1: Thinking Critically With Psychological Science

- **The Need for Psychological Science**
  - The Limits of Intuition and Common Sense
  - The Scientific Attitude
  - The Scientific Method
- **Description**
  - The Case Study
  - The Survey
  - Naturalistic Observation
- **Correlation**
  - Correlation and Causation
  - Illusory Correlations
  - Perceiving Order in Random Events
- **Experimentation**
  - Exploring Cause and Effect
  - Evaluating Therapies
  - Independent and Dependent Variables
- **Statistical Reasoning**
  - Describing Data
  - Making Inferences
- **Frequently Asked Questions About Psychology**
  - *Thinking Critically About: Desegregation and the Death Penalty*

What good fortune for those in power that people do not think.

Adolf Hitler, 1889–1945

Hoping to satisfy their curiosity about people and to remedy their own woes, millions turn to "psychology." They listen to talk-radio counseling, read articles on psychic powers, attend stop-smoking hypnosis seminars, and absorb self-help books on the meaning of dreams, the path to ecstatic love, and the roots of personal happiness.

Others, intrigued by claims of psychological truth, wonder: Do mothers and infants bond in the first hours after birth? Should we trust childhood sexual abuse memories that get "recovered" in adulthood—and prosecute the alleged predators? Are first-born children more driven to achieve? Does handwriting offer clues to personality? Does psychotherapy heal?

In working with such questions, how can we separate uninformed opinions from examined conclusions? *How can we best use psychology to understand why people think, feel, and act as they do?*

The Need for Psychological Science

As we familiarize ourselves with psychological science's strategies and incorporate its underlying principles into our daily thinking, our thinking becomes smarter. Two phenomena—hindsight bias and judgmental overconfidence—illustrate why we cannot rely solely on intuition and common sense. The critical inquiry that flows from a scientific approach—undergirded by curiosity, skepticism, and humility—helps winnow sense from nonsense.

The Limits of Intuition and Common Sense

Some people think psychology merely documents what people already know and dresses it in jargon: "So what else is new—you get paid for using fancy methods to prove what my grandmother knew?" Others scorn a scientific approach because of their faith in human intuition. Advocates of "intuitive management" urge us to distrust statistical predictors and tune into our hunches when hiring, firing, and investing. Like *Star Wars'* Luke Skywalker, should we trust the force within?

The limits of intuition
Personnel interviewers tend to be overconfident of their gut feelings about job applicants. Their confidence stems partly from their recalling cases where their favorable impression proved right, and partly from their ignorance about rejected applicants who succeeded elsewhere.

Taxi/Getty Images

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

Actually, notes writer Madeleine L'Engle, "The naked intellect is an extraordinarily inaccurate instrument" (1972). Our intuition can lead us astray.

1. Imagine (or ask someone to imagine) folding a sheet of paper on itself 100 times. Roughly how thick would it then be?
2. A rope is placed around the Earth at the equator. How much more rope would have to be added for the rope to be 1 foot above the Earth all the way around? (See page 22 for the answers.)

Our notions of common sense similarly err. We're all wise after the fact, presuming that we could have foreseen what happened.

Did We Know It All Along? Hindsight Bias

OBJECTIVE 1 | Describe *hindsight bias,* and explain how it can make research findings seem like mere common sense.

"Life is lived forwards, but understood backwards."

Philosopher Søren Kierkegaard, 1813–1855

How easy it is to seem astute when drawing the bull's eye after the arrow has struck. *After* each stock market downswing—after the bursting of the dot-com bubble, for example—investment gurus say "the market was obviously overdue for a correction." After the first World Trade Center tower in New York was hit on September 11, 2001 (9/11), commentators said people in the second tower *should* have immediately evacuated (it became obvious only later that it was not an accident). And after physicians receive case information *plus* an autopsy report, they find the cause of death to be self-evident—something they presume they easily could have foreseen, knowing the symptoms. But *before* the arrow strikes, the stock market drops, the terrorists attack, and death occurs, these results are anything but obvious. Causes of death, for example, are not so clear to doctors told the same symptoms without the autopsy report (Dawson & others, 1988). Finding that something has happened makes it seem inevitable. Psychologists Paul Slovic and Baruch Fischhoff (1977) have called this 20/20 hindsight vision **hindsight bias,** also known as the *I-knew-it-all-along phenomenon*.

"History is written through a rearview mirror, but it unfolds through a foggy windshield."

Samuel Berger, President Clinton's national security adviser, in testimony before the 9/11 Commission, 2004

This phenomenon is easy to demonstrate: Give half the members of a group some purported psychological finding, and the other half an opposite result. Tell the first group, "Psychologists have found that separation weakens romantic attraction. As the saying goes, 'Out of sight, out of mind.'" Ask them to imagine why this might be true. Most people can, and nearly all will then regard this true finding as unsurprising.

