

Psychology in the News

Zaniness on Parade in Pasadena

PASADENA, CA, May 1, 2010. The 33rd Occasional Pasadena Doo Dah Parade, a joyful celebration of wacky weirdness, took place today to the cheers of fans lining the streets. Known as “the other parade” (the more famous one being



Anything goes at the Doo Dah Parade.

the Rose Parade on January 1), the event encourages marchers to shed their inhibitions and dress as outrageously as they please. The parade's favorites include the Men of Leisure Synchronized Nap Team, Tequila Mockingbird & the Royal Doo Dah Orchestra, the BBQ & Hibachi Marching Grill Team, and the Clown Doctors from Outer Space.

Brazil Boy Reunited with Father After Five-Year Custody Battle

ORLANDO, FL, December 27, 2009. After a frustrating five-year custody dispute in Brazilian courts, David Goldman has finally prevailed and has brought his son Sean, now 9, back to the United States. The boy's mother had taken him to her native Brazil, but after her unexpected death, her family refused to allow the father to have custody. David said the boy has yet to call him Dad, but, he added, “now we're together and we'll heal.”

Mexico City Legalizes Gay Marriage

MEXICO CITY, December 24, 2009. Mexico city has become the first city in Latin America to allow same-sex couples to marry and to have the same rights as spouses in heterosexual unions, including the right to



Gay couples in Mexico City celebrate.

adopt children. “This is a huge triumph that has followed so many years of struggle,” said Kin Castañeda. But the ruling has also sparked hostility from social conservatives and church officials. The Roman Catholic Archbishop of Mexico City described the law as immoral and abhorrent. Belgium, the Netherlands, Spain, and Canada have also legalized gay marriage, but the issue remains divisive and inflammatory in the United States.

Court Finds No Evidence Linking Vaccine to Autism

WASHINGTON, DC, March 13, 2010. A special federal court, headed by judges called “special masters,” has sustained an earlier court ruling against three sets of parents who blamed their children's autism on their having gotten the MMR vaccine (which inoculates children against measles, mumps, and rubella, also called German measles). For years, many parents of children with autism have argued that vaccines trigger the devastating condition, but one of the special masters said that the evidence for this claim is “weak, contradictory, and unpersuasive.” Nonetheless, some autism advocacy groups expressed disappointment and said that they still believe a link exists.

Man Charged with Failed Attack on Transatlantic Airliner

DETROIT, MI, December 25, 2009. A 23-year-old Nigerian man, Umar Farouk Abdulmutallab, has been charged with attempting to destroy a Northwest Airlines plane on Christmas Eve as it prepared to land in Detroit with 278 passengers and 11 crew members aboard. Abdulmutallab apparently attended University College London until 2008, studying engineering and living in a posh apartment in an upscale neighborhood. He is accused of trying to detonate a bomb with ingredients that he concealed in his clothes. His plans went awry when the bomb failed to detonate and passengers heard popping noises and saw smoke and fire. Passenger Jasper Schuringa, 32, immediately jumped over several seats to reach Abdulmutallab and helped to douse the fire and subdue him. “I didn't hesitate a moment, just wanted to stop it with whatever I can do,” said Schuringa.

The Science of Psychology

What Psychologists Do

Critical and Scientific Thinking
in Psychology

Descriptive Studies:
Establishing the Facts

Correlational Studies: Looking
for Relationships

The Experiment: Hunting for
Causes

Evaluating the Findings

Psychology in the News,
Revisited

Taking Psychology with You:
What Psychology Can Do for
You—and What It Can't

What Is Psychology?

The news is full of tales of heroism and cowardice, challenges to existing laws and social norms, acts of joyful playfulness and savage terror, human creativity and human folly. What on earth do these stories have to do with psychology?

The answer is: Everything.

People usually associate psychology with mental and emotional disorders, personal problems, and psychotherapy. But psychologists take as their subject the entire spectrum of beautiful and brutish things that human beings do—the kinds of things you read and hear about every day. They want to know why some people, like the jovial marchers in the Doo Dah Parade, are extroverts, whereas others prefer to blend in quietly. They investigate why people become straight, gay, or bisexual, why many straight people fear or detest homosexuality, and why people differ in their attitudes toward gay marriage. They explore the reasons that some individuals, who grow up in affluence and with every educational opportunity, become willing to sacrifice their lives to commit a terrorist act that will kill hundreds of innocent people, and why some people spontaneously risk their own lives to save others. They study the factors that predict whether a child will emerge from difficult early years as a resilient and healthy adult, or carry the scars of those years forever. And psychologists ask why some parents of autistic children, when given the good news from scientific research that they don't need to beat themselves up for having had their children vaccinated, react not with relief but with anger.

In this book, we will be discussing the psychological issues raised by these stories and many others in the news. But psychology is not only about behavior that is newsworthy. Psychologists are also interested in how ordinary human beings learn, remember, solve problems, perceive, feel, and get along (or fail to get along) with others. They are therefore as likely to study commonplace experiences—rearing children, gossiping, remembering a shopping list, day-dreaming, making love, and making a living—as exceptional ones.



If you have ever wondered what makes people tick, or if you want to gain some insight into your own behavior, then you are in the right course. We invite you now to step into the world of psychology, the discipline that dares to explore the most complex topic on earth: you.



YOU are about to learn...

- how “psychobabble” differs from serious psychology.
- what’s wrong with psychologists’ nonscientific competitors, such as astrologers and psychics.
- how and when psychology became a formal discipline.
- three early schools of psychology.
- the five major perspectives in psychology.

