering evidence to test our ideas. Psychological research has repeatedly found that when people are asked to test a hypothesis, they tend to seek the evidence that supports their expectations (Copeland & Snyder, 1995; Klayman & Ha, 1987; Snyder & Campbell, 1980; Snyder & White, 1981). As a result, people tend to gather only a certain kind of information, and then they conclude that their beliefs are supported. This bias is one reason clinical psychologists and other therapists are required to get a research methods education (Figure 2.6).

BIASED ABOUT BEING BIASED

Even though we read about the biased ways people think (such as in a research methods textbook like this one), we nevertheless conclude that those biases do not apply to us. We have what’s called a bias blind spot, the belief that we are unlikely to fall prey to the other biases previously described (Pronin, Gilovich, & Ross, 2004; Pronin, Lin, & Ross, 2002). Most of us think we are less biased than others, so when we notice our own view of a situation is different from that of somebody else, we conclude that “I’m the objective one here” and “you are the biased one.”

In one study, researchers interviewed U.S. airport travelers, most of whom said the average American is much more biased than themselves (Pronin et al., 2002). For example, the travelers said that while most others would take...
The bias blind spot. A physician who receives a free gift from a pharmaceutical salesperson might believe she won't be biased by it, but she may also believe other physicians will be persuaded by such gifts to prescribe the drug company's medicines.

The bias blind spot might be the sneakiest of all of the biases in human thinking. It makes us trust our faulty reasoning even more. In addition, it can make it difficult for us to initiate the scientific theory-data cycle. We might say, "I don't need to test this conclusion; I already know it is correct." Part of learning to be a scientist is learning not to use feelings of confidence as evidence for the truth of our beliefs. Rather than thinking what they want to, scientists use data.

The Intuitive Thinker vs. the Scientific Reasoner

When we think intuitively rather than scientifically, we make mistakes. Because of our biases, we tend to notice and actively seek information that confirms our ideas. To counteract your own biases, try to adopt the empirical mindset of a researcher. Recall from Chapter 1 that empiricism involves basing beliefs on systematic information from the senses. Now we have an additional nuance for what it means to reason empirically: To be an empiricist, you must also strive to interpret the data you collect in an objective way; you must guard against common biases.

Researchers—scientific reasoners—create comparison groups and look at all the data. Rather than base their theories on hunches, researchers dig deeper and generate data through rigorous studies. Knowing they should not simply go along with the story everyone believes, they train themselves to test their intuition with systematic, empirical observations. They strive to ask questions objectively and collect potentially disconfirming evidence, not just evidence that confirms their hypotheses. Keenly aware that they have biases, scientific reasoners allow the data to speak more loudly than their own confidently held—but possibly biased—ideas. In short, while researchers are not perfect reasoners themselves, they have trained themselves to guard against the many pitfalls of intuition—and they draw more accurate conclusions as a result.

CHECK YOUR UNDERSTANDING

1. This section described several ways in which intuition is biased. Can you name all five?
2. Why might the bias blind spot be the most sneaky of all the intuitive reasoning biases?
3. Do you think you can improve your own reasoning by simply learning about these biases? How?

TRUSTING AUTHORITIES ON THE SUBJECT

You might have heard statements like these: "We only use 10% of our brains" and "People are either right-brained or left-brained." People—even those we trust—make such claims as if they are facts. However, you should be cautious about basing your beliefs on what everybody says—even when the claim is made by someone who is (or claims to be) an authority. In that spirit, how reliable is the advice of guidance counselors, TV talk show hosts, or psychology professors? All these people have some authority—as cultural messengers, as professionals with advanced degrees, as people with significant life experience. But should you trust them?

Let's consider this example of anger management advice from a person with a master's degree in psychology, several published books on anger management, a thriving workshop business, and his own website. He's certainly an authority on the subject, right? Here is his advice:

Punch a pillow or a punching bag. Yell and curse and moan and holler. If you are angry at a particular person, imagine his or her face on the pillow or punching bag, and vent your rage. . . . You are not hitting a person, you are hitting the ghost of that person . . . a ghost alive in you that must be exorcised in a concrete, physical way. (Lee, 1993, p. 96)

Knowing what you know now, you probably do not trust John Lee's advice. In fact, this is a clear example of how a self-proclaimed "expert" might be wrong.