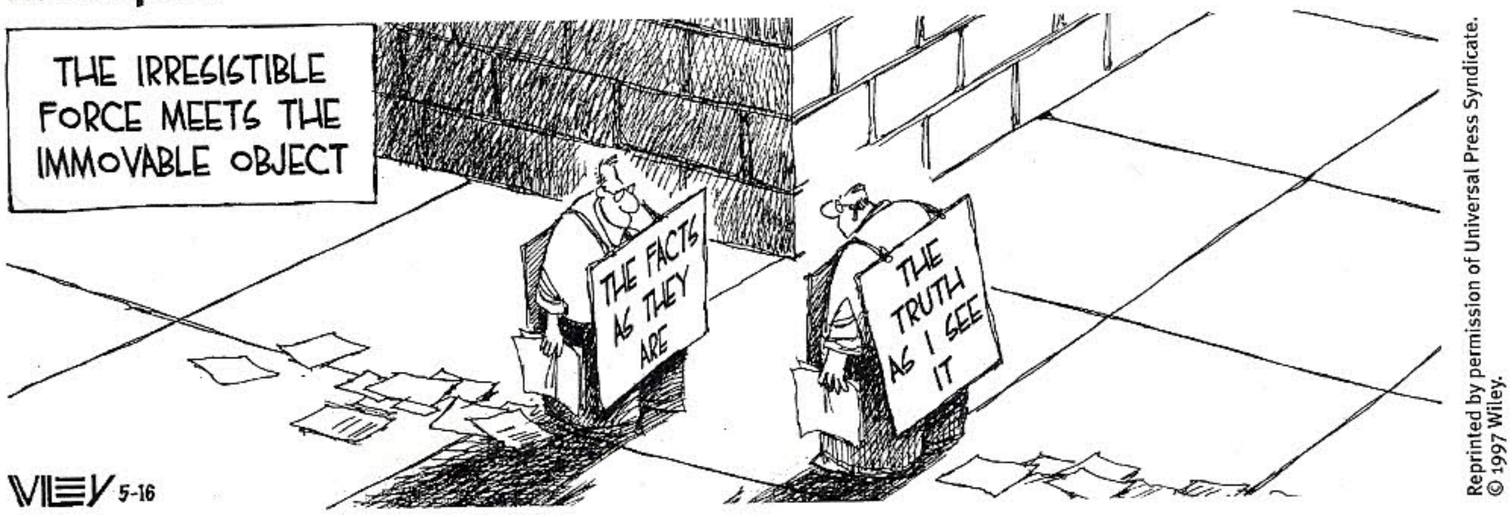
Tell the second group just the opposite—that "psychologists have found that separation strengthens romantic attraction. As the saying goes, 'Absence makes the heart grow fonder.'" People given this untrue result can also easily explain it, and they overwhelmingly see it as unsurprising common sense. Obviously, when both a supposed finding and its opposite seem like common sense, there is a problem.

"Anything seems commonplace, once explained."

Dr. Watson to Sherlock Holmes

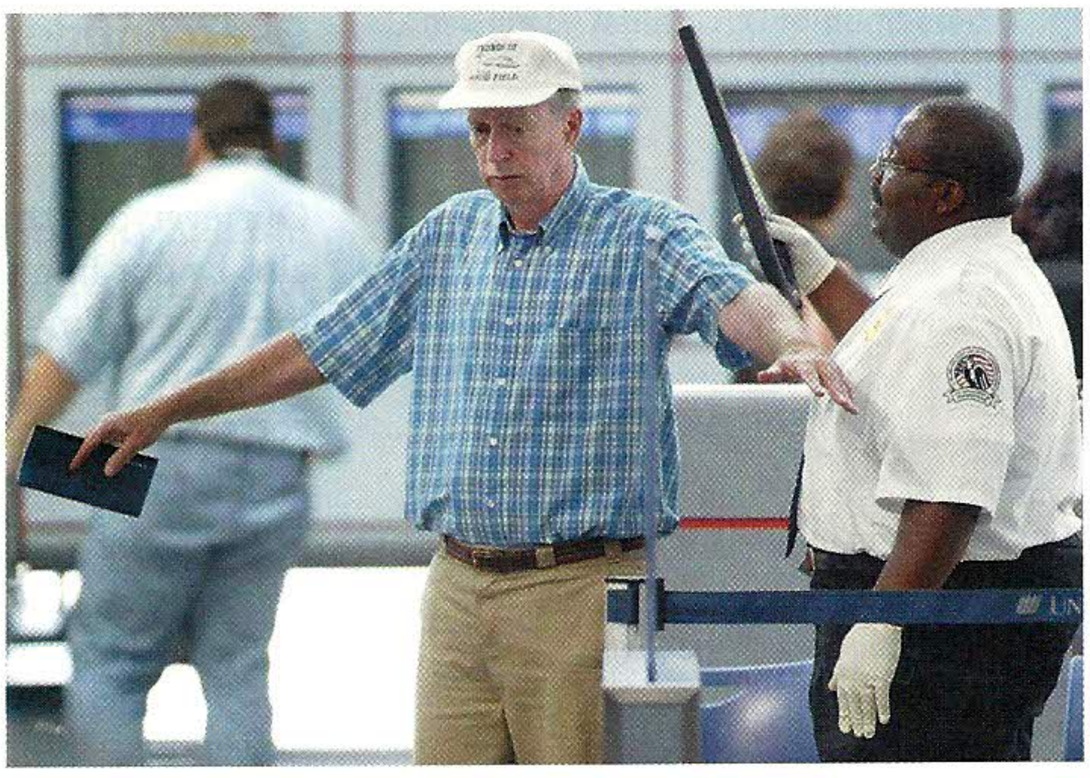
Such errors in our recollections and explanations show why we need psychological research. Just asking people how and why they felt or acted as they did can sometimes be misleading—*not* because common sense is usually wrong, but because it is after the fact.

Non Sequitur



Common sense describes what has happened more easily than it predicts what will happen. As physicist Neils Bohr reportedly said, "Prediction is very difficult, especially about the future."

