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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 “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?

For these questioners, as for most people whose exposure to psychology comes from popular books, magazines, and TV, psychologists analyze personality, offer counseling, and dispense child-rearing advice.

Do they? Yes, and much more. Consider some of psychology’s questions that from time to time you may wonder about:

- Have you ever found yourself reacting to something as one of your biological parents would—perhaps in a way you vowed you never would—and then wondered how much of your personality you inherited? *To what extent are person-to-person differences in personality predisposed by one’s genes? To what extent by the home and neighborhood environments?*
- Have you ever played peekaboo with a 6-month-old and wondered why the baby finds the game so delightful? The infant reacts as though, when you momentarily move behind a door, you actually disappear—only to reappear later out of thin air. *What do babies actually perceive and think?*
- Have you ever awakened from a nightmare and, with a wave of relief, wondered why you had such a crazy dream? *How often, and why, do we dream?*
- Have you ever wondered what leads to school and work success? Are some people just born smarter? *Does sheer intelligence explain why some people get richer, think more creatively, or relate more sensitively?*
- Have you ever become depressed or anxious and wondered whether you’ll ever feel “normal”? *What triggers our bad moods—and our good ones?*
- Have you ever worried about how to act among people of a different culture, race, or gender? *In what ways are we alike as members of the human family? How do we differ?*

Such questions provide grist for psychology’s mill because psychology is a science that seeks to answer all sorts of questions about us all: how we think, feel, and act.

“I have made a ceaseless effort not to ridicule, not to bewail, not to scorn human actions, but to understand them.”

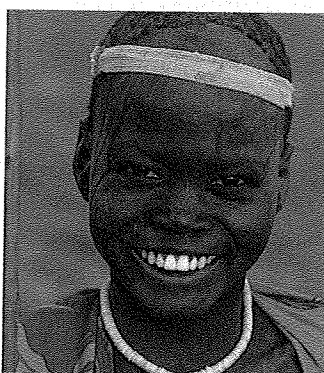
Benedict Spinoza, *A Political Treatise*, 1677



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A smile is a smile the world around Throughout this book, you will see examples not only of our cultural and gender diversity but also of the similarities that define our shared human nature. People in different cultures vary in when and how often they smile, but a smile *means* the same thing anywhere in the world.

What Is Psychology?

Psychology's Roots

Once upon a time, on a planet in your neighborhood of the universe, there came to be people. Soon thereafter, these creatures became intensely interested in themselves and in one another. They wondered, “*Who are we? From where come our thoughts? Our feelings? Our actions? And how are we to understand—and to master or manage—those around us?*” Psychology’s answers to these wonderings have developed from international roots in philosophy and biology into a science that aims to observe, describe, and explain how we think, feel, and act. Understanding the roots of today’s psychology helps us appreciate psychologists’ varied perspectives.

Psychological Science Is Born

1 How did the science of psychology develop?¹

To be human is to be curious about ourselves and the world around us. Before 300 B.C., the Greek naturalist and philosopher Aristotle theorized about learning and memory, motivation and emotion, perception and personality. Today we chuckle at some of his guesses, like his suggestion that a meal makes us sleepy by causing gas and heat to collect around the source of our personality, the heart. But credit Aristotle with asking the right questions.

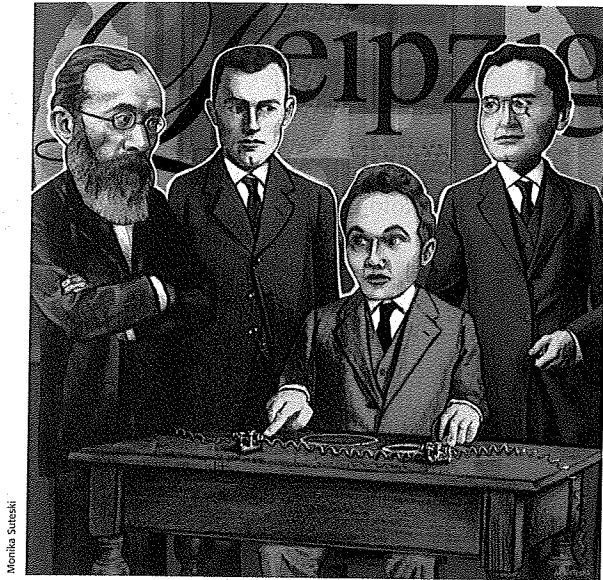
Philosophers’ thinking about thinking continued until the birth of psychology as we know it, on a December day in 1879, in a small room on the third floor of a modest building at Germany’s University of Leipzig. There, two young men were helping an austere, middle-aged professor, Wilhelm Wundt, create an experimental apparatus. Their machine measured the time lag between people’s hearing a ball hit a platform and their pressing a telegraph key (Hunt, 1993). Curiously, people responded in about one-tenth of a second when asked to press the key as soon as the sound occurred—and in about two-tenths of a second when asked to press the key as soon as they were consciously aware of perceiving the sound. (To be aware of one’s awareness takes a little longer.) Wundt was seeking to measure “atoms of the mind”—the fastest and simplest mental processes. Thus began what many consider psychology’s first experiment, launching the first psychological laboratory, staffed by Wundt and psychology’s first graduate students.

This young science of psychology developed from the more established fields of philosophy and biology. Wundt was both a philosopher and a physiologist. Charles Darwin, who proposed evolutionary psychology, was an English naturalist. Ivan Pavlov, who pioneered the study of learning, was a Russian physiologist. Sigmund Freud, renowned personality theorist, was an Austrian physician. Jean Piaget, the twentieth century’s most influential observer of children, was a Swiss biologist. William James, author of an important 1890 psychology textbook, was an American philosopher. This list of pioneering psychologists—“Magellans of the mind,” as Morton Hunt (1993) has called them—illustrates psychology’s origins in many disciplines and countries.

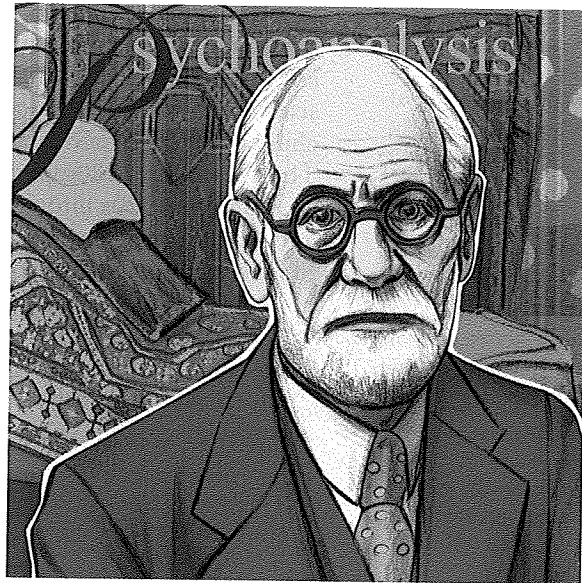
As these names illustrate, the early pioneers of most fields, including psychology, were predominantly men. When William James’ student Mary Calkins completed all the requirements for a Harvard Ph.D., outscoring all the male students on their exams, Harvard denied her the degree she had earned, offering her instead a degree from Radcliffe, its sister school for women. When Calkins

¹A Preview Question will appear at the beginning of each major section of a chapter. Search actively for the answer to the question as you read through the section. Answers are available in the form of a numbered chapter review at the end of the chapter.

Information sources are cited in parentheses, with name and date. Every citation can be found in the end-of-book References, with complete documentation that follows American Psychological Association style.



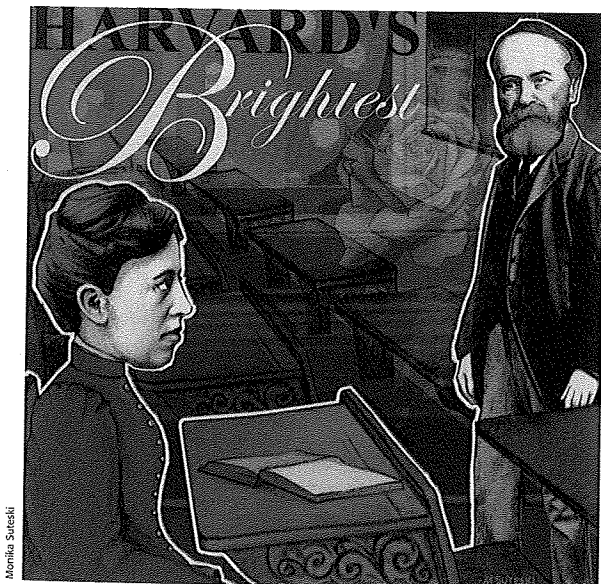
Wilhelm Wundt Wundt (far left) established the first psychology laboratory at the University of Leipzig, Germany.



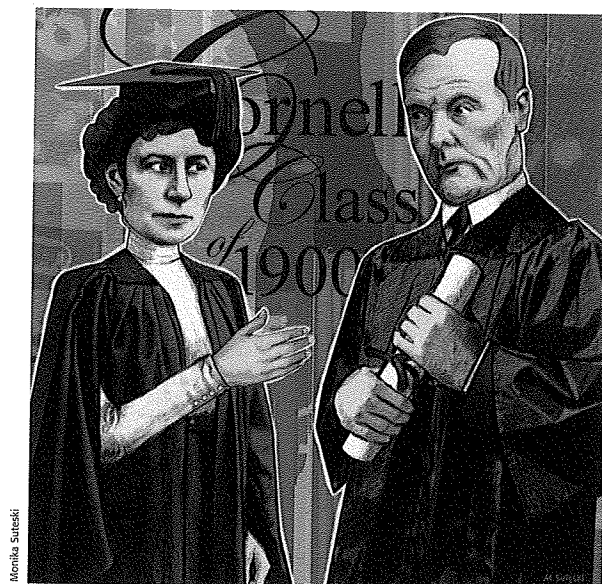
Sigmund Freud Famed personality theorist and therapist, whose controversial ideas influenced humanity's self-understanding.

refused the degree, before becoming the American Psychological Association's (APA's) first female president, the first psychology Ph.D. was awarded to animal behavior researcher Margaret Floy Washburn, who became the second female APA president.

The rest of the story of psychology—the subject of this book—develops at many levels. With activities ranging from psychotherapy to the study of nerve cell activity, *psychology* is not easily defined. Psychology began as the science of mental life.



William James and Mary Whiton Calkins William James was a legendary teacher-writer of psychology. He also mentored students, including Mary Whiton Calkins, who became a pioneering memory researcher and American Psychological Association president.



Margaret Floy Washburn The first woman to receive a psychology Ph.D.; synthesized animal behavior research in *The Animal Mind*.

Wundt's basic research tool became introspection—self-examination of one's own emotional states and mental processes. Wundt focused on *inner* sensations, images, and feelings. James, too, engaged in introspective examination of the stream of consciousness and of emotion. Freud emphasized the ways emotional responses to childhood experiences and our unconscious thought processes affect our behavior. Thus, until the 1920s, *psychology* was defined as “the science of mental life.”

From the 1920s into the 1960s, American psychologists, initially led by flamboyant and provocative John B. Watson and later by the equally provocative B. F. Skinner, dismissed introspection and redefined *psychology* as “the scientific study of observable behavior.” After all, said these **behaviorists**, science is rooted in observation. You cannot observe a sensation, a feeling, or a thought, but you *can* observe and record people's *behavior* as they respond to different situations.

