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, 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

Preview: 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. Psychologists, like all scientists, use the scientific method to construct theories that organize observations and imply testable hypotheses.

The Limits of Intuition and Common Sense

In sifting reality from illusion, won't intuition and plain common sense suffice for everyday life? Some say 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?"

Bob Daemmrich/The Image Works

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 from their ignorance about rejected applicants who succeeded elsewhere.

"The naked intellect is an extraordinarily inaccurate instrument."

Madeleine L'Engle, *A Wind in the Door*, 1973

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?

Actually, our intuition can lead us astray. Consider two examples:

- Imagine (or ask someone to imagine) folding a sheet of paper on itself 100 times. Roughly how thick would it then be?
- Given our year with 365 days, a group needs 366 people to ensure that at least two people share the same birthday; how big should a group be to have a 50 percent chance of finding a birthday match? (See page 22 for the answers.)

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

Did We Know It All Along? The Hindsight Bias

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 was hit on 9/11, 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 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 out that something has happened makes it seem inevitable. Psychologists call this 20/20 hindsight vision the **hindsight bias**, also known as the *I-knew-it-all-along phenomenon*.

"Life is lived forwards, but understood backwards."

Philosopher Søren Kierkegaard, 1813–1855

Psychologists Paul Slovic and Baruch Fischhoff (1977) and Gordon Wood (1979) have shown how unanticipated scientific results and historical happenings can indeed *seem* like common sense. 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 result can also easily explain it, and they overwhelmingly see it as unsurprising common sense. Obvious when both a supposed finding and its opposite seem like common sense, there is a problem.

Hindsight bias
After the horror of 9/11 it seemed obvious that the American intelligence services should have taken advance warnings more seriously, that airport security should have anticipated box-cutter–wielding terrorists, that occupants of the second tower should have known to play it safe and leave. With 20/20 hindsight, everything seems obvious.

Tim Boyle/Getty Images

Consider hindsight bias in a police context. When viewing a police lineup, eyewitnesses often feel uncertain: "I'm not sure. . . I think it's one of those two, maybe the shorter guy on the left." Told they have chosen the actual suspect, they may later, while testifying in court, recall identifying the person easily. "There was no maybe about it," recalled one formerly uncertain eyewitness. Gary Wells and Amy Bradfield (1998) demonstrated hindsight bias after showing 352 Iowa State University students a grainy security video of a man entering a store just before murdering a security guard. When shown a photospread from the actual case minus the actual gunman's photo, all 352 students made a false identification. Those told "Good. You identified the actual s

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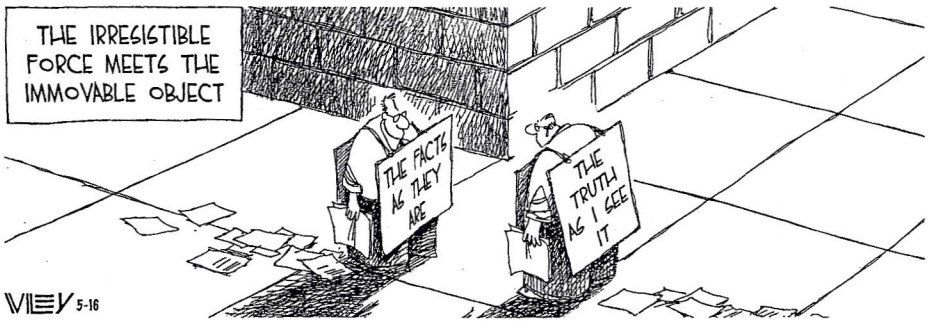


pect" were now understandably more confident in their identification—but were also *four times* more likely to recall having felt great confidence when earlier making their identification. Were they aware of how the experimenter's off-hand comment had influenced their recollections? No, most denied being influenced by the casual feedback.

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 sometimes can be misleading—*not* because common sense is usually wrong, but because it is after the fact. Common sense describes what has happened more easily than it predicts what will happen.

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").

But some research findings *do* jolt our common sense. 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 commonsense ideas are wrong, wrong, and wrong. 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.