The Science of Psychology

Psychology can be defined as *the discipline concerned with behavior and mental processes and how they are affected by an organism’s physical state, mental state, and external environment*. This definition, however, is a little like defining a car as a vehicle for transporting people from one place to another, without explaining how a car differs from a train or a bus, how a Ford differs from a Ferrari, or how a catalytic converter works. To get a clear picture of what psychology is, you are going to need to know more about its methods, its findings, and its ways of interpreting information.

Psychology, Pseudoscience, and Common Sense

Let’s begin by considering what psychology is *not*. First, the psychology that you are about to study bears little relation to the popular psychology (“pop psych”) often found in self-help books or on talk shows. In recent years, the public’s appetite for psychological information has created a huge market for “psychobabble”: pseudoscience and quackery covered by a veneer of psychological language. Pseudoscience (*pseudo* means “false”) promises quick fixes to life’s problems, such as reliving the supposed trauma of birth to resolve your current unhappiness, or “reprogramming” your brain to make it more creative. Serious psychology is more complex, more informative, and, we think, far more helpful than psychobabble because it is based on rigorous research and **empirical**

evidence—evidence gathered by careful observation, experimentation, and measurement.

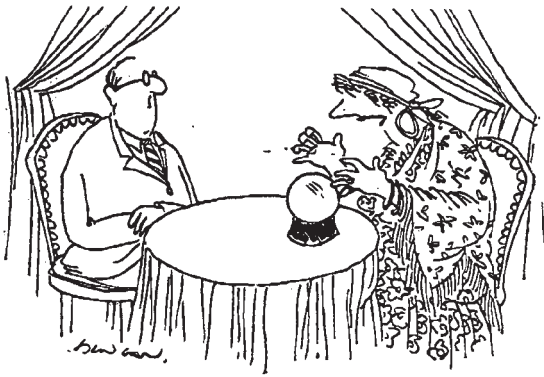
Second, serious psychology differs radically from such nonscientific competitors as graphology (handwriting analysis), fortune-telling, numerology, and the most popular, astrology. Like psychologists, promoters of these competing systems try to explain people’s problems and predict their behavior. If you are having romantic problems, an astrologer may advise you to choose an Aries instead of an Aquarius as your next love, and a channeler of past lives may say it’s because you were jilted in a former life. Belief in these unscientific approaches is widespread. Yet, whenever the predictions of psychics, astrologers, and the like are put to the test, they turn out to be so vague as to be meaningless (for example, “Spirituality will increase next year”) or just plain wrong (Radford, 2010; Shaffer & Jadwiszczok, 2010). In 2008, one well-known Canadian psychic predicted that George Clooney would marry and have a child, Sean Penn would be wounded in the Middle East, and John Edwards would win the U.S. presidency after Hillary Clinton dropped out of the race. Obviously, she was wrong on all counts. Moreover, contrary to what you might think from watching TV shows like *Medium* or reading claims on psychic websites, no psychic has ever found a missing child, identified a serial killer, or helped police solve any other crime by using “psychic powers.” Their claims merely add to the heartbreak the victim’s family feels.

Third, psychology is not just a fancy name for common sense. Often, psychological research produces findings that directly contradict prevailing beliefs, and throughout this book you will be discovering many of them. Are unhappy memories repressed and then accurately recalled years later, as if they had been recorded on videotape? Do most women suffer from PMS? Do policies of abstinence from alcohol reduce rates of alcoholism? If you play Beethoven to your infant, will your baby become smarter? These beliefs are widely held, but as you will learn, they are wrong.

At the start of an introductory psychology course, many students hold beliefs that have been promoted in the popular culture, or are based on personal experience or what seems to be common sense, but which are not scientifically supported. Two instructors gave their 90 introductory psychology students a true–false psychological information questionnaire on the first day of class, a questionnaire consisting entirely of false statements such as “At any point in time, we use only 10 percent of our brains” and “Under hypnosis, you can perform feats that are otherwise impossible.” The students

psychology The discipline concerned with behavior and mental processes and how they are affected by an organism’s physical state, mental state, and external environment; often represented by Ψ , the Greek letter psi (usually pronounced “sy”).

empirical Relying on or derived from observation, experimentation, or measurement.



I see you being less gullible in the future.

were accurate only 38.5 percent of the time, which is actually worse than chance (Taylor & Kowalski, 2004). But by the last week of class, when the students took a test containing all of the earlier items, their overall accuracy was much better: 66.3 percent. Although there was still room for improvement, the students had lost confidence in their remaining misconceptions, suggesting that they were on the way to giving them up. If so, they had learned one of the most important lessons in science: Uncertainty about untested assumptions and beliefs can be a good thing.

Throughout this book and your introductory course, you, too, will repeatedly learn that popular opinion and common sense are not always reliable guides to human behavior. The kind of research you will encounter won't always provide the answers you might have wished for, and sometimes there won't be definite answers. Our goal, however, is to show you why the scientific investigation of even our most cherished beliefs can lead to explanations that are far more sensible than common sense. Of course, psychological findings do not have to be surprising or counterintuitive to be important. Like scientists in other fields, psychological scientists strive not only to discover new phenomena and correct mistaken ideas, but also to deepen our understanding of an already familiar world—as they do by identifying the varieties of love, the origins of violence, the nonsexual motives for sex, or the mysteries of memory.