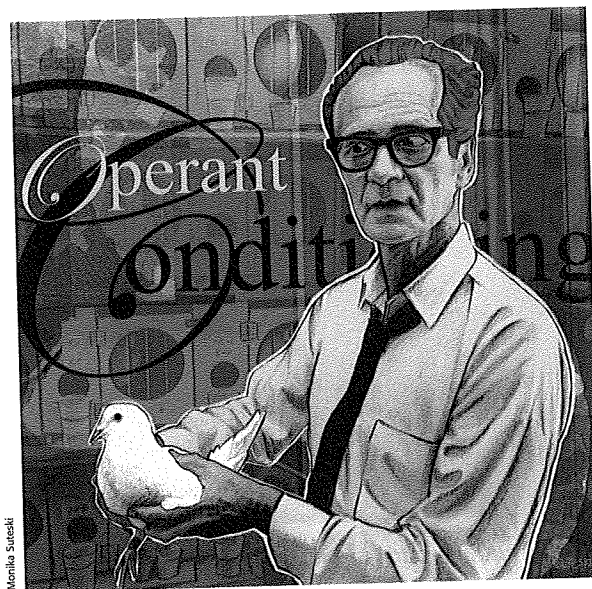
Humanistic psychology was a softer, 1960s response to Freudian psychology and to behaviorism, which pioneers Carl Rogers and Abraham Maslow found too mechanistic. Rather than calling up childhood memories or focusing on learned behaviors, Rogers and Maslow both emphasized the importance of current environmental influences on our growth potential, and the importance of meeting our needs for love and acceptance.

In the 1960s, psychology began to recapture its initial interest in mental processes through studies of how our mind processes and retains information. This *cognitive revolution* supported earlier psychologists' ideas about the importance of internal thought processes, but expanded those ideas to explore scientifically the ways we perceive, process, and remember information. Cognitive psychology, and more recently *cognitive neuroscience* (the study of brain activity underlying thought), has suggested new ways to understand and treat psychological disorders.

To encompass psychology's concern with observable behavior *and* with inner thoughts and feelings, today we define **psychology** as *the scientific study of behavior and mental processes*. Let's unpack this definition. *Behavior* is anything an organism *does*—any action we can observe and record. Yelling, smiling, blinking, sweating, talking, and questionnaire marking are all observable behaviors. *Mental processes* are the internal, subjective experiences we infer from behavior—sensations, perceptions, dreams, thoughts, beliefs, and feelings.



John B. Watson and Rosalie Rayner Working with Rayner, Watson championed psychology as the science of behavior and demonstrated conditioned responses on a baby who became famous as “Little Albert.”



B. F. Skinner A leading behaviorist, who rejected introspection and studied how consequences shape behavior.

Throughout the text, important concepts are **boldfaced**. As you study, you can find these terms with their definitions in a nearby margin and in the Glossary at the end of the book.

The key word in psychology's definition is *science*. Psychology, as I will emphasize throughout this book, is less a set of findings than a way of asking and answering questions. My aim, then, is not merely to report results but also to show you how psychologists play their game. You will see how researchers evaluate conflicting opinions and ideas. And you will learn how all of us, whether scientists or simply curious people, can think smarter when describing and explaining the events of our lives.

Contemporary Psychology

Like its pioneers, today's psychologists are citizens of many lands. The International Union of Psychological Science has 69 member nations, from Albania to Zimbabwe. Nearly everywhere, membership in psychological societies is mushrooming—from 4183 American Psychological Association members and affiliates in 1945 to more than 160,000 today, with similarly rapid growth in Britain (from 1100 to 34,000). In China, five universities had psychology departments in 1985; by the century's end, there were 50 (Jing, 1999). Worldwide, some 500,000 people have been trained as psychologists, and 130,000 of them belong to European psychological organizations (Tikkanen, 2001). Moreover, thanks to international publications, joint meetings, and the Internet, collaboration and communication cross borders more now than ever: "We are moving rapidly towards a single world of psychological science," reports Robert Bjork (2000). Psychology is *growing* and it is *globalizing*.

Today's psychologists debate some enduring issues and view behavior from differing perspectives. They also teach, work, and do research in many different subfields.

Psychology's Big Question

2 What is psychology's historic big issue?

During its short history, psychology has wrestled with some issues that will reappear throughout this book. The biggest and most persistent (and the focus of Chapter 3) is the **nature-nurture issue**—*the controversy over the relative contributions of biology and experience*. The origins of this debate are ancient. Do our human traits develop through experience, or do we come equipped with them? Plato assumed that character and intelligence are largely inherited and that certain ideas are inborn. Aristotle countered that there is nothing in the mind that does not first come in from the external world through the senses. The nature-nurture debate weaves a thread from these ancient Greeks to our own time. Today's psychologists explore this issue by asking, for example:

- How are differences in intelligence, personality, and psychological disorders influenced by heredity and by environment?
- Is children's grammar mostly innate or formed by experience?
- Are sexual behaviors more "pushed" by inner biology or "pulled" by external incentives?
- Should we treat depression as a disorder of the brain or a disorder of thought—or both?
- How are we humans alike (because of our common biology and evolutionary history) and different (because of our differing environments)?
- Are gender differences biologically predisposed or socially constructed?

Such debates continue. Yet over and over again we will see that in contemporary science the nature-nurture tension



Dennis Degnan/Corbis



Tim Wright/Corbis

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

humanistic psychology historically significant perspective that emphasized the growth potential of healthy people; used personalized methods to study personality in hopes of fostering personal growth.

psychology the scientific study of behavior and mental processes.

nature-nurture issue the longstanding controversy over the relative contributions that genes and experience make to the development of psychological traits and behaviors. Today's science sees traits and behaviors arising from the interaction of nature and nurture.

A nature-made nature-nurture experiment

Because identical twins have the same genes, they are ideal participants in studies designed to shed light on hereditary and environmental influences on temperament, intelligence, and other traits. Studies of identical and fraternal twins provide a rich array of findings—described in later chapters—that underscore the importance of both nature and nurture.

levels of analysis the differing complementary views, from biological to psychological to social-cultural, for analyzing any given phenomenon.

biopsychosocial approach an integrated approach that incorporates biological, psychological, and social-cultural levels of analysis.



Views of anger How would each of psychology's levels of analysis explain what's going on here?

dissolves: *Nurture works on what nature endows*. Our species is biologically endowed with an enormous capacity to learn and adapt. Moreover, every psychological event (every thought, every emotion) is simultaneously a biological event. Thus depression can be *both* a thought disorder and a brain disorder.

Psychology's Three Main Levels of Analysis

3 What theoretical perspectives do psychologists take, and how does the biopsychosocial approach help integrate these perspectives?

Each of us is a complex system that is part of a larger social system, but each of us is also composed of smaller systems, such as our nervous system and body organs, which are composed of still smaller systems—cells, molecules, and atoms.

These tiered systems suggest different **levels of analysis**, which offer complementary outlooks. It's like explaining why grizzly bears hibernate. Is it because hibernation enhanced their ancestors' survival and reproduction? Because their inner physiology drives them to do so? Because cold environments hinder food gathering during winter? Such perspectives are complementary, because "everything is related to everything else" (Brewer, 1996). Together, different levels of analysis form an integrated **biopsychosocial approach**, which considers the influences of biological, psychological, and social-cultural factors (Figure 1.1). Each level provides a valuable vantage point for looking at behavior, yet each by itself is incomplete. Like different academic disciplines, psychology's varied perspectives ask different questions and have their own limits. One perspective may stress the biological, psychological, or social-cultural level more than another, but the different perspectives described in Table 1.1 complement one another. Consider, for example, how they shed light on anger.

- Someone working from a *neuroscience perspective* might study brain circuits that produce the physical state of being "red in the face" and "hot under the collar."
- Someone working from the *evolutionary perspective* might analyze how anger facilitated the survival of our ancestors' genes.
- Someone working from the *behavior genetics perspective* might study how heredity and experience influence our individual differences in temperament.
- Someone working from the *psychodynamic perspective* might view an outburst as an outlet for unconscious hostility.
- Someone working from the *behavioral perspective* might study the facial expressions and body gestures that accompany anger, or might attempt to determine which external stimuli result in angry responses or aggressive acts.
- Someone working from the *cognitive perspective* might study how our interpretation of a situation affects our anger and how our anger affects our thinking.

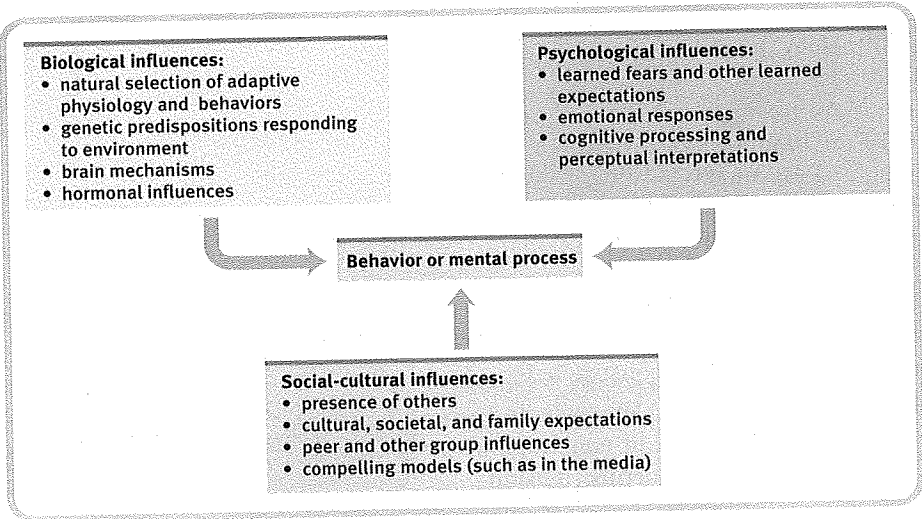


Figure 1.1 Biopsychosocial approach This integrated viewpoint incorporates various levels of analysis and offers a more complete picture of any given behavior or mental process.

Table 1.1**Psychology's Current Perspectives**

Perspective	Focus	Sample Questions
Neuroscience	How the body and brain enable emotions, memories, and sensory experiences	How are messages transmitted within the body? How is blood chemistry linked with moods and motives?
Evolutionary	How the natural selection of traits promotes the perpetuation of one's genes	How does evolution influence behavior tendencies?
Behavior genetics	How much our genes and our environment influence our individual differences	To what extent are psychological traits such as intelligence, personality, sexual orientation, and vulnerability to depression attributable to our genes? To our environment?
Psychodynamic	How behavior springs from unconscious drives and conflicts	How can someone's personality traits and disorders be explained in terms of sexual and aggressive drives or as the disguised effects of unfulfilled wishes and childhood traumas?
Behavioral	How we learn observable responses	How do we learn to fear particular objects or situations? What is the most effective way to alter our behavior, say, to lose weight or stop smoking?
Cognitive	How we encode, process, store, and retrieve information	How do we use information in remembering? Reasoning? Solving problems?
Social-cultural	How behavior and thinking vary across situations and cultures	How are we—as Africans, Asians, Australians, or North Americans—alike as members of one human family? As products of different environmental contexts, how do we differ?

- Someone working from the *social-cultural perspective* might explore which situations produce the most anger, and how expressions of anger vary across cultural contexts.

The point to remember: Like two-dimensional views of a three-dimensional object, each of psychology's perspectives is helpful but by itself fails to reveal the whole picture.

So bear in mind psychology's limits. Don't expect it to answer the ultimate questions, such as those posed by Russian novelist Leo Tolstoy (1904): "Why should I live? Why should I do anything? Is there in life any purpose which the inevitable death that awaits me does not undo and destroy?" Instead, expect that psychology will help you understand why people think, feel, and act as they do. Then you should find the study of psychology fascinating and useful.