The phenomenon is widespread. Some 100 studies have observed hindsight bias in various countries and among both children and adults (Bernstein & others, 2004; Guilbault & others, 2004). Nevertheless, Grandmother is often right. As Yogi Berra once said, "You can observe a lot by watching." (We have Berra to thank for other gems, such as "Nobody ever comes here—it's too crowded," and "If the people don't want to come out to the ballpark, nobody's gonna stop 'em.") Because we're all behavior watchers, it would be surprising if many of psychology's findings had *not* been foreseen. Many people believe that love breeds happiness, and they are right (we have what Chapter 12 calls a deep "need to belong"). Indeed, note Daniel Gilbert, Brett Pelham, and Douglas Krull (2003), "Good ideas in psychology usually have an oddly familiar quality, and the moment we encounter them we feel certain that we once came close to thinking the same thing ourselves and simply failed to write it down."



Tim Boyle/Getty Images

Hindsight bias *After* the horror of 9/11, it seemed obvious that the U.S. intelligence analysts should have taken advance warnings more seriously, that airport security should have anticipated box-cutter–wielding terrorists, that occupants of the second World Trade Center tower should have known to play it safe and leave. With 20/20 hindsight, everything seems obvious. Thus we now spend billions to protect ourselves against what the terrorists did last time.

But sometimes Grandmother's intuition has it wrong. Informed by countless casual observations, our intuition may tell us that familiarity breeds contempt, that dreams predict the future, and that emotional reactions coincide with menstrual phase. As we will see in later chapters, the available evidence suggests that these common-sense ideas are wrong, wrong, and wrong. Do you know which of the popular ideas in **TABLE 1.1** have been confirmed by psychology's research, and which have been refuted? Throughout this book we will see how research has both inspired and overturned popular ideas—about aging, about sleep and dreams, about personality. And we will also see how it has surprised us with discoveries about how the brain's chemical messengers control our moods and memories, about animal abilities, and about the effects of stress on our capacity to fight disease.

TABLE 1.1

TRUE OR FALSE?

Psychological research discussed in chapters to come will either confirm or refute each of these statements (adapted, in part, from Furnham & others, 2003).

1. If you want to teach a habit that persists, reward the desired behavior every time, not just intermittently (see pages 330–332).
2. Patients whose brains are surgically split down the middle survive and function much as they did before the surgery (see pages 83–85).
3. Traumatic experiences, such as sexual abuse or surviving the Holocaust, are typically "repressed" from memory (see pages 381, 387–390, 604–605).
4. Most abused children do *not* become abusive adults (see pages 158–159).
5. Most infants recognize their own reflection in a mirror by the end of their first year (see page 161).
6. Adopted siblings tend not to develop similar personalities, even though reared by the same parents (see pages 100–101).
7. Fears of harmless objects, such as flowers, are just as easy to acquire as fears of potentially dangerous objects, such as snakes (see pages 534–535).
8. Lie detection tests often lie (see pages 520–521).

(For answers, see page 23.)

Overconfidence

OBJECTIVE 2 | Describe how overconfidence contaminates our everyday judgments.

Our everyday thinking is limited not only by our after-the-fact common sense but also by our human tendency to be overly confident. As Chapter 10 explains, we tend to think we know more than we do. Asked how sure we are of our answers to factual questions (Is Boston north or south of Paris?), we tend to be more confident than correct.[1] Or consider these three anagrams, which Richard Goranson (1978) asked people to unscramble:

WREAT → WATER
ETRYN → ENTRY
GRABE → BARGE

Reflect for a moment: About how many seconds do you think it would have taken you to unscramble each of these?

Once people know the target word, hindsight makes it seem obvious—so much so that they become overconfident. They think they would have seen the solution in only 10 seconds or so, when in reality the average problem solver spends 3 minutes, as you also might, given a similar anagram without the solution: OCHSA (see page 24 to check your answer).

Are we any better at predicting our social behavior? To find out, Robert Vallone and his associates (1990) had students predict at the beginning of the school year whether they would drop a course, vote in an upcoming election, call their parents more than twice a month, and so forth. On average, the students felt 84 percent confident in making these self-predictions. Later quizzes about their actual behavior showed their predictions were correct only 71 percent of the time. Even when they were 100 percent sure of themselves, their self-predictions erred 15 percent of the time.

It's not just collegians. For a dozen years, Ohio State University psychologist Philip Tetlock (1998) collected experts' predictions of political, economic, and military situations. In the late 1980s, for example, he invited expert professors, think-tank analysts, government experts, and journalists to project the governance of the Soviet Union or of South Africa five years later, and to rate how confident they felt. Others did the same for the future of Canada in 1992. After the five years had elapsed (and Communism had collapsed in the Soviet Union, South Africa had become a multiracial democracy, and the Canadian constitution continued), Tetlock invited the experts to recall and reflect on their predictions—which, as in laboratory studies, were far more confident than correct. Experts who had felt more than 80 percent confident were right less than 40 percent of the time.

Despite their lackluster predictions, those who erred were nearly as likely as those who got it right to convince themselves that their initial analysis was *still basically right*. I was "almost right," many of them felt. "The hardliners almost succeeded in their coup attempt against Gorbachev." "The Quebecois separatists almost won the secessionist referendum." "But for the coincidence of de Klerk and Mandela, the transition to black majority rule in South Africa would have been a lot bloodier." The overconfidence of political experts (and stock market forecasters and sports prognosticators) is therefore hard to dislodge, no matter what the outcome.

The point to remember: Hindsight bias and overconfidence often lead us to overestimate our intuition. But scientific inquiry, fed by curious skepticism and by humility, can help us sift reality from illusions.

[1]Boston is south of Paris.