Before taking the advice of authorities, ask yourself about the source of their ideas. Did the authority systematically and objectively compare different conditions, as a researcher would do? Or maybe they have read the research and
CHAPTER 2  

FIGURE 2.8  
Which authority to believe?  
Jenny McCarthy (left), an actress and celebrity, claims that giving childhood vaccines later in life would prevent autism disorders. Dr. Paul Offit (right), a physician-scientist who has both reviewed and conducted scientific research on childhood vaccines, says that early vaccines save lives and that there is no link between vaccination and autism diagnosis. 

are interpreting it for you; they might be practitioners who are basing their conclusions on empirical evidence. In this respect, an authority with a scientific degree may be better able to accurately understand and interpret scientific evidence (Figure 2.8). If you know this is the case—in other words, if an authority refers to research evidence—their advice might be worthy of attention. However, authorities can also base their advice on their own experience or intuition, just like the rest of us. And they, too, might present only the studies that support their own side. 

Keep in mind, too, that not all research is equally reliable. The research an expert uses to support his or her argument might have been conducted poorly. In the rest of this book, you will learn how to interrogate others’ research and form conclusions about its quality. Also, the research someone cites to support an argument may not accurately and appropriately support that particular argument. In Chapter 3, you’ll learn more about what kinds of research support different kinds of claims. Figure 2.9 shows a concept map illustrating the sources of information reviewed in this chapter. Conclusions based on research, outlined in black on the concept map, are the most likely to be correct. 

FIGURE 2.9  
A concept map showing sources of information.  
People’s beliefs can come from several sources. You should base your beliefs about psychological phenomena on research, rather than experience, intuition, or authority. Research can be found in a variety of sources, some more dependable than others. Ways of knowing that are mentioned in outlined boxes are more trustworthy.
For a full discussion of meta-analysis, see Chapter 14, "violent video games on the aggressive behavior of children. Sometimes a review, or meta-analysis, which combines the article uses a quantitative technique called colleagues (2010), for example, summarizes 130 studies on the effects of playing that have been done in one research area. A review article by Anderson and his empirical journal article. is an example of an statistical tests used, and the results of the study. Figure 2.10 shows how the article appears in an online search in that journal. Clicking "Full Text pdf" takes you to the article shown. (Source: Bushman, 2002.)

Does Venting Anger Feed or Extinguish the Flame? Catharsis, Rumination, Distraction, Anger, and Aggressive Responding

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Does distraction or rumination work better to diffuse anger? Catharsis theory predicts that rumination works best, but empirical evidence is lacking. In this study, angered participants hit a punching bag and thought about the person who had angered them (rumination group) or thought about becoming physically fit (distraction group). After hitting the punching bag, they reported how angry they felt. Next, they were given the chance to administer loud blasts of noise to the person who had angered them. Those who had hit a punching bag control group. People in the rumination group felt angrier than did people in the distraction or control groups. People in the rumination group were also more aggressive, followed respectively by people in the distraction and control groups. Rumination increased rather than decreased anger and aggression. Doing nothing at all was more effective than venting anger. These results directly contrast catharsis theory.

T he belief in the value of venting anger has become widespread in our culture. In movies, magazine articles, and even on billboards, people are encouraged to vent their anger and "blow off steam." For example, in the movie Anybody Can Play, a psychiatrist (played by Billy Crystal) tells his New York gangster client (played by Robert De Niro), "You know what I do when I'm angry? I hit a pillow. Try that." The client promptly pulls out his gun, points it at the couch, and fires several bullets into the pillows. "Feel better?" asks the psychiatrist. "Yeah, I do," says the gangster. In a Vogue magazine article, female model Shalom concedes that boxing helps her release pent-up anger. She said, "I found myself looking forward to the chance to pound out the frustrations of the week against Carlos's (her trainer) mitts. Let's face it: A personal boxing trainer has advantages over a husband or lover. He won't look at you accusingly and say, "I don't know where this irritation is coming from."... Your boxing trainer knows it's in there. And he wants you to give it to him." ("Fighting Fit," 1993, p. 179)

In a New York Times Magazine article about hate crimes, Andrew Sullivan writes, "Some expression of prejudice serves a useful purpose. It lets off steam; it allows natural tensions to express themselves incrementally; it can siphon off conflict through words, rather than actions" (1999, p. 113). A large billboard in Missouri states, "Hit a Pillow, Hit a Wall, But Don't Hit Your Kids!" Catharsis Theory

The theory of catharsis is one popular and authoritative statement that venting one's anger will produce a positive improvement in one's psychological state. The word catharsis comes from the Greek word catharsis, which literally translated means a cleansing or purging. According to catharsis theory, acting aggressively or even viewing aggression is an effective way to purge and aggressive feelings.