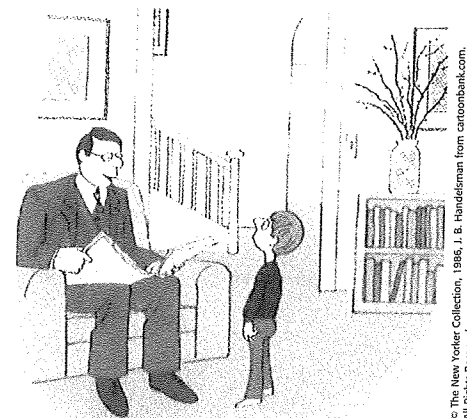
Psychology's Subfields

4 What are psychology's specialized subfields?

Picturing a chemist at work, you probably envision a white-coated scientist surrounded by glassware and high-tech equipment. Picture a psychologist at work and you would be right to envision

- a white-coated scientist probing a rat's brain.
- an intelligence researcher measuring how quickly an infant becomes bored with (looks away from) a familiar picture.
- an executive evaluating a new "healthy life-styles" training program for employees.
- someone at a computer keyboard analyzing data on whether adopted teens' temperaments more closely resemble those of their adoptive parents or those of their biological parents.
- a therapist listening carefully to a client's depressed thoughts.
- a traveler en route to another culture to collect data on variations in human values and behaviors.
- a teacher or writer sharing the joy of psychology with others.

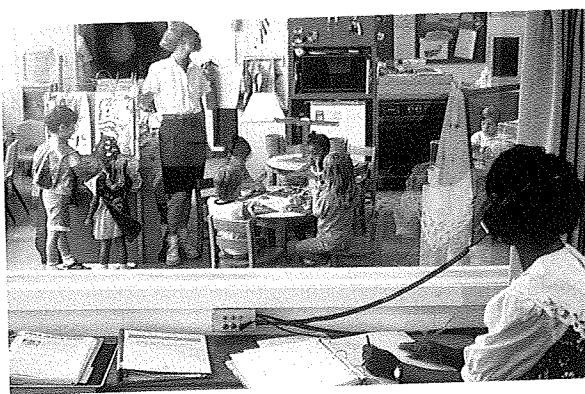
Want to learn more? See Appendix C, Careers in Psychology, at the end of this book for more information about psychology's subfields and to learn about the many interesting options available to those with bachelor's, master's, and doctoral degrees in psychology.



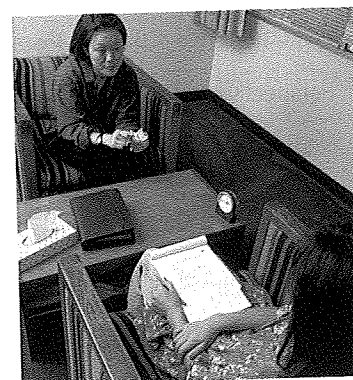
"I'm a social scientist, Michael. That means I can't explain electricity or anything like that, but if you ever want to know about people I'm your man."



Michael Newman/Photo Edit



Jeff Greenberg/PhotoEdit



Michael Newman/Photo Edit

Psychology: A science and a profession Psychologists experiment with, observe, test, and treat behavior. Here we see psychologists testing a child, recording children's behavior, and doing face-to-face therapy.

basic research pure science that aims to increase the scientific knowledge base.

applied research scientific study that aims to solve practical problems.

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

I see you! A biological psychologist might view this child's delighted response as evidence for brain maturation. A cognitive psychologist might see it as a demonstration of the baby's growing knowledge of his surroundings. For a cross-cultural psychologist, the role of grandparents in different societies might be the issue of interest. As you will see throughout this book, these and other perspectives offer complementary views of behavior.



Laura Dwight

The cluster of subfields we call psychology has less unity than most other sciences. But there is a payoff: Psychology is a meeting ground for different disciplines and is thus a perfect home for those with wide-ranging interests. In their diverse activities, from biological experimentation to cultural comparisons, a common quest unites the tribe of psychology: to describe and explain behavior and the mind underlying it.

Some psychologists conduct **basic research** that builds psychology's knowledge base. In the pages that follow we will meet a wide variety of such researchers:

- *Biological psychologists* exploring the links between brain and mind
- *Developmental psychologists* studying our changing abilities from womb to tomb
- *Cognitive psychologists* experimenting with how we perceive, think, and solve problems
- *Personality psychologists* investigating our persistent traits
- *Social psychologists* exploring how we view and affect one another

These psychologists also may conduct **applied research** that tackles practical problems. So do other psychologists, such as *industrial/organizational psychologists*, who use psychology's concepts and methods in the workplace to help organizations and companies select and train employees, boost morale and productivity, design products, and implement systems.

Although most psychology textbooks focus on psychological science, psychology is also a helping profession devoted to such practical issues as how to have a happy marriage, how to overcome anxiety or depression, and how to raise thriving children. **Counseling psychologists** help people cope with challenges (including academic, vocational, and marital issues) by recognizing their strengths and resources. **Clinical psychologists** assess and treat mental, emotional, and behavior disorders (APA, 2003). Both counseling and clinical psychologists administer and interpret tests, provide counseling and therapy, and sometimes conduct basic and applied research. By contrast, **psychiatrists**, who also often provide psychotherapy, are medical doctors licensed to prescribe drugs and otherwise treat physical causes of psychological disorders. (Some clinical psychologists are lobbying for a similar right to prescribe mental health-related drugs, and in 2002 the state of New Mexico was the first state to grant that right to specially trained and licensed psychologists.)

With perspectives ranging from the biological to the social, and with settings from the laboratory to the clinic, psychology relates to many fields, ranging from mathematics to biology to sociology to philosophy. And more and more, psychology's methods and findings aid other disciplines. Psychologists teach in medical schools, law schools, and theological seminaries, and they work in hospitals, factories, and corporate offices. They engage in interdisciplinary studies, such as psychohistory (the psychological analysis of historical characters), psycholinguistics (the study of language and thinking), and psychoceramics (the study of crackpots).²

²Confession time: I wrote the last part of this sentence on April Fools' Day.

Psychology also influences modern culture. Knowledge transforms us. Learning about the solar system and the germ theory of disease alters the way people think and act. Learning psychology's findings also changes people: They less often judge psychological disorders as a moral failing, treatable by punishment and ostracism. They less often regard and treat women as men's mental inferiors. They less often view and rear children as ignorant, willful beasts in need of taming. "In each case," notes Morton Hunt (1990, p. 206), "knowledge has modified attitudes, and, through them, behavior." Once aware of psychology's well-researched ideas—about how body and mind connect, how a child's mind grows, how we construct our perceptions, how we remember (and misremember) our experiences, how people across the world differ (and are alike)—your mind may never again be quite the same.

"Once expanded to the dimensions of a larger idea, [the mind] never returns to its original size."

Oliver Wendell Holmes, 1809–1894

You can use these Rehearse It questions to gauge whether you are ready for the next section.

Rehearse It!

- The science of psychology was born in December 1879, when a psychologist and his students measured the time lag between people's hearing a ball hit a platform and their pressing a key. The psychologist who ran this experiment and established the first psychology lab was
 - Charles Darwin.
 - William James.
 - Edward Bradford Titchener.
 - Wilhelm Wundt.
- A prominent psychology text was published in 1890. Its author was
 - Wilhelm Wundt.
 - Mary Whiton Calkins.
 - Charles Darwin.
 - William James.
- The definition of *psychology* has changed several times since the late 1800s. In the early twentieth century, _____ redefined *psychology* as "the science of observable behavior."
 - John B. Watson
 - René Descartes
 - William James
 - Edward Bradford Titchener
- Psychology is now defined as "the scientific study of behavior and mental processes." The perspective in psychology that focuses on how behavior and thought differ from situation to situation and from culture to culture is the
 - cognitive perspective.
 - behavioral perspective.
 - social-cultural perspective.
 - neuroscience perspective.
- In the history of psychology, a major topic has been the relative influence of nature and nurture. Nature is to nurture as
 - personality is to intelligence.
 - biology is to experience.
 - intelligence is to biology.
 - psychological traits are to behaviors.
- The behavioral perspective in psychology emphasizes observable responses and how they are acquired and modified. A behavioral psychologist would be most likely to study
 - the effect of school uniforms on classroom behaviors.
 - the hidden meaning in children's themes and drawings.
 - the age at which children can learn algebra.
 - whether certain mathematical abilities appear to be inherited.
- A psychologist who treats emotionally troubled adolescents at the local mental health agency is most likely to be a/an
 - research psychologist.
 - psychiatrist.
 - industrial/organizational psychologist.
 - clinical psychologist.
- A psychologist who conducts basic research to expand psychology's knowledge base would be most likely to
 - design a computer screen with limited glare and assess the effect on computer operators' eyes after a day's work.
 - treat older people who are overcome by depression.
 - observe 3- and 6-year-old children solving puzzles and analyze differences in their abilities.
 - interview children with behavioral problems and suggest treatments.

Answers:
1. d, 2. d, 3. a, 4. c, 5. b, 6. a, 7. d, 8. c

Why Do Psychology?

Although in some ways we outsmart the smartest computers, our intuition often goes awry. To err is human. Enter psychological science. With its procedures for gathering and sifting evidence, science restrains error. As we familiarize ourselves with its strategies and incorporate its underlying principles into our daily thinking, we can think smarter. *Psychologists use the science of behavior and mental processes to better understand why people think, feel, and act as they do.*

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

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



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.

“Life is lived forwards, but understood backwards.”

Philosopher Søren Kierkegaard, 1813–1855

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.)

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.

What About Intuition and Common Sense?

5 Why are the answers that flow from the scientific approach more reliable than those based on 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?

Actually, notes writer Madeleine L’Engle, “The naked intellect is an extraordinarily inaccurate instrument” (1972). Our intuition can lead us astray. We sometimes err in presuming that we could have foreseen what happened.

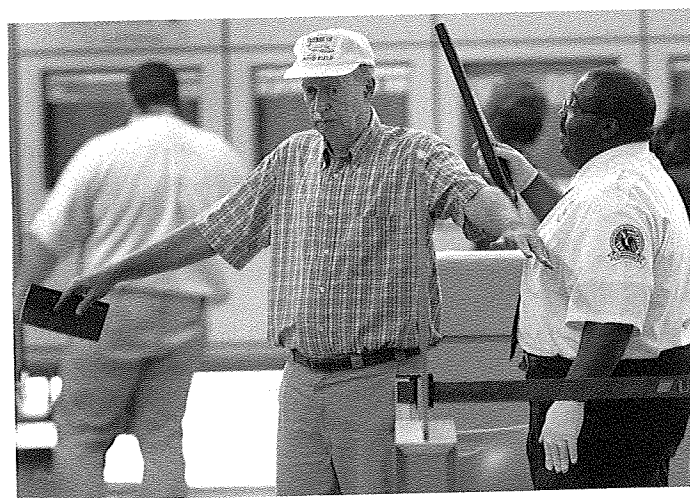
Did We Know It All Along? Hindsight Bias

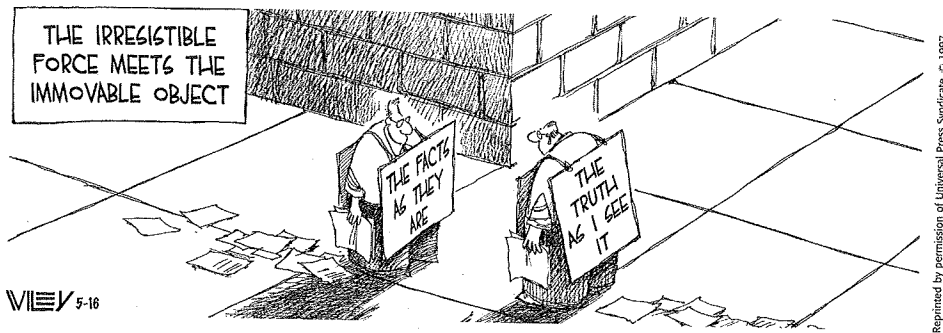
How easy it is to seem astute when drawing the bull’s eye after the arrow has struck. After each stock market downswing—after the bursting of the dot-com bubble, for example—investment gurus say “the market was obviously overdue for a correction.” After the first World Trade Center tower in New York was hit on September 11, 2001, commentators said people in the second tower *should* have immediately evacuated (it became obvious only later that it was not an accident). But *before* the arrow strikes, the stock market drops, or the terrorists attack, these results are anything but obvious. 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*.