Fun anagram solutions from Wordsmith.org:
Elvis = lives
Dormitory = dirty room
Slot machines = cash lost in 'em

"We don't like their sound. Groups of guitars are on their way out."
Decca Records, in turning down a recording contract with the Beatles in 1962

"Computers in the future may weigh no more than 1.5 tons."
Popular Mechanics, 1949

"The telephone may be appropriate for our American cousins, but not here, because we have an adequate supply of messenger boys."
British expert group evaluating the invention of the telephone

"They couldn't hit an elephant at this dist—."
General John Sedgwick's last words, uttered during a U.S. Civil War battle, 1864

Answers to questions on page 20:
1. Given a 0.1-millimeter-thick sheet, the thickness after 100 folds would be 800 trillion times the distance between the Earth and the Sun (Gilovich, 1991).
2. About 6 more feet of rope. The circumference of a circle, or of the Earth, is $2\pi r$. The circumference of a rope elevated one foot is $2\pi(r + 1)$. Thus the added length is $2\pi(r + 1) - 2\pi r = 2\pi$, or about 6 feet.

The Scientific Attitude

OBJECTIVE 3 | Explain how the scientific attitude encourages critical thinking.

Underlying all science is, first, a hard-headed *curiosity,* a passion to explore and understand without misleading or being misled. Some questions (Is there life after death?) are beyond science. To answer them in any way requires a leap of faith. With many other ideas (Can some people demonstrate ESP?), the proof is in the pudding. No matter how sensible or crazy-sounding an idea, the hard-headed question is, Does it work? When put to the test, can its predictions be confirmed?

This scientific approach has a long history. As ancient a figure as Moses used such an approach. How do you evaluate a self-proclaimed prophet? His answer: Put the prophet to the test. If the predicted event "does not take place or prove true," then so much the worse for the prophet (*Deuteronomy* 18:22). Magician James Randi uses Moses' approach when testing those claiming to see auras around people's bodies:

Randi: Do you see an aura around my head?
Aura-seer: Yes, indeed.
Randi: Can you still see the aura if I put this magazine in front of my face?
Aura-seer: Of course.
Randi: Then if I were to step behind a wall barely taller than I am, you could determine my location from the aura visible above my head, right?

Randi has told me that no aura-seer has agreed to take this simple test.

When subjected to such scrutiny, crazy-sounding ideas sometimes find support. During the 1700s, scientists scoffed at the notion that meteorites had extraterrestrial origins. When two Yale scientists dared to deviate from the conventional opinion, Thomas Jefferson jeered, "Gentlemen, I would rather believe that those two Yankee Professors would lie than to believe that stones fell from heaven." Sometimes scientific inquiry refutes skeptics.

More often, science relegates crazy-sounding ideas to the mountain of forgotten claims of perpetual motion machines, miracle cancer cures, and out-of-body travels into centuries past. To sift reality from fantasy, sense from nonsense, therefore requires a scientific attitude: being skeptical but not cynical, open but not gullible.

As scientists, psychologists approach the world of behavior with a *curious skepticism.* They persistently ask two questions: What do you mean? How do you know? In business, the motto is "Show me the money." In science, it is "Show me the evidence."

Do parental behaviors determine their children's sexual orientation? Can astrologers analyze your character and predict your future based on the position of the planets at your birth? As you will see in the chapters that follow, putting such claims to the test has led most psychologists to doubt them. In the arena of competing ideas, skeptical testing can reveal which ones best match the facts. "To believe with certainty," says a Polish proverb, "we must begin by doubting."

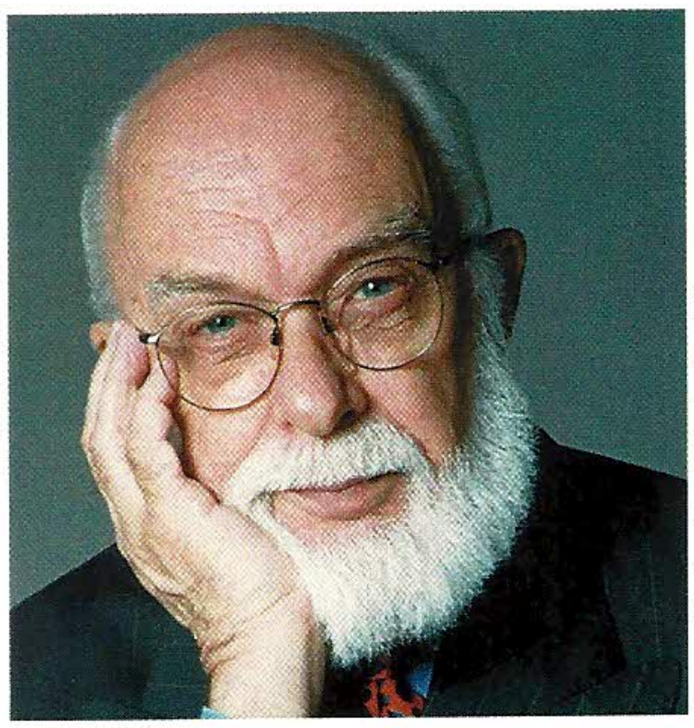
Putting a scientific attitude into practice requires not only skepticism but also *humility,* because we may have to reject our own ideas. In the last analysis, what matters is not my opinion or yours, but the truths nature reveals in response to our questioning. If people don't behave as our ideas predict, then so much the worse for our ideas. This is the humble attitude expressed in one of psychology's early mottos: "The rat is always right."

Historians of science tell us that these attitudes of curiosity, skepticism, and humility helped make modern science possible. Many of its founders, including Copernicus and Newton, were people whose religious convictions made them humble before nature and skeptical of mere human authority (Hooykaas, 1972; Merton, 1938). Today's deeply religious people sometimes view science, especially psychological science, as a threat. Yet, notes sociologist Rodney Stark (2003a,b), the scientific revolution was led

Answers to Table 1.1: Odd-numbered statements are false; even-numbered are true.

"The scientist . . . must be free to ask any question, to doubt any assertion, to seek for any evidence, to correct any errors."