The Birth of Modern Psychology

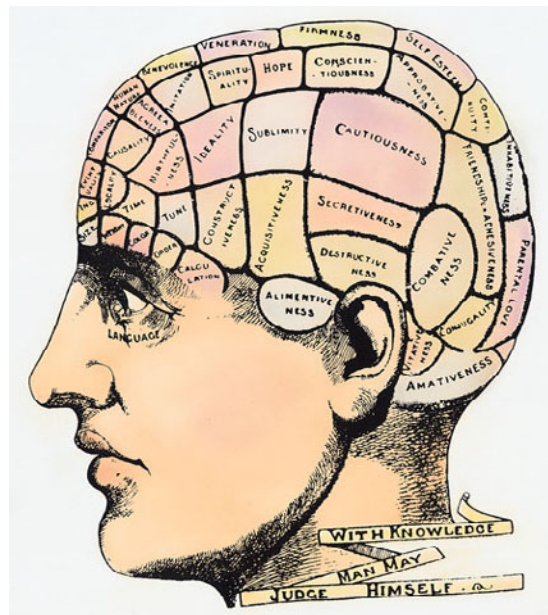
Most of the great thinkers of history, from Aristotle to Zoroaster, raised questions that today would be called psychological. They wanted to know how people take in information through their senses, use information to solve problems, and become motivated to act in brave or villainous ways. They wondered about the elusive nature of emotion, and

whether it controls us or is something we can control. Like today's psychologists, they wanted to describe, predict, understand, and modify behavior to add to human knowledge and increase human happiness. But unlike modern psychologists, scholars of the past did not rely heavily on empirical evidence. Often, their observations were based simply on anecdotes or descriptions of individual cases.

This does not mean that the forerunners of modern psychology were always wrong. On the contrary, they often had insights and made observations that were verified by later work. Hippocrates (c. 460 B.C.–c. 377 B.C.), the Greek physician known as the founder of modern medicine, observed patients with head injuries and inferred that the brain must be the ultimate source of “our pleasures, joys, laughter, and jests as well as our sorrows, pains, griefs, and tears.” And so it is. In the first century A.D., the Stoic philosophers observed that people do not become angry or sad or anxious because of actual events but because of their explanations of those events. And so they do.

Without empirical methods, however, the forerunners of psychology also committed terrible blunders. A good example comes from the early 1800s, when the theory of **phrenology** (Greek for “study of the mind”) became wildly popular in Europe and America. Inspired by the writings and lectures of Austrian physician Franz Joseph Gall (1758–1828), phrenologists argued that different brain areas accounted for specific character and personality traits, such as stinginess and religiosity,

phrenology The now-discredited theory that different brain areas account for specific character and personality traits, which can be “read” from bumps on the skull.




On this nineteenth-century phrenology “map,” notice the tiny space allocated to self-esteem and the large one devoted to cautiousness!

functionalism An early psychological approach that emphasized the function or purpose of behavior and consciousness.

psychoanalysis A theory of personality and a method of psychotherapy, originally formulated by Sigmund Freud, that emphasizes unconscious motives and conflicts.

biological perspective A psychological approach that emphasizes bodily events and changes associated with actions, feelings, and thoughts.

evolutionary psychology A field of psychology emphasizing evolutionary mechanisms that may help explain human commonalities in cognition, development, emotion, social practices, and other areas of behavior.

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important dates
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and that such traits could be read from bumps on the skull. Thieves, for example, supposedly had large bumps above the ears. So how to account for people who had these stealing bumps but who were not thieves? Phrenologists explained away this counterevidence by saying that the person's thieving impulses were being held in check by *other* bumps representing positive traits. In the United States, parents, teachers, and employers flocked to phrenologists for advice and self-improvement (Benjamin, 1998). But phrenology was a classic pseudoscience—sheer nonsense.

At about the time that phrenology was peaking in popularity, several pioneering men and women in Europe and America were starting to study psychological issues using scientific methods. In 1879, Wilhelm Wundt (VIL-helm Voont) officially established the first psychological laboratory in Leipzig, Germany. Wundt (1832–1920), who was trained in medicine and philosophy, promoted a method called *trained introspection*, in which volunteers were taught to carefully observe, analyze, and describe their own sensations, mental images, and emotional reactions. Wundt's introspectors might take as long as 20 minutes to report their inner experiences during a 1.5-second experiment. The goal was to break down behavior into its most basic elements, much as a chemist might analyze water into hydrogen plus oxygen. Most psychologists eventually rejected trained introspection as too subjective, but Wundt still is usually credited for formally initiating the movement to make psychology a science. Many early psychologists in North America were trained in Wundt's laboratory.

Another early approach to scientific psychology, called **functionalism**, emphasized the function or purpose of behavior, as opposed to its analysis and description. One of functionalism's leaders was William James (1842–1910), an American philosopher, physician, and psychologist. Attempting to grasp the nature of the mind through introspection, wrote James (1890/1950), is “like seizing a spinning top to catch its motion, or trying to turn up the gas quickly enough to see how the darkness looks.” (He was also a wonderful writer.) Inspired in part by the evolutionary theories of British naturalist Charles Darwin (1809–1882), James and other functionalists instead asked how various actions help a person or animal adapt to the environment. This emphasis on the causes and consequences of behavior was to set the course of psychological science.

Psychology also has roots in Vienna, Austria, where it first developed as a method of psychotherapy. While researchers were at work in their

laboratories, struggling to establish psychology as a science, Sigmund Freud (1856–1939), an obscure physician, was in his office listening to his patients' reports of depression, nervousness, and obsessive habits. Freud became convinced that their symptoms had mental, not bodily, causes. His patients' distress was due, he concluded, to conflicts and emotional traumas that had originated in early childhood and were too threatening to be remembered consciously, such as forbidden sexual feelings for a parent. Freud's ideas eventually evolved into a broad theory of personality, and both his theory and his method of treating people with emotional problems became known as **psychoanalysis**.

From its early beginnings in philosophy, natural science, and medicine, psychology eventually grew into a complex discipline encompassing many different specialties, perspectives, and methods. (In other chapters, you will be learning more about the history of psychology and the people who played a prominent role in its development.) Today, the field is like a large, sprawling family. The members of this family have common great-grandparents, and many of the cousins have formed alliances, but some are quarreling and a few are barely speaking to one another.  **Explore**

Psychology's Present

The early approaches to psychology eventually evolved into five major theoretical perspectives, which now predominate in the field. These approaches reflect different questions that psychologists ask about human behavior, different assumptions about how the mind works, and, most important, different ways of explaining why people do what they do.