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.

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



Non Sequitur

sometimes be misleading—*not* because common sense is usually wrong, but because common sense more easily describes what *has* happened than what *will* happen. As physicist Neils Bohr reportedly said, “Prediction is very difficult, especially about the future.”

Hindsight bias is widespread. Some 100 studies have observed it 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 10 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.”

But sometimes Grandmother’s intuition, informed by countless casual observations, has it wrong. In later chapters we will see how research has overturned popular ideas—that familiarity breeds contempt, that dreams predict the future, and that emotional reactions coincide with menstrual phase. 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.

Overconfidence

Our everyday thinking is also limited by our human tendency to be overly confident. As Chapter 9 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.³ 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 13 to check your answer).

³Boston is south of Paris.

“Anything seems commonplace, once explained.”

Dr. Watson to Sherlock Holmes

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

"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

"Computers in the future may weigh no more than 1.5 tons."

Popular Mechanics, 1949

"They couldn't hit an elephant at this distance."

General John Sedgwick just before being killed 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

"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

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.

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.

The Scientific Attitude

6 What attitudes characterize scientific inquiry?

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. 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.

"To believe with certainty," says a Polish proverb, "we must begin by doubting." As scientists, psychologists approach the world of behavior with a *curious skepticism*, persistently asking two questions: What do you mean? How do you know?

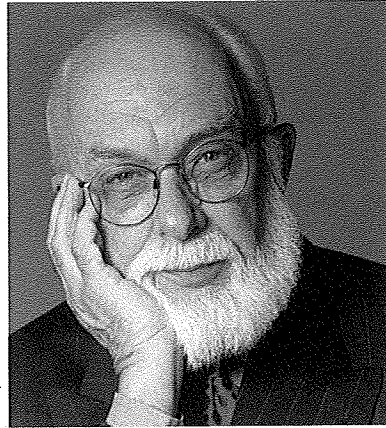
In the arena of competing ideas, skeptical testing can reveal which ones best match the facts. Do parental behaviors determine their children's sexual orientation? Can astrologers analyze your character and predict your future based on the position of the planets at your birth? As you will see in the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

Putting a scientific attitude into practice requires not only skepticism but also *humility*—an awareness of our own vulnerability to error and an openness to surprises and new perspectives. In the last analysis, what matters is not my opinion or yours, but the truths nature reveals in response to our questioning. If people or other animals 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, including psychological science, as a threat. Yet, notes sociologist Rodney Stark (2003a, b), the scientific revolution was led 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.



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

Critical Thinking

The 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 and its willingness to consider 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 58).
- within days, newborns can recognize their mother's odor and voice (see page 101).
- brain damage can leave a person able to learn new skills, yet be unaware of such learning (see pages 60–62).
- 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 389–391).
- electroconvulsive therapy (delivering an electric shock to the brain) is often a very effective treatment for severe depression (see pages 521–522).

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 sleepwalkers are *not* verbalizing their dreams (see Chapter 6).
- 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 8).
- most people do *not* suffer from unrealistically low self-esteem, and high self-esteem is not all good (see pages 452–453).
- opposites do *not* generally attract (see page 511).

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

Throughout this book, you will encounter Thinking Critically boxes. Each highlights careful thinking about some interesting or important issue.

"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 11: CHAOS.

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

Rehearse It!

9. Psychology tells us what we already know from common sense, say some skeptics. *Hindsight bias* refers to our tendency to
- perceive events as obvious or inevitable after the fact.
 - assume that two events happened because we wished them to happen.
 - overestimate our abilities to predict the future.
 - make judgments that fly in the face of common sense.

10. As scientists, psychologists view theories with skepticism, humility, and curiosity. This means that they
- approach research with a negative cynicism.
 - assume that an article published in a reputable journal must be true.
 - realize that some issues should not be studied.
 - persistently ask questions, and are willing to reject ideas that cannot be verified by research.

11. A newspaper article describes how a "cure for cancer has been found." A critical thinker probably will
- immediately dismiss the article as untrue because there is no evidence to back up the facts.
 - accept the information as a wonderful breakthrough.
 - question the article, evaluate the evidence, and assess the conclusions.
 - question the article but quickly accept it as true due to the author's excellent reputation.

Answers: 9. a, 10. d, 11. c

How Do Psychologists Ask and Answer Questions?

Psychologists arm their scientific attitude with the *scientific method*. Psychological science evaluates competing ideas with careful observation and rigorous analysis. In its attempt to describe and explain human nature, it welcomes hunches and plausible-sounding theories. And it puts them to the test. If a theory works—if the data support its predictions—so much the better for that theory. If the predictions fail, the theory will be revised or rejected.

The Scientific Method

7 How do psychologists use the scientific method to construct theories?

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 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 1.2).

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.

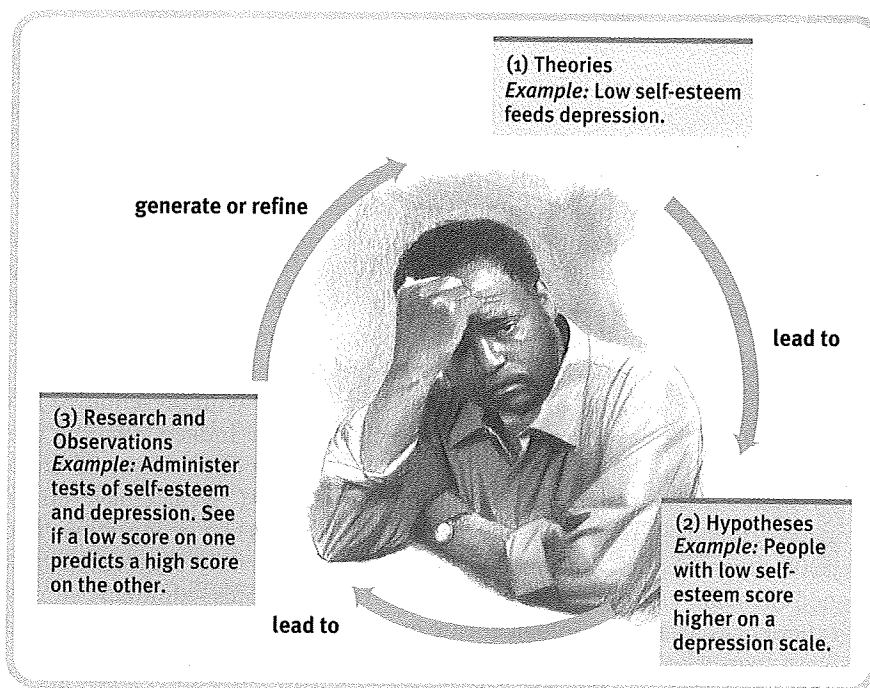


Figure 1.2 The scientific method
A self-correcting process for asking questions and observing nature's answer.

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. 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.

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 482–485) that better organizes and predicts what we know about depression.

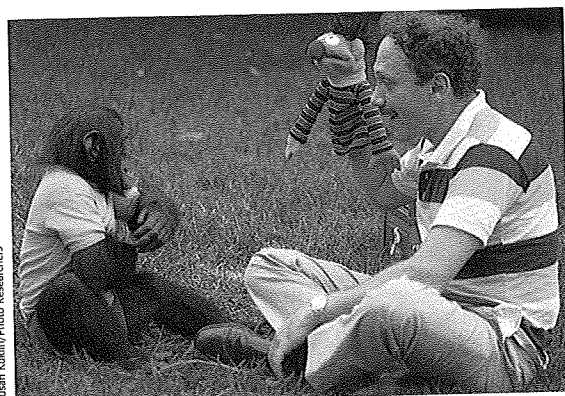
As we will see next, we can test our hypotheses and refine our theories using descriptive, correlational, and experimental methods. To think critically about popular psychology claims, we need to recognize these methods and know what conclusions they allow.

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

Description

8 How do psychologists observe and describe behavior?

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 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 9.

"'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 Case Study

Among the oldest research methods is the **case study**, studying 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 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"). 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 pages 177–178). Anecdotes—dramatic stories, personal experiences, even psychological case examples—often command attention. ("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.

The Survey

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. Harris and Gallup polls have revealed that 72 percent of Americans think there is too much TV violence, 89 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.

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 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. 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.

So how do you obtain a representative sample—say, of the students at your college or university? How could you choose a group that would represent the total student **population**, the whole group you want to study and describe? Typically, you would choose a **random sample**, in which every person in the entire group has an equal chance of participating. This means you would *not* send each student a questionnaire. (The conscientious people who return it would not be a random sample.) Rather, you would use, say, a table of random numbers to pick participants from a student listing, 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.

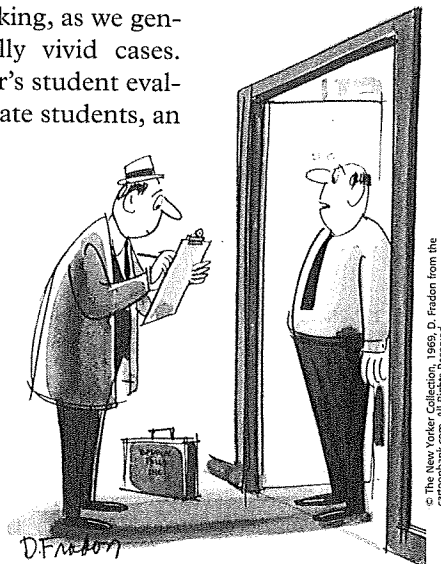
Sampling voters in a national election survey is like sampling the student population: 1500 randomly sampled people, drawn from all areas of a country, provide a remarkably accurate snapshot of the opinions of a nation. Without random sampling, large samples—including call-in phone samples and TV Web site polls—often merely give misleading results.

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.

Naturalistic Observation

A third descriptive research method involves watching and recording the behavior of organisms in their natural environment. These **naturalistic observations** range from watching chimpanzee societies in the jungle, to unobtrusively videotaping (and later systematically analyzing) parent-child interactions in different cultures, to recording students' self-seating patterns in the lunchrooms of multiracial schools.

Like the case study and survey methods, naturalistic observation does not *explain* behavior. It *describes* it. Nevertheless, descriptions can be revealing. We once thought, for example, that only humans use tools. Then naturalistic observation revealed that chimpanzees sometimes insert a stick in a termite mound and withdraw it, eating the stick's load of termites. Such unobtrusive naturalistic observations, recalls chimpanzee observer Jane Goodall (1998), paved the way for later studies of animal thinking, language, and emotion: "Observations, made in the natural habitat, helped to show that the societies and behavior of animals are far more complex than previously supposed," thus expanding our understanding of our fellow animals. We later learned that chimpanzees and baboons also use deception to achieve their aims. Psychologists Andrew Whiten and Richard Byrne (1988) repeatedly saw one young baboon pretending to have been attacked by another as a tactic to get its mother to drive the other baboon away from its food.



"How would you like me to answer that question?
As a member of my ethnic group, educational
class, income group, or religious category?"

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

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

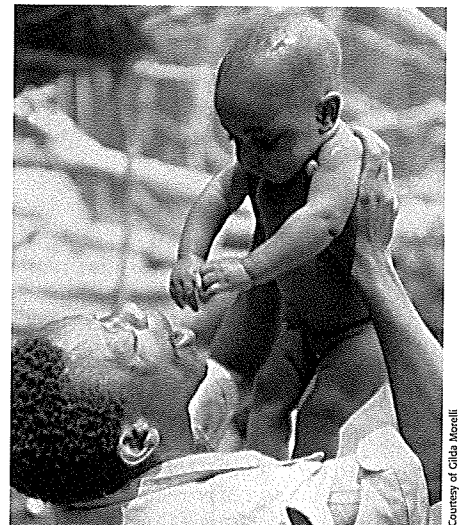
population all the cases in a group, from which samples may be drawn for a study. (Note: Except for national studies, this does *not* refer to a country's whole population.)