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*.)

"Anything seems commonplace, once explained."

Dr. Watson to Sherlock Holmes

Overconfidence

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?

[1]Boston is south of Paris.

Fun anagram solutions from Wordsmith.org:
Elvis = lives
Dormitory = dirty room
The Morse code = here come the dots
Slot machines = cash lost in 'em

Answers to questions on page 20: 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). Only 23 people are needed to give better than even odds of any two people having the same birthday.

"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

"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

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 subject spent 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 Scientific Attitude

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 tells me that no aura-seer has yet 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.

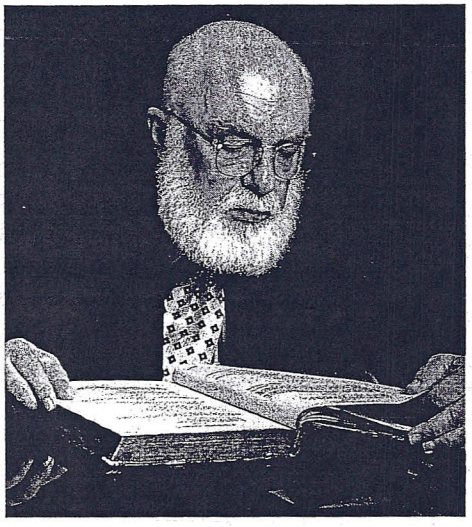
More often, science relegates crazy-sounding ideas to the mountain of forgotten claims of perpetual motion machines, miracle cancer cures, and out-of-body travels into centuries past. To sift reality from fantasy, sense from nonsense, therefore requires a scientific attitude: being skeptical but not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

As scientists, psychologists, too, 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."

Consider some familiar claims: that parental behaviors determine their children's sexual orientation; that lie detectors tell the truth; that astrologers can 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."



Rob Kinmonth

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

Historians of science tell us that these attitudes of curiosity, skepticism, and humility helped make modern science possible. Many of its founders were people whose religious convictions made them humble before nature and skeptical of mere human authority (Hooykaas, 1972; Merton, 1938). 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. Yet 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's 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.

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

"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 Brain*, 1979

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

hypothesis a testable prediction, often implied by a theory.

operational definition a statement of the procedures (operations) used to define research variables. For example, *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.

"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

Solution to anagram on page 22: CHAOS.

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.

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 85).
- within days, newborns can recognize their mother's odor and voice (see page 138).
- brain damage can leave a person able to learn new skills, yet be unaware of such (see pages 86–88).
- 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 523–525).
- electroconvulsive ("shock") therapy is often a very effective treatment for severe depression (see pages 689–690).

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

- as part of their passage to middle adulthood, men in their early forties do *not* typically undergo a midlife crisis (see pages 182–183) and most mothers are *not* depressed for a time after their children grow up and leave home (see page 185).
- 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 Chapter 9).
- most people do *not* suffer from unrealistically low self-esteem (see page 609).
- opposites do *not* generally attract (see page 729).

The Scientific Method

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, *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 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 much shorter list of principles. Say 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 imply 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 result

would disconfirm it. To test our self-esteem theory of depression, we might give people a test of self-esteem on which they respond to statements such as "I have good ideas." Then we could see whether, as we hypothesized, people who report poorer self-images also score higher on a depression scale (**FIGURE 1.1**).