Physicist J. Robert Oppenheimer, *Life,* October 10, 1949



Courtesy of the James Randi Education Foundation

The amazing Randi The magician James Randi exemplifies skepticism. He has tested and debunked a variety of psychic phenomena.

"A skeptic is one who is willing to question any truth claim, asking for clarity in definition, consistency in logic, and adequacy of evidence."

Philosopher Paul Kurtz, *The Skeptical Inquirer,* 1994

"My deeply held belief is that if a god anything like the traditional sort exists, our curiosity and intelligence are provided by such a god. We would be unappreciative of those gifts . . . if we suppressed our passion to explore the universe and ourselves."

Carl Sagan, *Broca's B*

critical thinking thinking that does not blindly accept arguments and conclusions. Rather, it examines assumptions, discerns hidden values, evaluates evidence, and assesses conclusions.

mostly by deeply religious people acting on the religious idea that "in order to love and honor God, it is necessary to fully appreciate the wonders of his handiwork."

Of course, scientists, like anyone else, can have big egos and may cling to their preconceptions. We all view nature through the spectacles of our preconceived ideas. Nevertheless, the ideal that unifies psychologists with all scientists is the curious, skeptical, humble scrutiny of competing ideas. As a community, scientists check and recheck one another's findings and conclusions.

This scientific attitude prepares us to think smarter. Smart thinking, called **critical thinking,** examines assumptions, discerns hidden values, evaluates evidence, and assesses conclusions. Whether reading a news report or listening to a conversation, critical thinkers ask questions. Like scientists, they wonder, How do they know that? What is this person's agenda? Is the conclusion based on anecdote and gut feelings, or on evidence? Does the evidence justify a cause-effect conclusion? What alternative explanations are possible? Carried to an extreme, healthy skepticism can degenerate into a negative cynicism that scorns any unproven idea. Better to have a critical attitude that produces humility—an awareness of our own vulnerability to error and an openness to surprises and new perspectives.

> "The real purpose of the scientific method is to make sure Nature hasn't misled you into thinking you know something you don't actually know."
>
> Robert M. Pirsig, *Zen and the Art of Motorcycle Maintenance,* 1974

Has psychology's critical inquiry been open to surprising findings? The answer, as ensuing chapters illustrate, is plainly yes. Believe it or not . . .

- massive losses of brain tissue early in life may have minimal long-term effects (see page 83).
- within days, newborns can recognize their mother's odor and voice (see page 143).
- brain damage can leave a person able to learn new skills, yet be unaware of such learning (see pages 367–368).
- diverse groups—men and women, old and young, rich and working class, those with disabilities and without—report roughly comparable levels of personal happiness (see pages 537–544).
- electroconvulsive therapy (delivering an electric shock to the brain) is often a very effective treatment for severe depression (see pages 715–716).

And has critical inquiry convincingly debunked popular presumptions? The answer, as ensuing chapters also illustrate, is again yes. The evidence indicates that . . .

- sleepwalkers are *not* acting out their dreams and sleeptalkers are *not* verbalizing their dreams (see Chapter 7).
- our past experiences are *not* all recorded verbatim in our brains; with brain stimulation or hypnosis, one *cannot* simply "play the tape" and relive long-buried or repressed memories (see pages 364–369).
- most people do *not* suffer from unrealistically low self-esteem, and high self-esteem is not all good (see pages 633–636).
- opposites do *not* generally attract (see pages 758–759).

In each of these instances and more, what has been learned is not yet what is widely believed.

The Scientific Method

OBJECTIVE 4 | Describe how psychological theories guide scientific research.

Psychologists arm their scientific attitude with the *scientific method:* They make observations, form theories, and then refine their theories in the light of new observations. In everyday conversation, we tend to use *theory* to mean "mere hunch." In science, however, *theory* is linked with observation. A scientific **theory** *explains* through an integrated set of principles that *organizes* and *predicts* behaviors or events. By organizing isolated facts, a theory simplifies things. There are too many facts about behavior to remember

Solution to anagram on page 22: CHAOS.

them all. By linking facts and bridging them to deeper principles, a theory offers a useful summary. When we connect the observed dots, we may discover a coherent picture.

A good theory of depression, for example, helps us organize countless observations concerning depression into a short list of principles. Imagine we observe over and over that people with depression describe their past, present, and future in gloomy terms. We might therefore theorize that low self-esteem contributes to depression. So far so good: Our self-esteem principle neatly summarizes a long list of facts about people with depression.

Yet no matter how reasonable a theory may sound—and low self-esteem seems a reasonable explanation of depression—we must put it to the test. A good theory doesn't just sound appealing. It must produce testable predictions, called **hypotheses.** By enabling us to test and reject or revise the theory, such predictions give direction to research. They specify what results would support the theory and what results would disconfirm it. To test our self-esteem theory of depression, we might assess people's self-esteem by having them indicate their agreement to statements such as "I have good ideas" and "I am fun to be with." Then we could see whether, as we hypothesized, people who report poorer self-images also score higher on a depression scale (**FIGURE 1.1**).

In testing our theory, we should be aware that it can bias subjective observations. Having theorized that depression springs from low self-esteem, we may see what we expect. We may perceive depressed people's neutral comments as self-disparaging. The urge to see what we expect is an ever-present temptation for all of us. For example, according to the bipartisan U.S. Senate Select Committee on Intelligence (2004), preconceived expectations that Iraq had weapons of mass destruction led intelligence analysts to wrongly interpret ambiguous observations as confirming that theory, and this theory-driven conclusion then led to the preemptive U.S. invasion of Iraq.