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.

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).

Naturalistic observation For more than 20 years, psychologist Gilda Morelli has lived among and observed the Efe people of Central Africa, including the man and baby shown here, studying paternal and maternal care and observing children's development.



Courtesy of Gilda Morelli

Naturalistic observations are also done with humans. Here are three findings you might enjoy.

- *A funny finding.* We humans laugh 30 times more often in social situations than in solitary situations. (Have you noticed how seldom you laugh when alone?) When we do laugh, 17 muscles contort our mouth and squeeze our eyes, and we emit a series of 75-millisecond vowel-like sounds that are spaced about one-fifth of a second apart (Provine, 2001).
- *Sounding out students.* What, really, are introductory psychology students saying and doing during their everyday lives? To find out, Matthias Mehl and James Pennebaker (2003) equipped 52 such University of Texas students with a belt-worn tape recorder that, for up to four days, captured 30 seconds of their waking hours every 12.5 minutes—thus enabling the researchers to eavesdrop on more than 10,000 half-minute life slices. On what percentage of the slices do you suppose they found the students talking with someone? What percentage captured the students at a computer keyboard? The answers: 28 and 9 percent, respectively. (What percentage of *your* waking hours are spent in these activities?)
- *Culture, climate, and the pace of life.* Naturalistic observation also enabled Robert Levine and Ara Norenzayan (1999) to compare the pace of life in 31 countries. By operationally defining *pace of life* as walking speed, the speed with which postal clerks completed a simple request, and the accuracy of public clocks, they concluded that life is fastest paced in Japan and Western Europe, and slower paced in economically less-developed countries. People in colder climates also tend to live at a faster pace (and are more prone to die from heart disease). As this study illustrates, naturalistic observation can also be used with correlational research, our next topic.

Correlation

Describing behavior is a first step toward predicting it. When surveys and naturalistic observations reveal that one trait or behavior accompanies another, we say the two **correlate**. The *correlation coefficient* is a statistical measure of a relationship. It reveals how closely two things vary together and thus how well either one *predicts* the other. Knowing how much aptitude test scores *correlate* with school success tells us how well the scores *predict* school success.

A *positive correlation* (between 0 and +1.00) indicates a *direct* relationship, meaning that two things increase together or decrease together.

A *negative correlation* (between 0 and -1.00) indicates an *inverse* relationship: As one thing increases, the other decreases. Our earlier findings on self-esteem and depression illustrate a negative correlation: People who score *low* on self-esteem tend to score *high* on depression. Negative correlations could go as low as -1.00, which means that, like people on the opposite ends of a teeter-totter, one set of scores goes down precisely as the other goes up. A weak correlation, indicating little or no relationship, has a coefficient near zero.

Here are some recent news reports of correlational research. Can you spot which are reporting positive correlations, which negative?

- The more TV is on in the homes of young children, the less time they spend reading (Kaiser, 2003).
 - The more sexual content teens see on TV, the more likely they are to have sex (Collins & others, 2004).
 - The longer children are breast-fed, the greater their later academic achievement (Horwood & Fergusson, 1998).
 - The more income rose among a sample of poor families, the fewer psychiatric symptoms their children experienced (Costello & others, 2003).
- (These are negative, positive, positive, and negative correlations, respectively.)

correlation a measure of the extent to which two factors vary together, and thus of how well either factor predicts the other. The *correlation coefficient* is the mathematical expression of the relationship, ranging from -1 to +1.

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

The point to remember: A correlation coefficient helps us see the world more clearly by revealing the extent to which two things relate.

Correlation and Causation

9 Why do correlations permit prediction but not explanation?

Correlations help us predict. Low self-esteem correlates with (and therefore predicts) depression. But does that mean low self-esteem *causes* depression? If, based on the correlational evidence, you assume that it does, you have much company. A nearly irresistible thinking error is assuming that correlation proves causation. But no matter how strong the relationship, it does not!

How else might we explain the negative correlation between self-esteem and depression? As Figure 1.3 suggests, we'd get the same correlation between low self-esteem and depression if depression caused people to be down on themselves, or if something else—a third factor such as heredity or brain chemistry—caused both low self-esteem and depression. Among men, for example, length of marriage correlates positively with hair loss—because both are associated with a third factor, age.

This point is so important—so basic to thinking smarter with psychology—that it merits one more example, from a survey of over 12,000 adolescents: The more teens feel loved by their parents, the less likely they are to behave in unhealthy ways—having early sex, smoking, abusing alcohol and drugs, exhibiting violence (Resnick & others, 1997). “Adults have a powerful effect on their children’s behavior right through the high school years,” gushed an Associated Press (AP) story on the study. But the correlation comes with no built-in cause-effect arrow. Said differently (turn the volume up here), *correlation does not prove causation*. Thus, the AP could as well have said, “Well-behaved teens feel their parents’ love and approval; out-of-bounds teens more often think their parents are disapproving jerks.”

The point to remember: Correlation indicates the *possibility* of a cause-effect relationship, but it does not prove causation. Knowing that two events are correlated need not tell us anything about causation. Remember this principle and you will be wiser as you read and hear news of scientific studies.



Correlation need not mean causation

Length of marriage correlates with hair loss in men. Does this mean that marriage causes men to lose their hair (or that balding men make better husbands)? In this case, as in many others, a third factor obviously explains the correlation: Golden anniversaries and baldness both accompany aging.

A New York Times writer reported a massive survey showing that “adolescents whose parents smoked were 50 percent more likely than children of nonsmokers to report having had sex.” He concluded (would you agree?) that the survey indicated a causal effect—that “to reduce the chances that their children will become sexually active at an early age” parents might “quit smoking” (O’Neil, 2002).

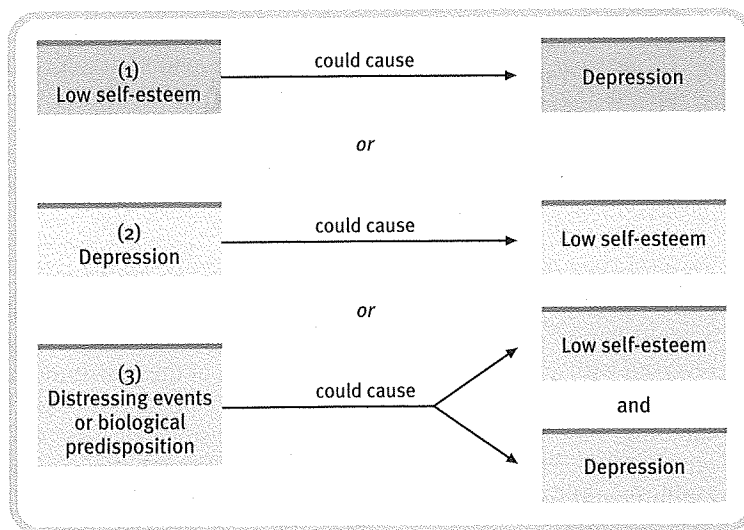


Figure 1.3 Three possible cause-effect relationships People low in self-esteem are more likely to report depression than are those high in self-esteem. One possible explanation of this negative correlation is that a bad self-image causes depressed feelings. But, as the diagram indicates, other cause-effect relationships are possible.

illusory correlation the perception of a relationship where none exists.

Illusory Correlations

10 How accurately does the naked eye detect correlations?

Correlation coefficients make visible the relationships we might otherwise miss. They also restrain our “seeing” relationships that actually do not exist. A perceived but nonexistent correlation is an **illusory correlation**. When we *believe* there is a relationship between two things, we are likely to *notice* and *recall* instances that confirm our belief (Trolier & Hamilton, 1986).

Because we are sensitive to dramatic or unusual events, we are especially likely to notice and remember the occurrence of two such events in sequence—say, a premonition of an unlikely phone call followed by the call. When the call does not follow the premonition, we are less likely to note and remember the nonevent. Illusory correlations help explain many other superstitious beliefs, such as the presumption that more babies are born when the moon is full or that infertile couples who adopt become more likely to conceive (Gilovich, 1991).

Such illusory thinking helps explain why for so many years people believed (and many still do) that sugar made children hyperactive, that getting cold and wet caused one to catch a cold, and that weather changes trigger arthritis pain. We are, it seems, prone to perceiving patterns, whether they’re there or not.

The point to remember: When we notice random coincidences, we may forget that they are random and instead see them as correlated. Thus, we can easily deceive ourselves by seeing what is not there.

Perceiving Order in Random Events

In our natural eagerness to make sense of our world—what poet Wallace Stevens called our “rage for order”—we look for order even in random data. And we usually find such, because *random sequences often don’t look random*. Consider a random coin flip: If someone flipped a coin six times, which of the following sequences of heads (H) and tails (T) would be most likely: HHHTTT or HTTHTH or HHHHHH?

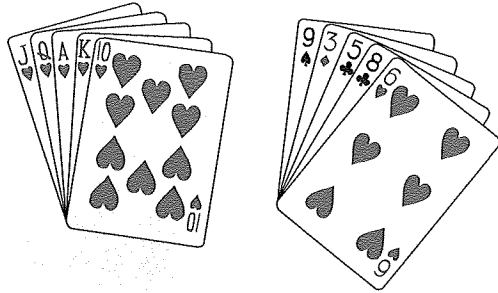
Daniel Kahneman and Amos Tversky (1972) found that most people believe HTTHTH would be the most likely random sequence. Actually, all three are equally likely (or, you might say, equally unlikely) to occur. A bridge or poker hand of 10 through Ace, all of hearts, would seem extraordinary; actually, it would be no more or less likely than any other specific hand of cards (Figure 1.4).

In actual random sequences, patterns and streaks (such as repeating digits) occur more often than people expect. To demonstrate this phenomenon for myself (as you can do), I flipped a coin 51 times, with these results:

1. H	11. T	21. T	31. T	41. H	51. T
2. T	12. H	22. T	32. T	42. H	
3. T	13. H	23. H	33. T	43. H	
4. T	14. T	24. T	34. T	44. H	
5. H	15. T	25. T	35. T	45. T	
6. H	16. H	26. T	36. H	46. H	
7. H	17. T	27. H	37. T	47. H	
8. T	18. T	28. T	38. T	48. T	
9. T	19. H	29. H	39. H	49. T	
10. T	20. H	30. T	40. T	50. T	

Looking over the sequence, patterns jump out: Tosses 10 to 22 provided an almost perfect pattern of pairs of tails followed by pairs of heads. On tosses 30 to 38 I had a “cold hand,” with only one head in eight tosses. But my fortunes immediately reversed with a “hot hand”—seven heads out of the next nine tosses. Similar streaks happen, about as often as one would expect in random sequences, in basketball shooting, baseball hitting, and mutual fund stock pickers’ selections (Gilovich & others, 1985; Malkiel, 1989, 1995; Myers, 2002). These sequences often don’t look random, and so get overinterpreted (“When you’re hot, you’re hot!”).

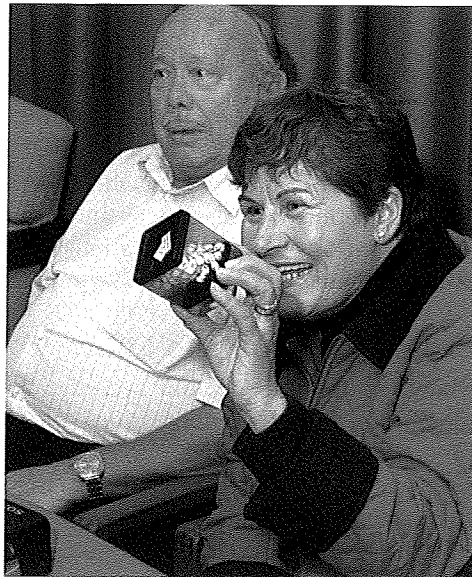
Figure 1.4 Two random sequences
Your chances of being dealt either of these hands are precisely the same: 1 in 2,598,960.