Sigmund Freud believed that repressed negative emotions could build up inside an individual and cause psychological symptoms, such as hysteria (nervous outbursts). Breuer and Freud (1893-1895/1955) proposed that the treatment of hysteria required the discharge of the emotional state previously associated with trauma. They claimed that for interpersonal trauma, such as
results of many studies and gives a number that summarizes the magnitude, or the effect size, of a relationship. In the Anderson review (2010), the authors computed the average effect size across all the studies. This technique is valued by psychologists because it weighs each study proportionately and does not allow cherry-picking particular studies.

Before being published in a journal, both empirical articles and review articles must be peer-reviewed (see Chapter 1). Both types are considered the most prestigious forms of publication because they have been rigorously peer-reviewed.

**CHAPTERS INEDITED BOOKS**

An edited book is a collection of chapters on a common topic; each chapter is written by a different contributor. For example, Michaela Riedeger and Kathrin Klipker published a chapter entitled “Emotional Regulation in Adolescence” in an edited book, The Handbook of Emotion Regulation (2014). There are over 30 chapters, all written by different researchers. The editor, James Gross, invited all the other authors to contribute. Generally, a book chapter is not the first place a study is reported; instead, the scientist is summarizing a collection of research and explaining the theory behind it. Edited book chapters can therefore be a good place to find a summary of a set of research a particular psychologist has done. (In this sense, book chapters are similar to review articles in journals.) Chapters are not peer-reviewed as rigorously as empirical journal articles or review articles. However, the editor of the book is careful to invite only experts—researchers who are intimately familiar with the empirical evidence on a topic—to write the chapters. The audience for these chapters is usually other psychologists and psychology students (Figure 2.11).

**FULL-LENGTH BOOKS**

In some other disciplines (such as anthropology, art history, or English), full-length books are a common way for scholars to publish their work. However, psychologists do not write many full-length scientific books for an audience of psychologists. In some other disciplines (such as anthropology, art history, or English), full-length books are a common way for scholars to publish their work. However, psychologists do not write many full-length scientific books for an audience of psychologists. The editor, James Gross, invited all the other authors to contribute. Generally, a book chapter is not the first place a study is reported; instead, the scientist is summarizing a collection of research and explaining the theory behind it. Edited book chapters can therefore be a good place to find a summary of a set of research a particular psychologist has done. (In this sense, book chapters are similar to review articles in journals.) Chapters are not peer-reviewed as rigorously as empirical journal articles or review articles. However, the editor of the book is careful to invite only experts—researchers who are intimately familiar with the empirical evidence on a topic—to write the chapters. The audience for these chapters is usually other psychologists and psychology students (Figure 2.11).

**Finding Scientific Sources**

You can find trustworthy, scientific sources on psychological topics by starting with the tools in your college or university’s library. The library’s reference staff can be extremely helpful in teaching you how to find appropriate articles or chapters. Working on your own, you can use databases such as PsycINFO and Google Scholar to conduct searches.

**PsycINFO**

One comprehensive tool for sorting through the vast number of psychological research articles is a search engine and database called PsycINFO; it is maintained and updated weekly. Doing a search in PsycINFO is like using Google, but instead of searching the Internet, it searches only sources in psychology, plus a few sources from related disciplines, including communication, marketing, and education. PsycINFO’s database includes more than 2.5 million records, mostly peer-reviewed articles.

PsycINFO has many advantages. It can show you all the articles written by a single author (e.g., “Brad Bushman”) or under a single keyword (e.g., “autism”). It tells you whether each source was peer-reviewed. One of the best features of PsycINFO is that it shows other articles that have cited each target article (listed under “Cited by”) and other articles each target article has cited (listed under “References”). If you’ve found a great article for your project in PsycINFO, the “Cited by” and “references” lists can be helpful for finding more papers just like it.