As a check on their biases, psychologists report their research—with precise **operational definitions** of concepts that allow anyone to **replicate** (repeat) their observations. If other researchers re-create a study with different participants and materials and get similar results, then our confidence in the finding's reliability grows. The first study of hindsight bias aroused psychologists' curiosity. Now, after many successful replications with differing people and questions, we feel sure of the phenomenon's power.

theory an explanation using an integrated set of principles that organizes observations and predicts behaviors or events.

hypothesis a testable prediction, often implied by a theory.

operational definition a statement of the procedures (operations) used to define research variables. For example, *human intelligence* may be operationally defined as what an intelligence test measures.

replication repeating the essence of a research study, usually with different participants in different situations, to see whether the basic finding extends to other participants and circumstances.

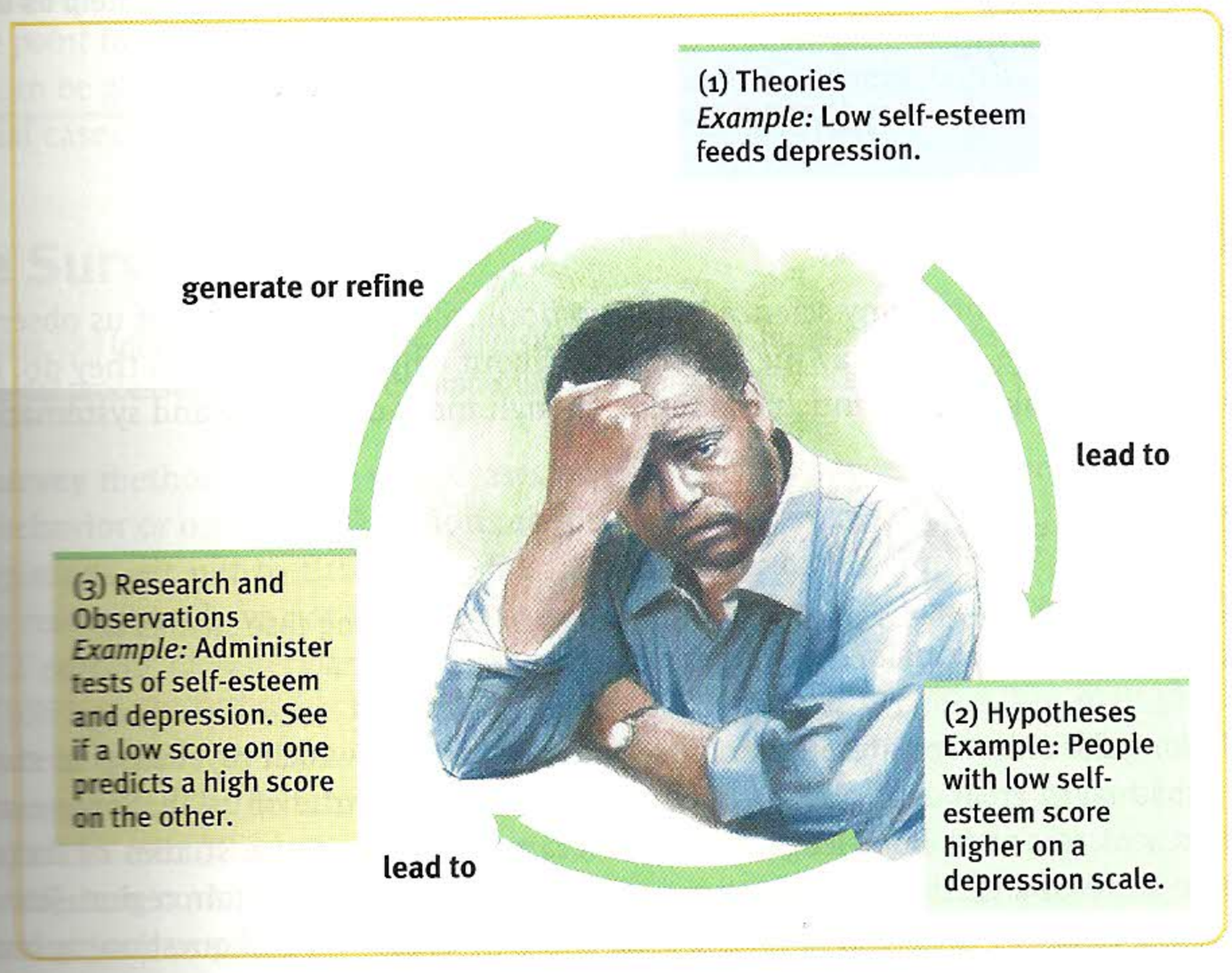


FIGURE 1.1
The scientific method A self-correcting process for asking questions and observi
nature's answer.

Good theories explain by
1. **organizing and linking observed facts.**
2. **implying hypotheses that offer testable predictions and, sometimes, practical applications.**

In the end, our theory will be useful if it (1) effectively *organizes* a range of self-reports and observations and (2) implies clear *predictions* that anyone can use to check the theory or to derive practical applications. (If we boost people's self-esteem, will their depression lift?) Eventually, our research will probably lead to a revised theory (such as the one on pages 665–668) that better organizes and predicts what we know about depression.

As we will see next, we can test our hypotheses and refine our theories using descriptive, correlational, and experimental methods. To think critically about popular psychology claims, we need to recognize these methods and know what conclusions they allow.

>> LEARNING OUTCOMES

The Need for Psychological Science

OBJECTIVE 1 | Describe *hindsight bias*, and explain how it can make research findings seem like mere common sense.