What explains these streaky patterns? Was I exercising some sort of paranormal control over my coin? Did I snap out of my tails funk and get in a heads groove? No such explanations are needed, for these are the sorts of streaks found in any random data. Comparing each toss to the next, 24 of the 50 comparisons yielded a changed result—just the sort of near 50-50 result we expect from coin tossing. Despite seeming patterns, the outcome of one toss gives no clue to the outcome of the next.

However, some happenings seem so extraordinary that we struggle to conceive an ordinary, chance-related explanation (as applies to our coin-tosses). In such cases, statisticians often are less mystified. When Evelyn Marie Adams won the New Jersey lottery *twice*, newspapers reported the odds of her feat as 1 in 17 trillion. Bizarre? Actually, 1 in 17 trillion are the odds that a given person who buys a single ticket for two New Jersey lotteries will win both times. But statisticians Stephen Samuels and George McCabe (1989) report that, given the millions of people who buy U.S. state lottery tickets, it was “practically a sure thing” that someday, somewhere, someone would hit a state jackpot twice. Indeed, say fellow statisticians Persi Diaconis and Frederick Mosteller (1989), “with a large enough sample, any outrageous thing is likely to happen.” “The really unusual day would be one where nothing unusual happens,” adds Diaconis (2002). An event that happens to but one in 1 billion people every day occurs about six times a day, 2000 times a year.

Jerry Teller/San Francisco Chronicle



Given enough random events, something weird will happen Angelo and Maria Gallina were the beneficiaries of one of those extraordinary chance events when they won two California lottery games on the same day.

On March 11, 1998, Utah's Ernie and Lynn Carey gained three new grandchildren when three of their daughters gave birth—on the same day (Los Angeles Times, 1998).

BIZARRE SEQUENCE OF COMPUTER-GENERATED RANDOM NUMBERS



© 1990 by Sidney Harris/American Scientist magazine.

Bizarre-looking, perhaps. But actually no more unlikely than any other number sequence.

Rehearse It!

12. In psychology, a good theory implies hypotheses, or predictions that can be tested. When hypotheses are tested, the result is typically
 - a. increased skepticism.
 - b. rejection of the merely theoretical.
 - c. confirmation or revision of the theory.
 - d. personal bias on the part of the investigator.
13. Psychologists use various research methods to observe and describe behaviors and mental processes. Which of the following would you use in an attempt to predict college grades from high school grades?
 - a. A case study
 - b. Naturalistic observation
 - c. Correlational research
 - d. A phone survey
14. You wish to take an accurate poll in a certain country by questioning

people who truly represent the country's adult population. Therefore, you need to make sure the people are

- a. at least 50 percent males and 50 percent females.
- b. a small but intelligent sample of the population.
- c. a very large sample of the population.
- d. a random sample of the population.

15. Suppose a psychologist finds that the more natural childbirth training classes a woman attends, the less pain medication she requires during childbirth. The relationship between the number of training sessions and the amount of pain medication required is a/an
 - a. positive correlation (direct relationship).
 - b. negative correlation (inverse relationship).

- c. cause-effect relationship.
- d. illusory correlation.

16. Knowing that two events are correlated does not tell us what is the cause and what is the effect. However, it does provide
 - a. a basis for prediction.
 - b. an explanation of events.
 - c. proof that as one increases, the other also increases.
 - d. an indication that an underlying third factor is at work.
17. Some people wrongly perceive that their dreams predict future events. This is an example of a/an
 - a. negative correlation.
 - b. positive correlation.
 - c. illusory correlation.
 - d. naturalistic correlation.

Answers: 12. c, 13. c, 14. d, 15. b, 16. d, 17. c

Experimentation

11 How do experiments clarify or reveal cause-effect relationships?

Happy are they, remarked the Roman poet Virgil, “who have been able to perceive the causes of things.” We endlessly wonder and debate *why* we act as we do. Why do people smoke? Have babies while they are still children? Do stupid things when drunk? Become troubled teens and open fire on their classmates? Though psychology cannot answer these questions directly, it has helped us to understand what influences drug use, sexual behaviors, thinking when drinking, and aggression.

Exploring Cause and Effect

Many factors influence our everyday behavior. To isolate cause and effect—say, in looking for causes of depression—psychologists statistically control for other factors. For example, many studies have found that breast-fed infants grow up with somewhat higher intelligence scores than those of infants bottle-fed with cow’s milk (Angelsen & others, 2001; Mortensen & others, 2002; Quinn & others, 2001). Mother’s milk correlates modestly but positively with later intelligence. But does this mean that smarter mothers (who more often breast-feed) have smarter children? Or, as some researchers believe, do the nutrients of mother’s milk contribute to brain development? To help answer this question, researchers have “controlled for” (statistically removed differences in) certain other factors, such as maternal age, education, and intelligence. Still, breast-fed infants exhibit slightly higher intelligence as young children.

Although this suggests that breast feeding gives a boost, correlational research cannot control for all other possible factors. Thus, the clearest and cleanest way to isolate cause and effect is, however, to **experiment**. Experiments enable a researcher to focus on the possible effects of one or more factors by (1) *manipulating the factors of interest* and (2) *holding constant* (“controlling”) *other factors*. With parental permission, a British research team led by Alan Lucas (1992) decided to experiment. They randomly assigned 424 hospital preterm infants to either the usual infant formula feedings or to donated breast milk feedings. When given intelligence tests at age 8, the children nourished with breast milk had significantly higher intelligence scores than their formula-fed counterparts. No single experiment is conclusive, of course. But by **randomly assigning** infants to one feeding group or the other, these researchers were able to hold constant all factors except nutrition. This eliminated alternative explanations and supported the conclusion that, so far as the developing intelligence of preterm infants is concerned, breast is best. (Note: The other infants were not harmed by the experiment, because they received the standard feeding.)

If a behavior (such as test performance) changes when we vary an experimental factor (such as infant nutrition), then we know the factor is having an effect. *The point to remember:* Unlike correlational studies, which uncover naturally occurring relationships, an experiment manipulates a factor to determine its effect.

Evaluating Therapies

Our tendency to seek new remedies when we are ill or emotionally down can produce misleading testimonies. If three days into a cold we start taking vitamin C tablets and find our cold symptoms lessening, we may credit the pills rather than the cold naturally subsiding. If, after nearly failing the first exam, we listen to a “peak learning” subliminal tape and then improve on the next exam, we may credit the tape rather than conclude that our performance has returned to our average. In the 1700s, blood-letting *seemed* effective. Sometimes people improved after the treatment; when they didn’t, the practitioner inferred the disease was just too advanced to be reversed. (We, of course, now know that blood-letting is a *bad* treatment.) So, whether or not a remedy is truly effective, enthusiastic users will probably endorse it. To find out whether it actually is effective, we must experiment.

experiment a research method in which an investigator manipulates one or more factors (independent variables) to observe the effect on some behavior or mental process (the dependent variable). By random assignment of participants, the experimenter aims to control other relevant factors.

random assignment assigning participants to experimental and control conditions by chance, thus minimizing preexisting differences between those assigned to the different groups.

double-blind procedure an experimental procedure in which both the research participants and the research staff are ignorant (blind) about whether the research participants have received the treatment or a placebo. Commonly used in drug-evaluation studies.

placebo [pluh-SEE-bo; Latin for “I shall please”] **effect** experimental results caused by expectations alone; any effect on behavior caused by the administration of an inert substance or condition, which is assumed to be an active agent.

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

control group the group in an experiment that contrasts with the experimental condition and serves as a comparison for evaluating the effect of the treatment.

independent variable the experimental factor that is manipulated; the variable whose effect is being studied.

dependent variable the outcome factor; the variable that may change in response to manipulations of the independent variable.

And that is precisely how investigators evaluate new drug treatments and new methods of psychological therapy (Chapter 13). Often, the participants in these studies are *blind* (uninformed) about what treatment, if any, they are receiving. One group receives the treatment. Others receive a pseudotreatment—an inert *placebo* (perhaps a pill with no drug in it). Many studies use a **double-blind procedure**—neither the participant nor the research assistant collecting the data knows whether the participant's group is receiving the treatment. In such studies, researchers can check a treatment's actual effects apart from the participants' belief in its healing powers and the staff's enthusiasm for its potential. Just *thinking* you are getting a treatment can boost your spirits, relax your body, and relieve your symptoms. This **placebo effect** is well documented in reducing pain, depression, and anxiety (Kirsch & Sapirstein, 1998).

The double-blind procedure is one way to create an **experimental group**, in which people receive the treatment, and a contrasting **control group** without the treatment. By randomly assigning people to these conditions, researchers can be fairly certain the two groups are otherwise identical. Random assignment roughly equalizes the two groups in age, attitudes, and every other characteristic. With random assignment, as occurred with the infants in the breast milk experiment, we also can know that any later differences between people in the experimental and control conditions will usually be the result of the treatment.

Independent and Dependent Variables

Here is an even more potent example: The drug Viagra was approved for use after 21 clinical trials, including an experiment in which researchers randomly assigned 329 men with impotence to either an experimental condition (Viagra) or a control condition (a placebo). It was a double-blind procedure—neither the men nor the person who gave them the pills knew which drug they were receiving. The result: At peak doses, 69 percent of Viagra-assisted attempts at intercourse were successful, compared with 22 percent for men receiving the placebo (Goldstein & others, 1998). Viagra had an effect.

This simple experiment manipulated just one drug factor. We call this experimental factor the **independent variable** because we can vary it independently of other factors, such as the men's age, weight, and personality (which random assignment should control). Experiments examine the effect of one or more independent variables on some measurable behavior, called the **dependent variable** because it can vary *depending* on what takes place during the experiment. Both variables are given precise *operational definitions*, which specify the procedures that manipulate the independent variable (the precise drug dosage and timing in this study) or measure the dependent variable (the questions that assessed the men's responses). These definitions answer the "What do you mean?" question with a level of precision that enables others to repeat the study. (See Figure 1.5 for the breast milk experiment's design.)

Note the distinction between random sampling in surveys and random assignment in experiments. Random sampling helps us generalize to a larger population. Random assignment controls extraneous influences, which helps us infer cause and effect.

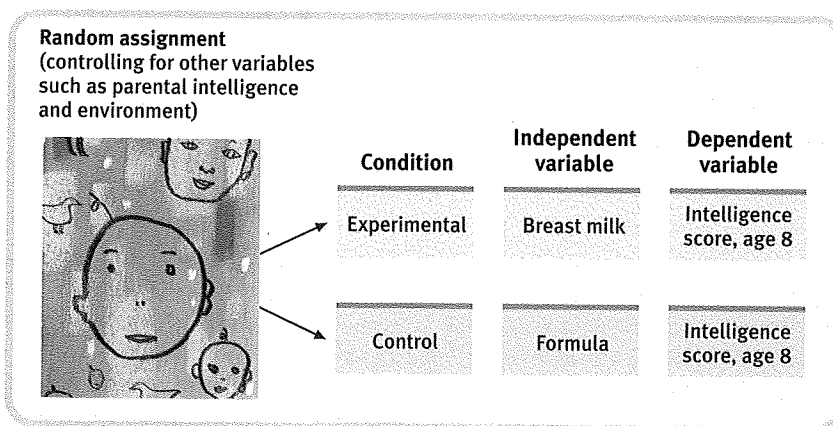


Figure 1.5 Experimentation To discern causation, psychologists may randomly assign some participants to an experimental group, others to a control group. Measuring the dependent variable (intelligence score) will determine the effect of the independent variable (type of milk).