The best way to learn to use PsycINFO is to simply try it yourself. Or, a reference librarian can show you the basic steps in a few minutes.

One disadvantage is that you cannot use PsycINFO unless your college or university library subscribes to it. Another challenge—true for any search—is translating your curiosity into the right keywords. Sometimes the search you run will give you too many results to sort through easily. Other times your search words won’t yield the kinds of articles you were expecting to see. Table 2.5 presents some strategies for turning your questions into successful searches.

**Tips for Turning Your Question into a Successful Database Search**

1. **Find out how psychologists talk about your question.** Use the Thesaurus tool in the PsycINFO search window to help you find the proper search term.

   **Example question:** Do eating disorders happen more frequently in families that eat dinner together?

   Instead of “eating disorders,” you may need to be more specific. The Thesaurus tool suggests “binge-eating disorder” or “binge eating.”

   Instead of “eating dinner together,” you may need to be more broad. Thesaurus terms include “family environment” and “home environment.”

2. **What motivates people to study?**

   Search terms to try: “achievement motivation,” “academic achievement motivation,” “academic self concept,” “study habits,” “homework,” “learning strategies.”

   **Example question:** Is the Mozart effect real?

   Search terms to try: “Mozart-effect,” “music,” “performance,” “cognitive processes,” “reasoning.”

3. **An asterisk can help you get all related terms:**

   Example: “adolescent*” searches for “adolescence” and “adolescents” and “adolescent.”

4. **If you get too few hits, combine terms using “or” (or gives you more):**

   Example: “anorexia” or “bulimia” or “eating disorder.”

   Example: “false memory” or “early memory.”

5. **If you get too many hits, restrict using “and” or by using “not”:**

   Example: “repressed memory” not “physical abuse.”

   Example: “repressed memory” and “physical abuse.”

6. **Did you find a suitable article? Great! Find similar others:**

   By looking through that article’s References and by clicking on Cited by to find other researchers who have used it.
CHAPTER 2

Sources of Information: Why Research Is Best and How to Find It

You should move on to the next article. Whether each article describes the kind of research you are looking for, or whether you are collecting articles for a project, the abstracts can help you quickly decide if you want to repeat the study. You could do so without having to ask the authors any questions.

It briefly describes the study’s hypotheses, method, and major results. When you first time you may not understand all the statistics used in the article (especially early in your psychology education), you might still be able to understand the basic findings by looking at the tables and figures.

When you find a good source in Google Scholar, you might be able to immediately access a PDF file of the article for free. If not, then look up whether your university library offers it. You can also request a copy of the article through your college's interlibrary loan office, or possibly by visiting the author's university home page.

Google Scholar

If you want to find empirical research but don't have access to PsycINFO, you can try the free tool Google Scholar. It works like the regular Google search engine, except the search results are only in the form of empirical journal articles and scholarly books. In addition, by visiting the User Profile for a particular scientist, you can see all of that person's publications. The User Profile list is updated automatically, so you can easily view each scientist's most recent work, as well as his or her most cited publications.

One disadvantage of Google Scholar is that it doesn’t let you limit your search to specific fields (such as the abstract). In addition, it doesn't categorize the articles it finds, for example, as peer-reviewed or not, whereas PsycINFO does. And while PsycINFO indexes only psychology articles, Google Scholar contains articles from all scholarly disciplines. It may take more time for you to sort through the articles it returns because the output of a Google Scholar search is less well organized. When you find a good source in Google Scholar, you might be able to immediately access a PDF file of the article for free. If not, then look up whether your university library offers it. You can also request a copy of the article through your college's interlibrary loan office, or possibly by visiting the author's university home page.

Reading the Research

Once you have found an empirical journal article or chapter, then what? You might wonder how to go about reading the material. At first glance, some journal articles contain an array of statistical symbols and unfamiliar terminology. Even the titles of journal articles and chapters can be intimidating. Take this one, for example: "Object Substitution Masking Interferes with Semantic Processing: Evidence from Event-Related Potentials" (Reiss & Hoffman, 2006). How is a student supposed to read this sort of thing? It helps to know what you will find in an article and to read with a purpose.