1 The **biological perspective** focuses on how bodily events affect behavior, feelings, and thoughts. Electrical impulses shoot along the intricate pathways of the nervous system. Hormones course through the bloodstream, telling internal organs to slow down or speed up. Chemical substances flow across the tiny gaps that separate one microscopic brain cell from another. Biological psychologists study how these physical events interact with events in the external environment to produce perceptions, memories, and behavior. They also investigate the contribution of genes and other biological factors to the development of abilities and personality traits. A popular specialty, **evolutionary psychology**, follows in the tradition of functionalism by focusing on how genetically influenced behavior that was functional or adaptive during our evolutionary past may be reflected in many



Psychologists study many puzzles of human behavior. Why does human touch reduce anxiety and feel so comforting? Why do some people become champion athletes in spite of physical disabilities? What causes someone to become anorexic, willing even to starve to death? What could motivate ordinary individuals to torture and humiliate prisoners, as soldiers did at the notorious Abu Ghraib prison in Iraq? Psychologists approach these and other questions from five major perspectives: biological, learning, cognitive, sociocultural, and psychodynamic.

of our present behaviors, mental processes, and traits. The message of the biological approach is that we cannot really know ourselves if we do not know our bodies.

2 The **learning perspective** is concerned with how the environment and experience affect a person's (or a nonhuman animal's) actions. Within this perspective, *behaviorists* focus on the environmental rewards and punishers that maintain or discourage specific behaviors. Behaviorists do not invoke the mind to explain behavior; they prefer to stick to what they can observe and measure directly: acts and events taking place in the environment. Do you have trouble sticking to a schedule, focusing on what you are studying, or keeping your temper under control? A behaviorist would analyze the environmental factors that are rewarding your giving in to distractions or that are encouraging your outbursts. *Social-cognitive learning theorists* combine elements of behaviorism with research on thoughts, values, and intentions. They believe that people

learn not only by adapting their behavior to the environment, but also by imitating others and by thinking about the events happening around them. As we will see in other chapters, the learning perspective has many practical applications.

3 The **cognitive perspective** emphasizes what goes on in people's heads—how people reason, remember, understand language, solve problems, explain experiences, acquire moral standards, and form beliefs. (The word *cognitive* comes from Latin for “to know.”) Using clever methods to infer mental processes from observable behavior, cognitive researchers have been able to study phenomena that were once only the stuff of speculation, such as emotions, motivations, and insight. They are designing computer programs that model how humans perform complex tasks, discovering what goes on in the mind of an infant, and identifying types of intelligence not measured by conventional IQ tests. The cognitive approach is one of the strongest forces in psychology and has inspired an

learning perspective
A psychological approach that emphasizes how the environment and experience affect a person's or animal's actions; it includes behaviorism and social-cognitive learning theories.

cognitive perspective
A psychological approach that emphasizes mental processes in perception, memory, language, problem solving, and other areas of behavior.

sociocultural perspective

A psychological approach that emphasizes social and cultural influences on behavior.

psychodynamic perspective

A psychological approach that emphasizes unconscious dynamics within the individual, such as inner forces, conflicts, or the movement of instinctual energy.

explosion of research on the intricate workings of the mind.

4 The **sociocultural perspective** focuses on social and cultural forces outside the individual, forces that shape every aspect of behavior, from how we kiss to what and where we eat. Most of us underestimate the impact of other people, the social context, and cultural rules on nearly everything we do: how we perceive the world, express joy or grief, manage our households, and treat our friends and enemies. We are like fish that are unaware they live in water, so obvious is water in their lives. Sociocultural psychologists study the water—the social and cultural environments that people swim in every day. Because human beings are social animals who are profoundly affected by their different cultural worlds, the sociocultural perspective has made psychology a more representative and rigorous discipline.

5 The **psychodynamic perspective** deals with unconscious dynamics within the individual, such as inner forces, conflicts, or instinctual energy. It has its origins in Freud's theory of psychoanalysis, but many other psychodynamic theories now exist. Psychodynamic psychologists try to dig below the surface of a person's behavior to get to the roots of personality; they think of themselves as archeologists of the mind. As we will see in Chapter 2, psychodynamic psychology is the thumb on the hand of

psychology—connected to the other fingers, but also set apart from them because it differs radically from the others in its language, methods, and standards of acceptable evidence. Many psychological scientists believe that psychodynamic approaches belong in philosophy or literature rather than in academic psychology. But psychotherapists and laypeople are often attracted to the psychodynamic perspective's emphasis on such grand psychological issues as the power of sexuality and the universal fear of death.

Of course, not all psychologists feel they must swear allegiance to one approach or another; many draw on what they take to be the best features of diverse schools of thought. In addition, many psychologists have been affected by social movements and intellectual trends, such as humanism and feminism, that do not fit neatly into any of the major perspectives or that cut across all of them.

Despite the diversity of psychological approaches, most psychological scientists agree on basic guidelines about what is and what is not acceptable in their discipline. Nearly all reject supernatural explanations of events—evil spirits, psychic forces, miracles, and so forth. Most believe in the importance of gathering empirical evidence and not relying on hunches or personal belief. This insistence on rigorous standards of proof is what sets psychology apart from nonscientific explanations of human experience.

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Quick Quiz

Here is your first Quick Quiz. Try it; you won't be graded!