Table 1.2

Comparing Research Methods

Research Method	Basic Purpose	How Conducted	What Is Manipulated	Weaknesses
Descriptive	To observe and record behavior	Do case studies, surveys, or naturalistic observations	Nothing	No control of variables; single cases may be misleading.
Correlational	To detect naturally occurring relationships; to assess how well one variable predicts another	Compute statistical association, sometimes among survey responses	Nothing	Does not specify cause and effect.
Experimental	To explore cause and effect	Manipulate one or more factors; use random assignment	The independent variable(s)	Sometimes not feasible; results may not generalize to other contexts; not ethical to manipulate certain variables.

Experiments can also help us evaluate social programs. Do early childhood education programs boost impoverished children's chances for success? What are the effects of different anti-smoking campaigns? Do school sex-education programs reduce teen pregnancies? To answer these questions, we can experiment: If an intervention is welcomed but resources are scarce, we could use a lottery to randomly assign some people (or regions) to experience the new program and others to a control condition. If later the two groups differ, the intervention's effect will be confirmed (Passell, 1993).

Let's recap. A *variable* is anything that can vary (infant nutrition, intelligence, TV exposure—anything within the bounds of what is feasible and ethical). Experiments aim to *manipulate* an *independent* variable, *measure* the *dependent* variable, and *control* all other variables. An experiment has at least two different groups: an *experimental group* and a *comparison or control group*. *Random assignment* works to equate the groups before any treatment effects. In this way, an experiment tests the effect of at least one independent variable (what we manipulate) on at least one dependent variable (the outcome we measure). Table 1.2 compares the features of psychology's research methods.

Rehearse It!

18. A researcher wants to determine whether noise level affects the blood pressure of elderly people. In one group she varies the level of noise in the environment and records participants' blood pressure. In this experiment, the level of noise is the
- control condition.
 - experimental condition.
 - dependent variable (the factor being measured).
 - independent variable (the factor being manipulated).

19. To test the effect of a new drug on depression, we randomly assign people to control and experimental groups. Those in the experimental condition take a pink pill containing the new medication; those in the control group take a pink pill that

contains no medication. Which statement is true?

- The medication is the dependent variable.
- Depression is the independent variable.
- Participants in the control group take a placebo.
- Neither the experimental nor the control group is told the purpose of the experiment.

20. To eliminate the biasing effect of a researcher's positive expectations on the outcome of a health clinic's research experiment,

- patients are randomly assigned to the control and experimental groups (random assignment).
- members of the experimental group are carefully matched for age, sex, income, and level of

education with members of the control group.

- neither the patients nor the researcher will know whether a given person has been assigned to the experimental or control condition.
- people in the experimental group are chosen by selecting every tenth person in an alphabetical listing of all the clinic's patients.

21. Descriptive and correlational studies describe behavior, detect relationships, and predict behavior. But in order to begin to explain that behavior, psychologists use
- naturalistic observation.
 - experimentation.
 - surveying.
 - case studying.

Answers: 18. d, 19. c, 20. c, 21. b.

Frequently Asked Questions About Psychology

We have reflected on how a scientific approach can restrain biases. We have seen how case studies, surveys, and naturalistic observations help us describe behavior. We have also noted that correlational studies assess the relationship between two factors, which indicates how well one thing predicts another. We have examined the logic that underlies experiments, which use control conditions and random assignment of participants to isolate the effects of an independent variable on a dependent variable.

You are now prepared to understand what lies ahead and to think critically about psychological matters. Yet, even knowing this much, you may still be approaching psychology with a mixture of curiosity and apprehension. So before we plunge in, let's address some frequently asked questions.

12 Can laboratory experiments illuminate everyday life?

When you see or hear about psychological research, do you ever wonder whether people's behavior in the lab will predict their behavior in real life? For example, does detecting the blink of a faint red light in a dark room have anything useful to say about flying a plane at night? After viewing a violent, sexually explicit film, does an aroused man's increased willingness to push buttons that he thinks will electrically shock a woman really say anything about whether violent pornography makes a man more likely to abuse a woman?

Before you answer, consider: The experimenter *intends* the laboratory environment to be a simplified reality—one that simulates and controls important features of everyday life. Just as an aeronautical wind tunnel enables an engineer to re-create atmospheric forces under controlled conditions, a laboratory experiment enables a psychologist to re-create psychological forces under controlled conditions.

In aggression studies, deciding whether to push a button that delivers a shock may not be the same as slapping someone in the face, but the *principle* is the same. The experiment's purpose, notes Douglas Mook (1983), is not to re-create the exact behaviors of everyday life but to test theoretical principles. *It is the resulting principles—not the specific findings—that help explain everyday behaviors.*

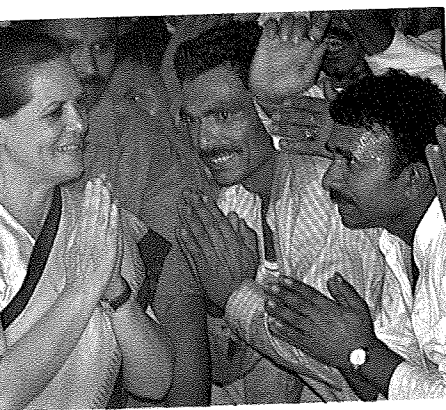
When psychologists apply laboratory research on aggression to actual violence, they are applying theoretical *principles* of aggressive behavior, principles they have refined through many experiments. Similarly, it is the principles of the visual system, developed from experiments in artificial settings (such as looking at red lights in the dark), that we apply to more complex behaviors such as night flying. And many investigations show that principles derived in the laboratory *do* typically generalize to the everyday world (Anderson & others, 1999).

The point to remember: As psychologists, our concerns lie less with particular behaviors than with the general principles that help explain many behaviors.

13 Does behavior depend on one's culture and gender?

If culture shapes behavior, what can psychological studies done in one culture, often with white Europeans or North Americans, really tell us about people in general? As we will see time and again, **culture**—shared ideas and behaviors that one generation passes on to the next—matters. Our culture influences our standards of promptness and frankness, our attitudes toward premarital sex and varying body shapes, our tendency to be casual or formal, our eye contact, our conversational distance, and much, much more. Being aware of such differences, we can restrain our assumptions that others will think and act as we do. Given the growing mixing and clashing of cultures, our need for such awareness is urgent.

culture the enduring behaviors, ideas, attitudes, and traditions shared by a large group of people and transmitted from one generation to the next.



A cultured greeting Because culture shapes people's understanding of social behavior, actions that seem ordinary to us may seem quite odd to visitors from far away. Yet underlying these differences are powerful similarities. Supporters of newly elected leaders everywhere typically greet them with pleased deference, though not necessarily with bows and folded hands, as in India. Here influential and popular politician Sonia Gandhi greets some of her constituents shortly after her election.

"All people are the same; only their habits differ."

Confucius, 551–479 B.C.

"Rats are very similar to humans except that they are not stupid enough to purchase lottery tickets."

Dave Barry, July 2, 2002

You will see throughout this book that gender matters, too. Researchers report gender differences in what we dream, in how we express and detect emotions, and in our risk for alcoholism, depression, and eating disorders. Not only is studying such differences interesting, it also is potentially beneficial. For example, many researchers believe that women carry on conversations more readily to build relationships, while men talk more to give information and advice (Tannen, 1990). Knowing this difference can help us prevent conflicts and misunderstandings in everyday relationships.

We also tend to exhibit and perceive the very behaviors our culture expects of males and females. But it's important to remember that psychologically as well as biologically, women and men are overwhelmingly similar. Whether female or male, we learn to walk at about the same age. We experience the same sensations of light and sound. We feel the same pangs of hunger, desire, and fear. We exhibit similar overall intelligence and well-being.

Our shared biological heritage unites us as a universal human family. The same underlying processes guide people everywhere:

- People diagnosed with dyslexia, a reading disorder, exhibit the same brain mal-function whether they are Italian, French, or British (Paulesu & others, 2001).
- Variation in languages—spoken and gestured—may impede communication across cultures. Yet all languages share deep principles of grammar, and people from opposite hemispheres can communicate with a smile or a frown.
- People in different cultures do vary in feelings of loneliness. But across cultures, loneliness is magnified by shyness, low self-esteem, and being unmarried (Jones & others, 1985; Rokach & others, 2002).
- Most Japanese prefer their fish raw and most North Americans prefer theirs cooked. But the same principles of hunger and taste influence us all when we sit down to a meal. We are each in certain respects like all others, like some others, and like no other. Studying people of all races and cultures helps us discern our similarities and our differences, our human kinship and our diversity.

The point to remember: Even when specific attitudes and behaviors vary across cultures, as they often do, the underlying processes are much the same. A children's song says it well: "We're all the same and different."

14 Why do psychologists study animals, and is it ethical to experiment on animals?

Many psychologists study animals because they find them fascinating. They want to understand how different species learn, think, and behave. Psychologists also study animals to learn about people, by doing experiments permissible only with animals. Human physiology resembles that of many other animals. We humans are not *like* animals; we *are* animals. Animal experiments have therefore led to treatments for human diseases—insulin for diabetes, vaccines to prevent polio and rabies, transplants to replace defective organs.

Likewise, the same processes by which humans see, exhibit emotion, and become obese are present in rats and monkeys. To discover more about the basics of human learning, researchers even study sea slugs. To understand how a combustion engine works, you would do better to study a lawn mower's engine than a Mercedes'. Like Mercedes' engines, humans are complex. But the simplicity of the sea slug's nervous system is precisely what makes it so revealing of the neural mechanisms of learning.

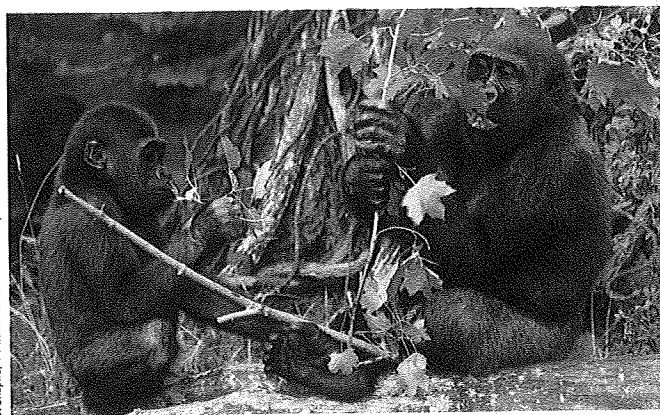
If we share important similarities with other animals, then should we not respect them? "We cannot defend our scientific work with animals on the basis of the similarities between them and ourselves and then defend it morally on the basis of differences," noted Roger Ulrich (1991). The animal protection movement protests the use of animals in psychological, biological, and medical research. Researchers remind us that the world's 30 million mammals used each year in research are but a fraction of 1 percent of the billions of animals killed annually for food (which means the average person eats 20 animals a year). And for every dog or cat used in an experiment and cared for under humane regulations, 50 others are killed each year in humane animal shelters (Goodwin & Morrison, 1999).

Animal protection organizations, such as Psychologists for the Ethical Treatment of Animals (PETA), advocate naturalistic observation of animals rather than laboratory manipulation. Animal researchers have responded that the issue is not the morality of good versus evil but of compassion for animals versus compassion for people. How many of us would have attacked Louis Pasteur's experiments with rabies, which caused some dogs to suffer but led to a vaccine that spared millions of people (and dogs) from agonizing death? And would we really wish to have deprived ourselves of the animal research that led to effective methods of training children with mental disorders; of understanding aging; and of relieving fears and depression? The answers to such questions vary by culture. In Gallup surveys in Canada and the United States, about 6 in 10 adults deem medical testing on animals "morally acceptable." In Britain, only 37 percent do (Mason, 2003).