Components of an Empirical Journal Article

Most empirical journal articles (those that report the results of a study for the first time) are written in a standard format, as recommended by the Publication Manual of the American Psychological Association (APA, 2010). Most empirical journal articles include certain sections in the same order: abstract, introduction, method, results, discussion, and references. Each section contains a specific kind of information. (For more on empirical journal articles, see Presenting Results: APA-Style Reports at the end of this book.)

Abstract. The abstract is a concise summary of the article, about 120 words long. It briefly describes the study's hypotheses, method, and major results. When you are collecting articles for a project, the abstracts can help you quickly decide whether each article describes the kind of research you are looking for, or whether you should move on to the next article.

Introduction. The introduction is the first section of regular text, and the first paragraphs typically explain the topic of the study. The middle paragraphs lay out the background for the research. What theory is being tested? What have past studies found? Why is the present study important? Pay attention to the final paragraph, which states the specific research questions, goals, or hypotheses for the current study.

Method. The Method section explains in detail how the researchers conducted their study. It usually contains subsections such as Participants, Materials, Procedure, and Apparatus. An ideal Method section gives enough detail that if you wanted to repeat the study, you could do so without having to ask the authors any questions.

Results. The Results section describes the quantitative and, as relevant, qualitative results of the study, including the statistical tests the authors used to analyze the data. It usually provides tables and figures that summarize key results. Although you may not understand all the statistics used in the article (especially early in your psychology education), you might still be able to understand the basic findings by looking at the tables and figures.

Discussion. The opening paragraph of the Discussion section generally summarizes the study's research question and methods and indicates how well the results of the study supported the hypotheses. Next, the authors usually discuss the study's importance: Perhaps their hypothesis was new, or the method they used was a creative and unusual way to test a familiar hypothesis, or the participants were unlike others who had been studied before. In addition, the authors may discuss alternative explanations for their data and pose interesting questions raised by the research.

References. The References section contains a full bibliographic listing of all the sources the authors cited in writing their article, enabling interested readers to locate these studies. When you are conducting a literature search, reference lists are excellent places to look for additional articles on a given topic. Once you find one relevant article, the reference list for that article will contain a treasure trove of related work.

Reading with a Purpose: Empirical Journal Articles

Here’s some surprising advice: Don’t read every word of every article, from beginning to end. Instead, read with a purpose. In most cases, this means asking two questions as you read: (1) What is the argument? (2) What is the evidence to support the argument? The obvious first step toward answering these questions is to read the abstract, which provides an overview of the study. What should you read next?

Empirical articles are stories from the trenches of the theory-data cycle (see Figure 1.5 in Chapter 1). Therefore, an empirical article reports on data that are generated to test a hypothesis, and the hypothesis is framed as a test of a particular theory. After reading the abstract, you can skip to the end of the introduction to
find the primary goals and hypotheses of the study. After reading the goals and hypotheses, you can read the rest of the introduction to learn more about the theory that the hypotheses are testing. Another place to find information about the argument of the paper is the first paragraph of the Discussion section, where most authors summarize the key results of their study and state how well the results supported their hypotheses.

Once you have a sense of what the argument is, you can look for the evidence. In an empirical article, the evidence is contained in the Method and Results sections. What did the researchers do, and what results did they find? How well do these results support their argument (i.e., their hypotheses)?

**READING WITH A PURPOSE: CHAPTERS AND REVIEW ARTICLES**

While empirical journal articles use predetermined headings such as Method, Results, and Discussion, authors of chapters and review articles usually create headings that make sense for their particular topic. Therefore, a way to get an overview of a chapter or review article is by reading each heading.

As you read these sources, again ask: What is the argument? What is the evidence? The argument will be the purpose of the chapter or review article—the author’s stance on the issue. In a review article or chapter, the argument often presents an entire theory (whereas an empirical journal article usually tests only one part of a theory). Here are some examples of arguments you might find in chapters or review articles:

- Playing violent video games causes children to be more aggressive (Anderson et al., 2010).
- While speed reading is possible, it comes at the cost of comprehension of the text (Rayner, Schotter, Masson, Potter, & Treiman, 2016).
- “Prolonged exposure therapy” is effective for treating most people who suffer from posttraumatic stress disorder, though many therapists do not yet use this therapy with their clients (Foa, Gillihan, & Bryant, 2013).