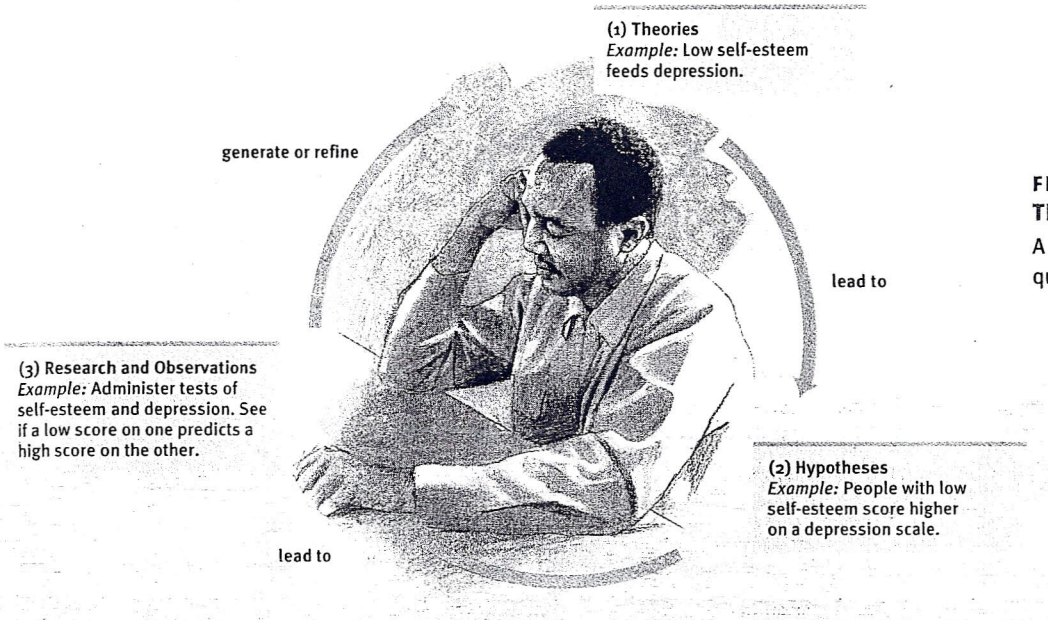


FIGURE 1.1
The scientific method
A self-correcting process for asking questions and observing nature's answer.

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.

As a check on their biases, psychologists report their research precisely enough—with clear **operational definitions** of concepts—to allow others 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.

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 642–643) that better organizes and predicts what we know about depression.

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

Our research strategies include descriptive, correlational, and experimental methods. We test hypotheses and refine our theories by making *observations* that *describe* behavior, detecting *correlations* that help *predict* behavior, and doing *experiments* that help *explain* behavior. To think critically about popular psychology claims, we need to recognize these designs and to know what conclusions they allow.

REVIEW AND REFLECT

The Need for Psychological Science

The Limits of Intuition and Common Sense

Although in some ways we outsmart the smartest computers, our intuition often goes awry. To err is human. Without scientific inquiry and critical thinking we readily succumb to *hindsight bias*, also called the I-knew-it-all-along phenomenon. Learning the outcome of a study (or of an everyday happening) can make it seem like obvious common sense. We also are routinely *overconfident* of our judgments, thanks partly to our bias to seek information that confirms them. Such biases lead us to overestimate our unaided intuition.

Enter psychological science. Science, with its procedures for gathering and sifting evidence, restrains error. Although limited by the testable questions it can address, a scientific approach helps us sift reality from illusion, taking us beyond the limits of our intuition and common sense.

The Scientific Attitude

Scientific inquiry begins with an attitude—a *curious* eagerness to *skeptically* scrutinize competing ideas and an open-minded *humility* before nature. Putting ideas, even crazy-sounding ideas, to the test helps us winnow sense from nonsense. The curiosity that drives us to test ideas and to expose their underlying assumptions carries into everyday life as *critical thinking*.

The Scientific Method

Research stimulates the construction of *theories*, which organize *observations* and imply predictive *hypotheses*. These hypotheses (predictions) are then tested to validate and refine the theory and to suggest practical applications.

CHECK YOURSELF: What is the scientific attitude and why is it important for critical thinking?

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

Answers to the Check Yourself questions can be found in the yellow appendix at the end of the book.

Description

Preview: Psychologists describe behavior using case studies, surveys, and naturalistic observations.

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

The Case Study

Among the oldest research methods is the **case study**, in which psychologists stu one individual in great depth in the hope of revealing things true of us all. Some e amples: Much of our early knowledge about the brain came from case studies of in viduals who suffered a particular impairment after damage to a certain brain regic Sigmund Freud constructed his theory of personality from a handful of case studi Developmental psychologist Jean Piaget taught us about children's thinking af carefully observing and questioning but a few children. Studies of only a few chi

"'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