- A.** See whether psychology's past is still present in your memory.
- True or false?* Psychology's forerunners relied heavily on empirical evidence.
 - Credit for founding modern scientific psychology usually goes to _____.
 - Early psychologists who emphasized how behavior helps an organism adapt to its environment were known as _____.
- B.** To find out whether you understand the five major perspectives in psychology, match each possible explanation of anxiety on the left with a perspective on the right.
- | | |
|---|------------------|
| 1. Anxious people often think about the future in distorted ways. | a. learning |
| 2. Anxiety is due to forbidden, unconscious desires. | b. psychodynamic |
| 3. Anxiety symptoms often bring hidden rewards, such as being excused from exams. | c. sociocultural |
| 4. Excessive anxiety can be caused by a chemical imbalance. | d. biological |
| 5. A national emphasis on competition and success promotes anxiety about failure. | e. cognitive |

Answers:

A. 1. false 2. Wilhelm Wundt 3. functionalists B. 1. e 2. b 3. a 4. d 5. c




YOU are about to learn...

- why you can't assume that all therapists are psychologists, or that all psychologists are therapists.
- the three major areas of psychologists' professional activities.
- the difference between a clinical psychologist and a psychiatrist.

What Psychologists Do

Now you know the main viewpoints that guide psychologists in their work. But what do psychologists actually do with their time between breakfast and dinner?

The professional activities of psychologists generally fall into three broad categories: (1) teaching and doing research in colleges and universities; (2) providing mental health services, often referred to as *psychological practice*; and (3) conducting research or applying its findings in nonacademic settings such as business, sports, government, law, and the military (see Table 1.1). Some psychologists move flexibly across these areas. A researcher might also provide counseling services in a mental health setting, such as a clinic or a hospital; a university professor might teach, do research, and serve as a consultant in legal cases.  **Explore**

Psychological Research

Most psychologists who do research have doctoral degrees (Ph.D.s or Ed.D.s, doctorates in education). Some, seeking knowledge for its own sake, work in **basic psychology**; others, concerned with the practical uses of knowledge, work in **applied psychology**. A psychologist doing basic research might ask, "How does peer pressure influence people's attitudes and behavior?" An applied psychologist might ask, "How can knowledge about peer pressure be used to reduce binge drinking in colleges?"

Psychologists doing basic and applied research have made important scientific contributions in areas as diverse as health, education, child development, testing, conflict resolution, marketing, industrial design, worker productivity, and urban planning. Their findings are the focus of this book and of your course. Yet scientific research is the aspect of the discipline least recognized and understood by the public (Benjamin, 2003). We hope that by the time you finish this book, you will have a greater understanding of what research psychologists do and of their contributions to human knowledge and welfare.

Psychological Practice

Psychological practitioners, whose goal is to understand and improve people's physical and mental health, work in mental hospitals, general hospitals, clinics, schools, counseling centers, the criminal

basic psychology The study of psychological issues in order to seek knowledge for its own sake rather than for its practical application.

applied psychology The study of psychological issues that have direct practical significance; also, the application of psychological findings.


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TABLE 1.1

What Is a Psychologist?

Not all psychologists do clinical work. Many do research, teach, work in business, or consult. The professional activities of psychologists with doctorates fall into three general categories.

Academic/Research Psychologists	Clinical Psychologists	Psychologists in Industry, Law, or Other Settings
<i>Specialize in areas of basic psychology or applied research, such as:</i>	<i>Do psychotherapy and sometimes research; may work in any of these settings:</i>	<i>Do research or serve as consultants to institutions on, for example:</i>
Human development	Private practice	Sports
Psychometrics (testing)	Mental health clinics	Consumer issues
Health	General hospitals	Advertising
Education	Mental hospitals	Organizational problems
Industrial/organizational psychology	Research laboratories	Environmental issues
Physiological psychology	Colleges and universities	Public policy
Sensation and perception		Opinion polls
Design and use of technology		Military training
		Animal behavior
		Legal issues



Psychological researchers and practitioners work in all kinds of settings. Here, Linda Bartoshuk (left) uses technology to study how the anatomy of the tongue influences the way we experience different tastes. A clinical psychologist (top right) helps a couple in therapy. And Louis Herman (bottom right) studies a dolphin's ability to understand an artificial language consisting of hand signals. In response to the gestural sequence "person" and "over," the dolphin will leap over the person in the pool.



justice system, and private practice. Since the late 1970s, the proportion of psychologists who are practitioners has steadily increased; practitioners now account for over two-thirds of new psychology doctorates and members of the American Psychological Association (APA), psychology's largest professional organization.

Some practitioners are *counseling psychologists*, who generally help people deal with problems of everyday life, such as test anxiety, family conflicts, or low job motivation. Others are *school psychologists* who work with parents, teachers, and students to enhance students' performance and resolve emotional difficulties. The majority, however, are *clinical psychologists* who diagnose, treat, and study mental or emotional problems. Clinical psychologists are trained to do psychotherapy with severely disturbed people, as well as with those who are simply troubled or unhappy and want to learn to handle their problems better.

In almost all states, a license to practice clinical psychology requires a doctorate. Most clinical psychologists have a Ph.D., some have an Ed.D., and a smaller but growing number have a Psy.D. (doctorate in psychology, pronounced *sy-dee*). Clinical psychologists typically do four or five years of graduate work in psychology, plus at least a year's internship under the direction of a practicing psychologist. Clinical programs leading to a Ph.D. or

Ed.D. are usually designed to prepare a person both as a scientist and as a practitioner; they require completion of a *dissertation*, a major scholarly project (usually involving research) that contributes to knowledge in the field. Programs leading to a Psy.D. focus on professional practice and do not usually require a dissertation, although they typically require the student to complete a major study, theoretical paper, or literature review.