In a chapter or review article, the evidence is the research that the author reviews. How much previous research has been done? What have the results been? How strong are the results? What do we still need to know? With practice, you will get better at reading efficiently. You’ll learn to categorize what you read as argument or evidence, and you will be able to evaluate how well the evidence supports the argument.

**Finding Research in Less Scholarly Places**

Reading about research in its original form is the best way to get a thorough, accurate, and peer-reviewed report of scientific evidence. There are other sources for reading about psychological research, too, such as nonacademic books written for the general public, websites, and popular newspapers and magazines. These can be good places to read about psychological research, as long as you choose and read your sources carefully.

**THE RETAIL BOOKSHELF**

If you browse through the psychology section in a bookstore, you will likely find what are known as trade books about psychology, written for a general audience (Figure 2.12). Unlike the scientific sources we’ve covered, these books are written for people who do not have a psychology degree. They are written to help people, to inform, to entertain, and to make money for their authors.

The language in trade books is much more readable than the language in most journal articles. Trade books can also show how psychology applies to your everyday life, and in this way they can be useful. But how well do trade books reflect current research in psychology? Are they peer-reviewed? Do they contain the best research, or do they simply present an uncritical summary of common sense, intuition, or the author’s own experience?

One place to start is flipping to the end of the book, where you should find footnotes or references documenting the research studies on which the arguments are based. For example, *The Secret Life of Pronouns*, by psychologist James Pennebaker (2011), contains 54 pages of notes—mostly citations to research discussed in the rest of the book. Gabrielle Oettingen's *Rethinking Positive Thinking* (2014) contains 17 pages of citations and notes. A book related to this chapter's theme, *Anger: The Misunderstood Emotion* (Tavris, 1989), contains 25 pages of references. These are examples of trade books based on research that are written by psychologists for a general audience.

In contrast, if you flip to the end of some other trade books, you may not find any references or notes. For example, *The Everything Guide to Narcissistic Personality Disorder*, by Cynthia Lechan and Barbara Leff (2011), suggests a handful of books, but includes no reference section. *Healing ADD: The Breakthrough Program that Allows You to See and Heal the 6 Types of ADD*, by Daniel Amen (2002), cites no research. The book *Why Mars and Venus Collide: Improving Relationships by Understanding How Men and Women Cope Differently with Stress*, by John Gray (2008), has four pages of references. Four pages is better than nothing but seems a little light, given that literally thousands of journal articles have been devoted to the scientific study of gender differences.
Vast, well-conducted bodies of literature exist on such topics as self-esteem, ADHD, gender differences, mental illnesses, and coping with stress, but some authors ignore this scientific literature and instead rely on hand-selected anecdotes from their own clinical practice. So if you find a book that claims to be about psychology but does not have any references, consider it to be light entertainment (at best) or irresponsible (at worst). By now, you know that you can do better.

WIKIS AS A RESEARCH SOURCE
Wikis can provide quick, easy-to-read facts about almost any topic. What kind of animal is a narwhal? What years were the Hunger Games movies released? How many Grammy awards has Shakira received? Wikis are democratic encyclopedias. Anyone can create a new entry, anyone can contribute to the content of a page, and anyone can log in and add details to an entry. Theoretically, wikis are self-correcting: If one user posts an incorrect fact, another user would come along and correct it.

If you're like most students, you've used wikis for research even though you've been warned not to. If you use Wikipedia for psychology research, for example, sometimes you will find a full review of a psychological phenomenon; sometimes you won't. Searching for the term catharsis provides an illustration. If you look up that term on Wikipedia, the first article that comes up is not related to psychology at all; it's about the role of catharsis in classical drama.

You probably know about other disadvantages. First, wikis are not comprehensive in their coverage: You cannot read about a topic if no one has created a page for it. Second, although wiki pages might include references, these references are not a comprehensive list; they are idiosyncratic, representing the preferences of wiki contributors. Third, the details on the pages might be incorrect, and they will stay incorrect until somebody else fixes them. Finally, vandalism is a potential problem (sometimes people intentionally insert errors into pages); however, Wikipedia has developed digital robots to detect and delete the most obvious errors—often within seconds (Nasaw, 2012).