Hindsight bias (also called the *I-knew-it-all-along phenomenon*) is the tendency to believe, after learning an outcome, that we would have foreseen it. Thus, learning the outcome of a study can make it seem like obvious common sense. Scientific inquiry and critical thinking can help us overcome this tendency to overestimate our unaided intuition.

OBJECTIVE 2 | Describe how overconfidence contaminates our everyday judgments.

We are routinely *overconfident* of our judgments, thanks partly to our bias to seek information that confirms them. Science, with its procedures for gathering and sifting evidence, restrains error by taking us beyond the limits of our intuition and common sense.

OBJECTIVE 3 | Explain how the scientific attitude encourages critical thinking.

Although limited by the testable questions it can address, a scientific approach helps us sift reality from illusion. Scientific inquiry begins with an attitude—a curious eagerness to *skeptically* scrutinize competing ideas and an open-minded *humility* before nature. This attitude carries into everyday life as *critical thinking*, which examines assumptions, discerns hidden values, evaluates evidence, and assesses outcomes. Putting ideas, even crazy-sounding ideas, to the test helps us winnow sense from nonsense.

OBJECTIVE 4 | Describe how psychological theories guide scientific research.

Psychological *theories* organize *observations* and imply predictive *hypotheses*. After constructing precise operational definitions of their procedures, researchers test their hypotheses (predictions), validate and refine the theory, and, sometimes, suggest practical applications. If other researchers can replicate the study with similar results, we can then place greater confidence in the conclusion.

ASK YOURSELF: How might the scientific method help us understand the roots of terrorism?

Description

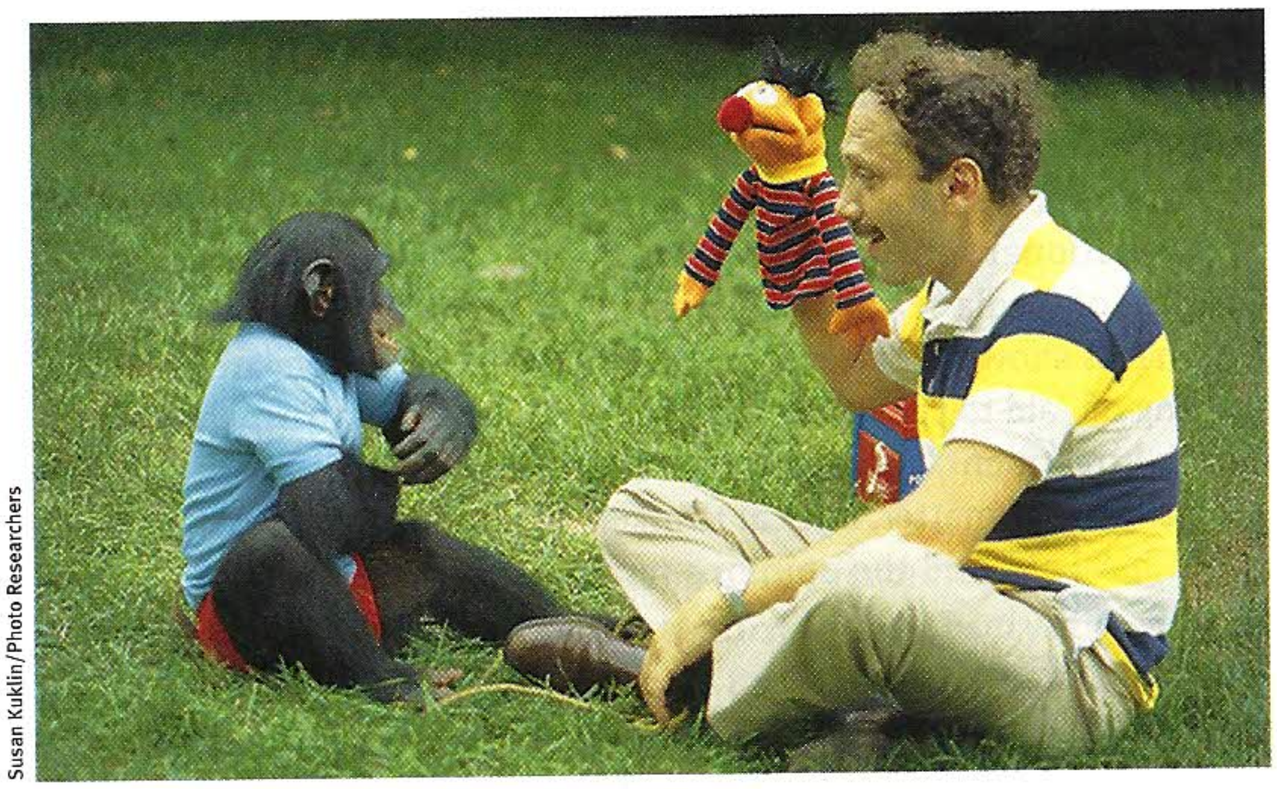
The starting point of any science is description. In everyday life, all of us observe and describe people, often drawing conclusions about why they behave as they do. Professional psychologists do much the same, though more objectively and systematically.

The Case Study

OBJECTIVE 5 | Identify an advantage and a disadvantage of using case studies to study behavior.

case study an observation technique in which one person is studied in depth in the hope of revealing universal principles.

Among the oldest research methods is the **case study,** in which psychologists study one individual in great depth in the hope of revealing things true of us all. Some examples: Much of our early knowledge about the brain came from case studies of individuals who suffered a particular impairment after damage to a certain brain region. Jean Piaget taught us about children's thinking after carefully observing and questioning but a few



Susan Kuklin/Photo Researchers

The case of the conversational chimpanzee In intensive case studies of chimpanzees, psychologists have explored the intriguing question of whether language is uniquely human. Here Nim Chimpsky signs *hug* as his trainer, psychologist Herbert Terrace, shows him the puppet Ernie. But is Nim really capable of using language? We'll explore that issue in Chapter 10.

children. Studies of only a few chimpanzees have revealed their capacity for understanding and language. Intensive case studies are sometimes very revealing.