People often confuse *clinical psychologist* with three other terms: *psychotherapist*, *psychoanalyst*, and *psychiatrist*. But these terms mean different things:

- A *psychotherapist* is simply someone who does any kind of psychotherapy. The term is not legally regulated; in fact, in most states, anyone can say that he or she is a therapist of one sort or another without having any training at all.
- A *psychoanalyst* is a person who practices one particular form of therapy, psychoanalysis. To call yourself a psychoanalyst, you must have an advanced degree, get specialized training at a psychoanalytic institute, and undergo extensive psychoanalysis yourself.
- A *psychiatrist* is a medical doctor (M.D.) who has done a three-year residency in psychiatry under the supervision of more experienced physicians to learn to diagnose and treat mental disorders. Like some clinical psychologists, some psychiatrists do research on mental problems, such as depression or schizophrenia, instead of working with patients. Psychiatrists and clinical psychologists do similar work, but psychiatrists, because of their medical training, are more likely to focus on possible biological causes of mental disorders and often treat these problems with medication. Unlike psychiatrists, most clinical psychologists at present cannot write prescriptions. (In the United States, New Mexico and Louisiana have given prescription privileges to psychologists who receive special training.) Psychiatrists, however, are often uneducated in current psychological theories and methods and unfamiliar with current research in psychology (Luhmann, 2000).

Other mental health professionals include licensed clinical social workers (LCSWs), marriage, family, and child counselors (MFCCs), and counselors with specific specialties. These professionals

TABLE 1.2
Types of Psychotherapists

Just as not all psychologists are psychotherapists, not all psychotherapists are clinical psychologists. Here are the major terms used to refer to mental health professionals:

Psychotherapist	Does any kind of psychotherapy; may have anything from no degree to an advanced professional degree; the term is unregulated.
Clinical psychologist	Diagnoses, treats, and/or studies mental and emotional problems, both mild and severe; has a Ph.D., an Ed.D., or a Psy.D.
Psychoanalyst	Practices psychoanalysis; has specific training in this approach after an advanced degree (usually, but not always, an M.D. or a Ph.D.); may treat any kind of emotional disorder or pathology.
Psychiatrist	Does work similar to that of a clinical psychologist but is likely to take a more biological approach; has a medical degree (M.D.) with a specialty in psychiatry.
Licensed clinical social worker (LCSW); marriage, family, and child counselor (MFCC)	Treats common individual and family problems, but may also deal with more serious problems such as addiction or abuse; generally has at least an M.A. in psychology or social work, though licensing requirements vary.

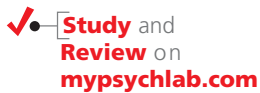
ordinarily treat general problems in adjustment and family conflicts rather than serious mental disturbance, although their work may bring them into contact with people who have serious problems—violent delinquents, people with drug addictions, sex offenders, and individuals involved in domestic violence or child abuse. Licensing requirements vary from state to state but usually include a master's degree in psychology or social work and one or two years of supervised experience. (For a summary of the types of psychotherapists and the training they receive, see Table 1.2.)

Many research psychologists, and some practitioners, are worried about an increase in the number of counselors and psychotherapists who are unschooled in research methods and the empirical findings of psychology, and who use untested, outdated, or ineffective therapy techniques (Baker, McFall, & Shoham, 2008; Lilienfeld, Lynn, & Lohr, 2003). Such concerns contributed to the formation of the Association for Psychological Science (APS), a national organization devoted to the needs and interests of psychology as a science, and to recent efforts to mandate scientific training for all clinical psychologists before they can be accredited (Bootzin, 2009). Many practitioners, however, argue that psychotherapy is an art and that research findings are largely irrelevant to the work they do with clients. In Chapter 12, we will return to the important issue of the gap in training between scientists and many therapists.

Psychology in the Community

During the second half of the twentieth century, psychology expanded rapidly in terms of scholars, publications, and specialties. The American Psychological Association now has 53 divisions. Some represent major fields such as developmental psychology or physiological psychology. Others represent specific research or professional interests, such as the psychology of women, the psychology of men, ethnic minority issues, sports, the arts, environmental concerns, gay and lesbian issues, peace, psychology and the law, and health.

As psychology has grown, psychologists have found ways to contribute to their communities in about as many fields as you can think of. They consult with companies to improve worker satisfaction and productivity. They establish programs to improve race relations and reduce ethnic tensions. They advise commissions on how pollution and noise affect mental health. They do rehabilitation training for people who are physically or mentally disabled. They educate judges and juries about eyewitness testimony. They assist the police in emergencies involving hostages or disturbed people. They conduct public opinion surveys. They run suicide-prevention hotlines. They advise zoos on the care and training of animals. They help coaches improve the athletic performances of their teams. And those activities are just for starters. Is it any wonder that people are often a little fuzzy about what a psychologist is?



Quick Quiz

Fortunately, you aren't fuzzy about what a student is—so try this quiz.

Can you match the specialties on the left with their defining credentials and approaches on the right?

- | | |
|--------------------------|---|
| 1. psychotherapist | a. Trained in a therapeutic approach started by Freud |
| 2. psychiatrist | b. Has a Ph.D., Psy.D., or Ed.D. and does research on, or psychotherapy for, mental health problems |
| 3. clinical psychologist | c. May have any credential, or none |
| 4. research psychologist | d. Has an advanced degree (usually a Ph.D.) and does applied or basic research |
| 5. psychoanalyst | e. Has an M.D.; tends to take a medical approach to emotional problems |

Answers:

1. c 2. e 3. b 4. d 5. a



YOU are about to learn ...

- what it means to think critically.
- why not all opinions are created equal.
- eight guidelines for evaluating psychological claims.
- why a psychological theory is unscientific if it explains anything that could conceivably happen.
- what's wrong with drawing conclusions about behavior from a collection of anecdotes.