Now that more scientists make a point of contributing to them, wikis may become more comprehensive and accurate (Association for Psychological Science, n.d.). But be careful. Wikis may be written only by a small, enthusiastic, and not necessarily expert group of contributors. Although Wikipedia may be your first hit from a Google search, you should always double-check the information found there. And be aware that many psychology professors do not accept wikis as sources in academic assignments.

THE POPULAR MEDIA
Overall, popular media coverage is good for psychology. Journalists play an important role in telling the public about exciting findings in psychological science. Psychological research is covered in online magazines (such as Slate and Vox), in news outlets, and in podcasts and blogs. Some outlets, such as Psychology Today

FIGURE 2.13
Examples of sources for reading about psychological science, directed at a popular audience.
A variety of sources cover psychological science in a reader-friendly format, and the Hidden Brain podcast, are devoted exclusively to covering social science research for a popular audience (Figure 2.13).

Chapter 1 explained that journalists who specialize in science writing are trained to faithfully represent journal articles for a popular audience, but journalists who are not trained in science writing might not correctly summarize a journal article. They may oversimplify things and even make claims that the study did not support. When you read popular media stories, plan to use your skills as
CHECK YOUR UNDERSTANDING

1. How are empirical journal articles different from review journal articles? How is each type of article different from a chapter in an edited book?
2. What two guiding questions can help you read any academic research source?
3. Describe the advantages and disadvantages of using PsycINFO and Google Scholar.
4. If you encounter a psychological trade book, what might indicate that the information it contains is research-based?

Summary

People's beliefs can be based on their own experience, their intuition, on authorities, or on controlled research. Of these, research information is the most accurate source of knowledge.

The Research vs. Your Experience

- Beliefs based on personal experience may not be accurate. One reason is that personal experience usually does not involve a comparison group. In contrast, research explicitly asks: Compared to what?
- In addition, personal experience is often confounded. In daily life, many things are going on at once, and it is impossible to know which factor is responsible for a particular outcome. In contrast, researchers can closely control for confounding factors.
- Research has an advantage over experience because researchers design studies that include appropriate comparison groups.
- Conclusions based on research are probabilistic. Research findings are not able to predict or explain all cases all the time; instead, they aim to predict or explain a high proportion of cases. Individual exceptions to research findings will not nullify the results.

The Research vs. Your Intuition

- Intuition is a flawed source of information because it is affected by biases in thinking. People are likely to accept the explanation of a story that makes sense intuitively, even if it is not true.
- People can overestimate how often something happens if they consider only readily available thoughts, those that come to mind most easily.
- People find it easier to notice what is present than what is absent. When people forget to look at the information that would falsify their belief, they may see relationships that aren't there.
- Intuition is also subject to confirmation bias. We tend to focus on the data that support our ideas and criticize or discount data that disagree. We ask leading questions whose answers are bound to confirm our initial ideas.
- We all seem to have a bias blind spot and believe we are less biased than everyone else.
- Scientific researchers are aware of their potential for biased reasoning, so they create special situations in which they can systematically observe behavior. They create comparison groups, consider all the data, and allow the data to change their beliefs.

Trusting Authorities on the Subject

- Authorities may attempt to convince us to accept their claims. If their claims are based on their own experience or intuition, we should probably not accept them. If they use well-conducted studies to support their claims, we can be more confident about taking their advice.

Finding and Reading the Research

- Tools for finding research in psychology include the online database PsycINFO, available through academic libraries. You can also use Google Scholar or the websites of researchers.
- Journal articles, chapters in edited books, and full-length books should be read with a purpose by asking: What is the theoretical argument? What is the evidence—what do the data say?
Key Terms

- comparison group, p. 26
- confound, p. 29
- confederate, p. 29
- probabilistic, p. 31
- availability heuristic, p. 33
- present/present bias, p. 35
- confirmation bias, p. 36
- bias blind spot, p. 37
- empirical journal article, p. 42
- review journal article, p. 42
- meta-analysis, p. 42
- effect size, p. 44

Review Questions

1. Destiny concluded that her new white noise machine helped her fall asleep last night. She based this conclusion on personal experience, which might have confounds. In this context, a confound means:
   a. Another thing might have also occurred last night to help Destiny fall asleep.
   b. Destiny’s experience has left her puzzled.
   c. It is never a good idea to base conclusions on the advice of authorities.
   d. If there are exceptions to a research result, it means the theory is probably incorrect.