Case studies can suggest hypotheses for further study. They also show us what *can* happen. In everyday life, however, individual cases sometimes mislead us: An individual may be atypical. Unrepresentative information can lead to mistaken judgments and false conclusions. Indeed, anytime a researcher mentions a finding ("Smokers die younger: 95 percent of men over 85 are nonsmokers") someone is sure to offer a contradictory case ("Well, I have an uncle who smoked two packs a day and lived to be 89"). Anecdotal cases—dramatic stories, personal experiences, even psychological case examples—have a way of overwhelming general truths. Highly publicized school shootings can raise alarm about school violence even while school violence rates are subsiding. Numbers can be numbing (in one study of 1300 dream reports concerning a kidnapped child, only 5 percent correctly envisioned the child as dead—see page 266). Anecdotes are often more startling. ("But I know a man who dreamed his sister was in a car accident, and two days later she was.") As psychologist Gordon Allport (1954, p. 9) said, "Given a thimbleful of [dramatic] facts we rush to make generalizations as large as a tub."

The point to remember: Individual cases can suggest fruitful ideas. What's true of all of us can be glimpsed in any one of us. But to discern the general truths that cover individual cases, we must answer questions with other methods.

'Well my dear,' said Miss Marple, 'human nature is very much the same everywhere, and of course, one has opportunities of observing it at closer quarters in a village.'"

Agatha Christie, *The Tuesday Club Murders*, 1933

The Survey

OBJECTIVE 6 | Identify the advantages and disadvantages of using surveys to study behavior and mental processes, and explain the importance of wording effects and random sampling.

The **survey** method looks at many cases in less depth. A survey asks people to report their behavior or opinions. Questions about everything from sexual practices to political opinions get put to the public. It's hard to think of a significant question that survey researchers have not asked. For example, Harris and Gallup polls have revealed that 72 percent of Americans think there is too much TV violence, 84 percent favor equal job opportunities for homosexual people, 89 percent say they face high stress, 95 percent believe in God, and 96 percent would like to change something about their appearance. In Britain, seven in ten 18- to 29-year-olds support gay marriage; among those over 50, about the same percentage oppose it (a generation gap found in many Western countries). But asking questions is tricky, and the answers may well depend on your wording and your choice of respondents.

survey a technique for ascertaining the self-reported attitudes or behaviors of people, usually by questioning a representative, random sample of them.

false consensus effect the tendency to overestimate the extent to which others share our beliefs and behaviors.

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

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

naturalistic observation observing and recording behavior in naturally occurring situations without trying to manipulate and control the situation.

Wording Effects

Even subtle changes in the order or wording of questions can have major effects. Should cigarette ads or pornography be allowed on television? People are much more likely to approve "not allowing" such things than "forbidding" or "censoring" them. In one national survey, only 27 percent of Americans approved of "government censorship" of media sex and violence, though 66 percent approved of "more restrictions on what is shown on television" (Lacayo, 1995). People are similarly much more approving of "aid to the needy" than of "welfare," of "affirmative action" than of "preferential treatment," and of "revenue enhancers" than of "taxes." Because wording is such a delicate matter, critical thinkers will reflect on how the phrasing of a question might have affected the opinions respondents expressed.

Random Sampling

In our everyday experience we spend most of our time with a biased sample of people—mostly those who share our attitudes and habits. Thus, when we wonder how many people hold a particular belief, those who think as we do come to mind most readily. This tendency to overestimate others' agreement with us is the **false consensus effect** (Ross & others, 1977). Vegetarians will think more people are vegetarians than will meat-eaters, and conservatives will perceive more support for conservative views than will liberals.

This Modern World by Tom Tomorrow © 1991.

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

You can describe human experience using your estimates of others, perhaps supplemented by dramatic anecdotes and personal experience. But for an accurate picture of the experiences and attitudes of a whole population, there's only one game in town—the representative sample.

We can extend this point to everyday thinking, as we generalize from samples we observe, especially vivid cases. Given (a) a statistical summary of a professor's student evaluations and (b) the vivid comments of two irate students, an administrator's impression of the professor may be influenced as much by the two unhappy students as by the many favorable evaluations in the statistical summary. Standing in the checkout line at the supermarket, George sees the woman in front of him pay with government-provided food stamps and then watches with dismay as she drives away in a fancy car. In both situations, the temptation to generalize from a few vivid but unrepresentative cases is nearly irresistible.

The point to remember: The best basis for generalizing is from a representative sample of cases.

If you wish to survey the students at your college or university, how could you survey a representative sample of the total student **population**—the whole group you want to study and describe? Typically, you would choose a **random sample,** one in which every person in the entire group has an equal chance of participating.

To sample the students randomly, you would *not* send each of them a questionnaire. (The conscientious people who return it would not be a random sample.) Rather, you would aim for a representative sample by, say, using a table of random numbers to pick participants from a student listing and then making sure you involve as many as possible. Large representative samples are better than small ones, but a small representative sample of 100 is better than an unrepresentative sample of 500.

The point to remember: Before believing survey findings, think critically: Consider the sample. You cannot compensate for an unrepresentative sample by simply adding more people.

The random-sampling principle also works in national surveys. Imagine that you had a giant barrel containing 60 million white beans mixed with 40 million red beans. A scoop that randomly sampled 1500 of them would contain about 60 percent white and 40 percent red beans, give or take 2 or 3 percent. Sampling voters in a