Critical and Scientific Thinking in Psychology

One of the greatest benefits of studying psychology is that you learn not only how the brain works in general but also how to use yours in particular—by thinking critically. **Critical thinking** is the ability and willingness to assess claims and make objective judgments on the basis of well-supported reasons and evidence, rather than emotion or anecdote. Critical thinkers are able to look for flaws in arguments and to resist claims that have no support. They realize that criticizing an argument is not the same as criticizing the person making it, and they are willing to engage in vigorous debate about the validity of an idea. Critical thinking, however, is not merely negative thinking. It includes the ability to be creative and constructive—the ability to come up with alternative explanations for events, think of implications of research findings, and apply new knowledge to social and personal problems.

Most people know that you have to exercise the body to keep it in shape, but they may not realize

that clear thinking also requires effort and practice. All around us we can see examples of flabby thinking. Sometimes people justify their mental laziness by proudly telling you they are open-minded. It's good to be open-minded, many scientists have countered, but not so open that your brains fall out! If you prefer the look of a Chevy truck to the look of a Honda Accord, no one can argue with your personal taste. But if you say, “The Chevy truck is better than a Honda and gets better mileage, besides,” you have uttered more than an opinion. Now you have to support your belief with evidence of the car's reliability, mileage, and safety record (Ruggiero, 2004). And if you say, “Chevy trucks are the best in the world and Hondas do not exist; they are a conspiracy of the Japanese government,” you forfeit the right to have your opinion taken seriously. Your opinion, if it ignores reality, is *not* equal to any other.

Critical thinking is not only indispensable in ordinary life; it is also fundamental to all science, including psychological science. By exercising critical thinking, you will be able to distinguish serious psychology from the psychobabble that clutters the airwaves and bookstores. Critical thinking requires logical skills, but other skills and dispositions are also important (Anderson, 2005; Halpern, 2002; Levy, 2010; Stanovich, 2010). Here are eight essential critical-thinking guidelines that we will be emphasizing throughout this book. **Explore**

1 Ask Questions; Be Willing to Wonder. What is the one kind of question that most exasperates parents of young children? “Why is the sky blue, Mommy?” “Why doesn't the plane fall?” “Why



critical thinking The ability and willingness to assess claims and make objective judgments on the basis of well-supported reasons and evidence rather than emotion or anecdote.

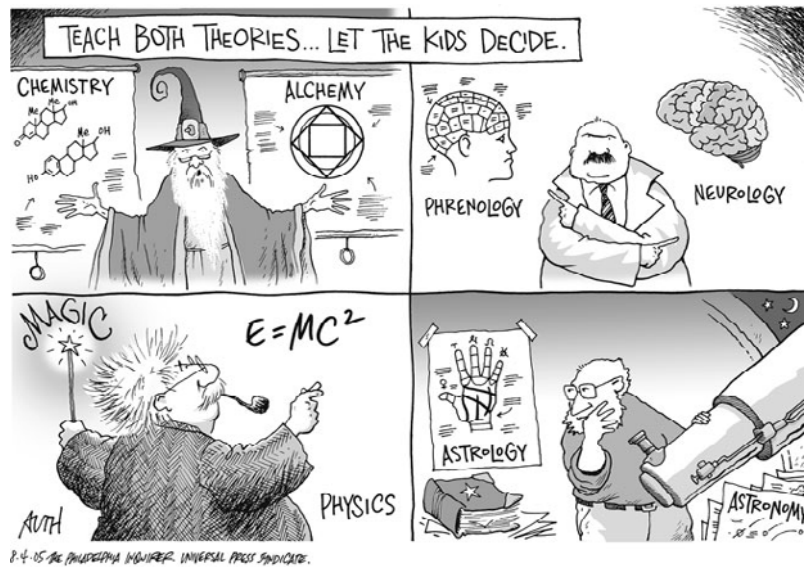
don't pigs have wings?" Unfortunately, as children grow up, they tend to stop asking "why" questions like these. (Why do you think this is?) But critical and creative thinking begins with wondering why. This educational program isn't working; why not? I want to stop smoking and improve my grades but can't seem to do it; why? Is my way of doing things the best way, or just the most familiar way? Critical thinkers are willing to question received wisdom—"We do it this way because this is the way we've always done things around here"—and ask, in essence, "Oh, yeah? Why?"

In science, knowledge advances by asking questions. What is the biological basis of consciousness? How are memories stored and retrieved? Why do we sleep and dream? Why are there critical periods for language learning? What causes schizophrenia? What are the cultural influences on addiction? Critical thinkers are not discouraged by the fact that questions like these have not yet been fully answered; they see them as an exciting challenge.

2 Define Your Terms. Once you have raised a general question, the next step is to frame it in clear and concrete terms. "What makes people happy?" is a fine question for midnight reveries, but it will not lead to answers until you have defined what you mean by "happy." Do you mean being in a state of euphoria most of the time? Do you mean feeling pleasantly contented with life? Do you mean being free of serious problems or pain? Vague or poorly defined terms can lead to misleading or incomplete answers or even to terrible misunderstandings. For example, is prejudice declining? The answer depends on how you define prejudice. Is conscious dislike the same as discomfort with a group's rules and beliefs? What if a person is unaware of having any prejudiced beliefs or feelings, yet a test suggests that he or she has an unconscious prejudice; what does that mean? (We will discuss this issue further in Chapter 10.)

For scientists, defining terms means being precise about just what it is that they're studying. Researchers often start out with a **hypothesis**, a statement that attempts to describe or explain a given behavior. Initially, this hypothesis may be stated quite generally, as in, say, "Misery loves company." But before any research can be done, the hypothesis must be made more precise. "Misery loves company" might be rephrased as "People who are anxious about a threatening situation tend to seek out others facing the same threat."