Out of this heated debate, two issues emerge. The basic one is whether it is right to place the well-being of humans above that of animals. In experiments on stress and cancer, is it right that mice get tumors in hopes that people might not? Should some monkeys be exposed to an HIV-like virus in the search for an AIDS vaccine? Is our use of other animals as natural as the behavior of carnivorous hawks, cats, and whales?

If we give human life first priority, the second issue is the priority we give to the well-being of animals in research. What safeguards should protect them? Most researchers today feel ethically obligated to enhance the well-being of captive animals and protect them from needless suffering. In one survey of animal researchers, 98 percent or more supported government regulations protecting primates, dogs, and cats, and 74 percent supported regulations providing for the humane care of rats and mice (Plous & Herzog, 2000). Many professional associations and funding agencies already have such guidelines. For example, British Psychological Society guidelines call for housing animals under reasonably natural living conditions, with companions for social animals (Lea, 2000). American Psychological Association (2002) guidelines mandate ensuring the "comfort, health, and humane treatment" of animals, and of minimizing "infection, illness, and pain of animal subjects." Humane care also leads to more effective science, because pain and stress would distort the animals' behavior during experiments.

Animals have themselves benefited from animal research. One Ohio team of research psychologists measured stress hormone levels in samples of millions of dogs brought each year to animal shelters, and they devised handling and stroking methods that reduced stress and eased their transition to adoptive homes (Tuber & others, 1999). In New York, formerly listless and idle Bronx Zoo animals now stave off boredom by working for their supper, as they would in the wild (Stewart, 2002). Other studies have helped improve care and management in animals' natural habitats. By revealing our behavioral kinship with animals and the remarkable intelligence of chimpanzees, gorillas, and other animals, experiments have also led to increased empathy and protection for them. At its best, a psychology concerned for humans and sensitive to animals serves the welfare of both.



D. Shapiro, et al./Life Conservation Society

"I believe that to prevent, cripple, or needlessly complicate the research that can relieve animal and human suffering is profoundly inhuman, cruel, and immoral."

Psychologist Neal Miller, 1983

"Please do not forget those of us who suffer from incurable diseases or disabilities who hope for a cure through research that requires the use of animals."

Psychologist Dennis Feeney (1987)

"The righteous know the needs of their animals."

Proverbs 12:10

"The greatness of a nation can be judged by the way its animals are treated."

Mahatma Gandhi, 1869–1948

Animal research benefiting animals

Thanks partly to research on the benefits of novelty, control, and stimulation, these gorillas are enjoying an improved quality of life in New York's Bronx Zoo.

15 Is it ethical to experiment on people?

If the image of animals or people receiving supposed electric shocks troubles you, you may be relieved to know that most psychological research involves no such stress. With people, blinking lights, flashing words, and pleasant social interactions are more common.

Occasionally, though, researchers do temporarily stress or deceive people, but only when they believe it is essential to a justifiable end, such as understanding and controlling violent behavior or studying mood swings. Such experiments wouldn't work if the participants knew all there was to know about the experiment beforehand. Either the procedures would be ineffective or the participants, wanting to be helpful, might try to confirm the researchers' predictions.

Ethical principles developed by the American Psychological Association (1992) and the British Psychological Society (1993) urge investigators to (1) obtain the informed consent of potential participants, (2) protect them from harm and discomfort, (3) treat information about individual participants confidentially, and (4) fully explain the research afterward. Moreover, most universities today screen research proposals through an ethics committee that safeguards the well-being of every participant.

16 Is psychology free of value judgments?

Psychology is definitely not value-free. Values affect what we study, how we study it, and how we interpret results. Consider: Researchers' values influence their choice of research topics—whether to study worker productivity or worker morale, sex discrimination or gender differences, conformity or independence. Values can also color “the facts.” As we noted earlier, our preconceptions can bias our observations and interpretations; sometimes we see what we want or expect to see (Figure 1.6).

Even the words we use to describe a phenomenon can reflect our values. Are the sex acts we do not practice “perversions” or “sexual variations”? Both in and out of psychology, labels describe and labels evaluate: The same holds true in everyday speech. One person's “rigidity” is another's “consistency,” one person's “faith” is another's “fanaticism.” Our labeling someone as “firm” or “stubborn,” “careful” or “picky,” “discreet” or “secretive” reveals our feelings.

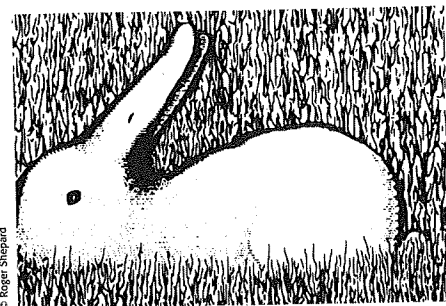
Popular applications of psychology also contain hidden values. If you defer to “professional” guidance about how to live—how to raise children, how to achieve self-fulfillment, what to do with sexual feelings, how to get ahead at work—you are accepting value-laden advice. A science of behavior and mental processes can certainly help us reach our goals, but it cannot decide what those goals should be.

“It is doubtless impossible to approach any human problem with a mind free from bias.”

Simone de Beauvoir, *The Second Sex*, 1953

Figure 1.6 What do you see?

People interpret ambiguous information to fit their preconceptions. Did you see a duck or a rabbit? Before showing some friends this image, ask them if they can see the duck lying on its back (or the bunny in the grass). (From Shepard, 1990.)



17 Is psychology potentially dangerous?

If some people see psychology as merely common sense, others have a different concern—that it is becoming dangerously powerful. Is it an accident that astronomy is the oldest science and psychology the youngest? Exploring the external universe is one thing, but to some people, exploring our own inner universe seems more dangerous and threatening. Might psychology be used to manipulate people?

Knowledge, like all power, can be used for good or evil. Nuclear power has been used to light up cities—and to demolish them. Persuasive power has been used to educate people—and to deceive them. Although psychology does indeed have the power to deceive, its purpose is to enlighten. Every day, psychologists are exploring ways to enhance learning, creativity, and compassion. Psychology also speaks to many of our world's great problems—war, overpopulation, prejudice, family dysfunction, crime—all of which involve attitudes and behaviors. And psychology speaks to our deepest longings—for nourishment, for love, for happiness. True, psychology cannot address all of life's great questions, but it speaks to some mighty important ones.

Rehearse It!

22. In a laboratory experiment, features of everyday life can be simulated, manipulated, and controlled. The laboratory environment is designed to
- exactly re-create the events of everyday life.
 - re-create psychological forces under controlled conditions.
 - create opportunities for naturalistic observation.
 - minimize the use of animals and humans in psychological research.
23. Which of the following is true

- regarding gender differences and similarities?
- Differences between the genders outweigh any similarities.
 - Despite some gender differences, the underlying processes of human behavior are the same.
 - Both similarities and differences between the genders depend more on biology than on environment.
 - Gender differences are so numerous, it is difficult to make meaningful comparisons.

24. The animal protection movement has protested the use of animals in all fields of scientific research. In defending their experimental research with animals, psychologists have noted that
- animals' physiology and behavior can tell us much about our own.
 - they do not torture or needlessly exploit animals.
 - advancing the well-being of humans justifies animal experimentation.
 - all of the above are true.

Answers : 22. a, 23. b, 24. d

Tips for Studying Psychology

18 How can psychological principles help you as a student?

The investment you are making in studying psychology should enrich your life and enlarge your vision. Although many of life's significant questions are beyond psychology, some very important ones are illuminated by even a first psychology course. Through painstaking research, psychologists have gained insights into brain and mind, depression and joy, dreams and memories. Even the unanswered questions can enrich us, by renewing our sense of mystery about "things too wonderful" for us yet to understand. What is more, your study of psychology can help teach you *how to ask and answer important questions*—how to think critically as you evaluate competing ideas and claims.

Having your life enriched and your vision enlarged (and getting a decent grade) requires effective study. As you will see in Chapter 8, to master information you must *actively process* it. Your mind is not like your stomach, something to be filled passively; it is more like a muscle that grows stronger with exercise. Countless experiments reveal that people learn and remember material best when they put it in their own words, rehearse it, and then review and rehearse it again.

The **SQ3R** study method incorporates these principles (Robinson, 1970). SQ3R is an acronym for its five steps: Survey, Question, Read, Rehearse, Review.

To study a chapter, first *survey*, taking a bird's-eye view as you note its headings. Notice how the chapter is organized.

As you prepare to read each section, use its heading or the preview question to form a *question* that you should answer. For this section, you might have asked, "How can I most effectively and efficiently master the information in this book?"

Then *read*, actively searching for the answer. At each sitting, read only as much of the chapter as you can absorb without tiring. Usually, a single main chapter section will do—the Frequently Asked Questions section you just finished, for example. Relating what you are reading to your own life will improve understanding and retention. Reading the occasional Close-Up and Thinking Critically boxes will also help.

Having read a section, *rehearse* in your own words what you read. Test yourself by trying to answer your question, rehearsing what you can recall, then glancing back over what you can't recall.

Finally, *review*: Read over any notes you have taken, again with an eye on the chapter's organization, and quickly review the whole chapter.

Survey, question, read, rehearse, review. I have organized this book's chapters to facilitate your use of the SQ3R study system. Each chapter begins with a chapter

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

outline that aids your *survey*. Headings and *preview questions* suggest issues and concepts you should consider as you *read*. The material is organized into sections of readable length. At the end of each section there are *Rehearse It* questions that help you test yourself before moving on, and more *Test Yourself* questions follow at the chapter's end. The answers to these questions help you *review* the chapter's essentials, and the list of key terms helps you check your mastery of important concepts. Survey, question, read. . . .

Five additional study tips may further boost your learning:

1. *Distribute your study time.* One of psychology's oldest findings is that "spaced practice" promotes better retention than "massed practice." You'll remember material better if you space your time over several study periods—perhaps one hour a day, six days a week—rather than cram it into one long study blitz. Spacing your study sessions requires a disciplined approach to managing your time. (Richard O. Straub explains time management in the helpful *Study Guide* that accompanies this text.) For example, rather than trying to read an entire chapter in a single sitting, read just one main section and then turn to something else.
2. *Learn to think critically.* Whether reading or in class, note people's *assumptions and values*. What perspective or bias underlies an argument? *Evaluate evidence*. Is it anecdotal? Correlational? Experimental? *Assess conclusions*. Are there alternative explanations?
3. *In class, listen actively.* As psychologist William James urged a century ago, "No reception without reaction, no impression without . . . expression." Listen for the main ideas and subideas of a lecture. *Write them down*. Ask questions during and after class. In class, as in your private study, process the information actively and you will understand and retain it better.
4. *Overlearn.* Psychology tells us that overlearning improves retention. We are prone to overestimating how much we know. You may understand a chapter as you read it, but by devoting extra study time to testing yourself and reviewing what you think you know, you will retain your new knowledge long into the future.
5. *Be a smart test-taker.* If a test contains both multiple-choice questions and an essay question, turn first to the essay. Read the question carefully, noting exactly what the instructor is asking. On the back of a page, pencil in a list of points you'd like to make and then organize them. Before writing, put aside the essay and work through the multiple-choice questions. (As you do so, your mind may continue to mull over the essay question. Sometimes the objective questions will bring pertinent thoughts to mind.) Then reread the essay question, rethink your answer, and start writing. When finished, proofread to eliminate spelling and grammatical errors that make you look less competent than you are. When reading multiple-choice questions, don't confuse yourself by trying to imagine how each choice might be the right one. Try instead to answer the question as if it were a fill-in-the-blank. First cover the answers, recall what you know, and complete the sentence in your mind. Then read the answers on the test and find the alternative that best matches your own answer.

While exploring psychology, you will learn much more than effective study techniques. Psychology deepens our appreciation for how we humans perceive, think, feel, and act. By so doing it can indeed enrich our lives and enlarge our vision. Through this book I hope to help guide you toward that end. As educator Charles Eliot said a century ago: "Books are the quietest and most constant of friends, and the most patient of teachers."