2. What does it mean to say that research is probabilistic?
   a. Researchers refer to the probability that their theories are correct.
   b. Research predicts all possible results.
   c. Research conclusions are meant to explain a certain proportion of possible cases, but may not explain all.
   d. If there are exceptions to a research result, it means the theory is probably incorrect.

3. After two students from his school commit suicide, Marcelino concludes that the most likely cause of death in teenagers is suicide. In fact, suicide is not the most likely cause of death in teens. What happened?
   a. Marcelino was probably a victim of the bias blind spot.
   b. Marcelino was probably influenced by the availability heuristic; he was too influenced by cases that came easily to mind.

4. Choose one of the search terms you worked on in Question 3. Try doing the same search using three platforms: a general search engine, then Google Scholar, then PsycINFO. Based on research, or do you see more commercial websites or blogs? How might you refine your search to get more research-based hits?

Learning Actively

1. Each of the examples below is a statement, based on experience, that does not take a comparison group into account.

   a. A bath at bedtime helps my baby sleep better.
   b. My meditation practice has made me feel more peaceful.
   c. The GRE course I took really improved my scores!

   For each statement: (a) Ask: Compared to what? Write a comparison group question that would help you evaluate the conclusion. (b) Get all the data. Draw a 2x2 matrix for systematically comparing outcomes. (c) Address confounds. Assuming there is a relationship, write down possible confounds for the proposed relationship.

   Example: "Since I cut sugar from their diets, I’ve noticed the campers in my cabin are much more cooperative.

   (a) Compared to what? Would the campers have improved anyway, without the change in diet?
   (b) A systematic comparison should be set up as follows:

   **REduce Sugar in Diet (Treatment)**
   **No Change in Diet (No Treatment)**

   ![Table showing sugar reduction and cooperation](image)

   (c) Possible confounds: What other factor might have changed at the same time as the low-sugar diet and also caused more cooperativeness? Possible confounds include that the campers may simply have gotten used to camp and settled down. Maybe the new swimming program started at the same time and tired the campers out.

2. Using what you have learned in this chapter, write a sentence or two explaining why the reasoning reflected in each of the following statements is sound or unsound.

   a. (a) What is the argument? What is the evidence to support the argument?
   b. Why was this research done? Were there any significant findings?
   c. How reputable is (are) the author(s)? Did the findings include support for the hypotheses?
   d. How does this research relate to other research? What are ways to extend this research further?

   b. A friend tells you, “I read something cool in the paper this morning. They said violent video games don’t cause aggression when they are played cooperatively as team games. They were talking about some research somebody did.”

   c. “I read online that doing these special puzzles every day helps grow your brain. It’s been proven by neuropsychology.”

   d. Destiny considered that her new white noise machine helped her fall asleep last night. She based this conclusion on personal experience, which might have confounds.

   e. “Binge drinking is totally normal on my campus. Everybody does it almost every weekend.”

   f. “I’m afraid of flying—planes are so dangerous!”

   g. “Decluttering your closets makes a huge difference in your happiness. I did it last week, and I feel so much happier when I am in my room.”

   h. “Wow—look at how many happy couples got married after meeting on Match.com! I think I’m going to try it, too.”

   3. Finding sources on PsycINFO means figuring out the right search terms. Use the PsycINFO Thesaurus tool to find keywords that will help you do searches on these research questions. Table 2.5 has some suggestions for turning research questions into helpful searches.

   a. Are adults with autism more violent than typical adults?
   b. Does having PTSD put you at risk for alcoholism?
   c. Can eating more protein make you smarter?
   d. How do we measure narcissism?
   e. What kinds of managers do employees like the best?

4. Choose one of the search terms you worked on in Question 3. Try doing the same search using three platforms: a general search engine, then Google Scholar, then PsycINFO. Based on research, or do you see more commercial websites or blogs? How might you refine your search to get more research-based hits?

b. Which of the three search platforms is easiest to use when you want a general overview of a topic? Which platforms will give you the most up-to-date research? Which of the three makes it easiest to know if information has been peer-reviewed?