A hypothesis, in turn, leads to explicit predictions about what will happen in a particular situation. In a prediction, terms such as *anxiety* or



We often hear that all viewpoints should be taught to students in the name of "fairness" and "open-mindedness," but not all viewpoints, theories, and opinions are equally valid or supported by the evidence.

threatening situation are given **operational definitions**, which specify how the phenomena in question are to be observed and measured. "Anxiety" might be defined operationally as a score on an anxiety questionnaire; "threatening situation" might be defined as the threat of an electric shock. The prediction might be, "If you raise people's anxiety scores by telling them they are going to receive electric shocks, and then you give them the choice of waiting alone or with others in the same situation, they will be more likely to choose to wait with others than they would be if they were not anxious." The prediction can then be tested, using systematic methods.

3 Examine the Evidence. Have you ever heard someone in the heat of argument exclaim, "I just know it's true, no matter what you say" or "That's my opinion; nothing's going to change it"? Have you ever made such statements yourself? Accepting a conclusion without evidence, or expecting others to do so, is a sure sign of lazy thinking. A critical thinker asks, "What evidence supports or refutes this argument and its opposition? How reliable is the evidence?" Have you ever received some dire warning or funny "I swear it's true" story emailed by a friend, and then forwarded it to your entire address book or posted it on Facebook, only to learn later that it was a hoax or an urban folktale? A critical thinker would ask, "Is this story something I'd better check out on snopes.com

hypothesis A statement that attempts to predict or to account for a set of phenomena; scientific hypotheses specify relationships among events or variables and are empirically tested.

operational definition A precise definition of a term in a hypothesis, which specifies the operations for observing and measuring the process or phenomenon being defined.



When demonstrating “levitation” and other supposedly magical phenomena, illusionists such as André Kole exploit people’s tendency to trust the evidence of their own eyes even when such evidence is misleading. Critical thinkers ask about the nature and reliability of the evidence for a phenomenon.

principle of falsifiability The principle that a scientific theory must make predictions that are specific enough to expose the theory to the possibility of disconfirmation.

confirmation bias The tendency to look for or pay attention only to information that confirms one’s own belief, and ignore, trivialize, or forget information that disconfirms that belief.

before I tell my closest 90,000 friends?”

In scientific research, an idea may initially generate excitement because it is plausible, imaginative, or appealing, but eventually it must be backed by empirical evidence if it is to be taken seriously. A collection of anecdotes or an appeal to authority will not do. Sometimes, of course, checking the reliability of the evidence directly is not practical. In those cases, critical thinkers consider whether it came from a reliable source. Sources who are reliable exercise critical thinking themselves. They have education or experience in the field in which they

claim expertise. They do not pressure people to agree with them. They are trusted by other experts in the field. They share their evidence openly. Their research has been published in professional journals where it has been reviewed by other experts on the subject, rather than merely announced to the public in a press release or blog.

4 Analyze Assumptions and Biases. *Assumptions* are beliefs that are taken for granted, and *biases* are assumptions that keep us from considering the evidence fairly or that cause us to ignore the evidence entirely. Critical thinkers try to identify and evaluate the unspoken assumptions on which claims and arguments may rest—in the books they read, the political speeches they hear, and the advertisements that bombard them every day. In science, as in other fields, a questioning attitude toward assumptions is what drives progress. Some of the greatest scientific advances have been made by those who dared to doubt widespread assumptions: that the sun revolves around the earth, that illness can be cured by applying leeches to the skin, that madness is a sign of demonic possession.

Critical thinkers are willing to analyze and test not only other people’s assumptions, but also their own (which is much harder). Researchers put their own assumptions to the test by stating a hypothesis in such a way that it can be *refuted*, or disproved by counterevidence. This principle, known as the

principle of falsifiability, does not mean that the hypothesis *will* be disproved, only that it *could be* if contrary evidence were to be discovered.

Another way of saying this is that a scientist must risk disconfirmation by predicting not only what will happen, but also what will *not* happen if the hypothesis is correct. In the misery-loves-company study, the hypothesis would be supported if most anxious people sought each other out, but disconfirmed if most anxious people went off alone to sulk and worry, or if anxiety had no effect on their behavior (see Figure 1.1). A willingness to risk disconfirmation forces scientists to take negative evidence seriously and to abandon mistaken assumptions. Any researcher who refuses to do this is not a true scientist.

The principle of falsifiability is often violated in everyday life because all of us are vulnerable to the **confirmation bias**: the tendency to look for and accept evidence that supports our pet theories and assumptions and to ignore or reject evidence that contradicts our beliefs. For example, once a police interrogator is convinced of a suspect’s guilt, he or she tends to interpret anything the suspect says, even the person’s maintenance of innocence, as confirming evidence that the suspect is guilty (“Of course he *says* he’s innocent; he’s a liar”) (Leo, 2008). But what if the suspect *is* innocent? The principle of falsifiability compels scientists, and the rest of us, to resist the confirmation bias and to consider counterevidence.

5 Avoid Emotional Reasoning. Emotion has a place in critical thinking and in science, too. Passionate commitment to a view motivates people to think boldly, to defend unpopular ideas, and to seek evidence for creative new theories. But emotional conviction alone cannot settle arguments, and in fact it usually makes them worse. The fact that you *really, really* feel strongly that something is true—or want it to be—doesn’t make it so.

All of us are apt to feel threatened and get defensive whenever our most cherished beliefs, or commitment to a course of action, are challenged by empirical evidence (Tavris & Aronson, 2007). At such times, it is especially important to separate the data from emotional reasoning. In the opening story in this chapter about the ruling that vaccines do not cause autism, one of the judges expressed sympathy and admiration for parents coping with their children’s disorder, but added, “I must decide this case not on sentiment, but by analyzing the evidence.” Another of the judges concluded, “Sadly, the petitioners in this litigation have been the victims of bad science conducted to support litigation rather than

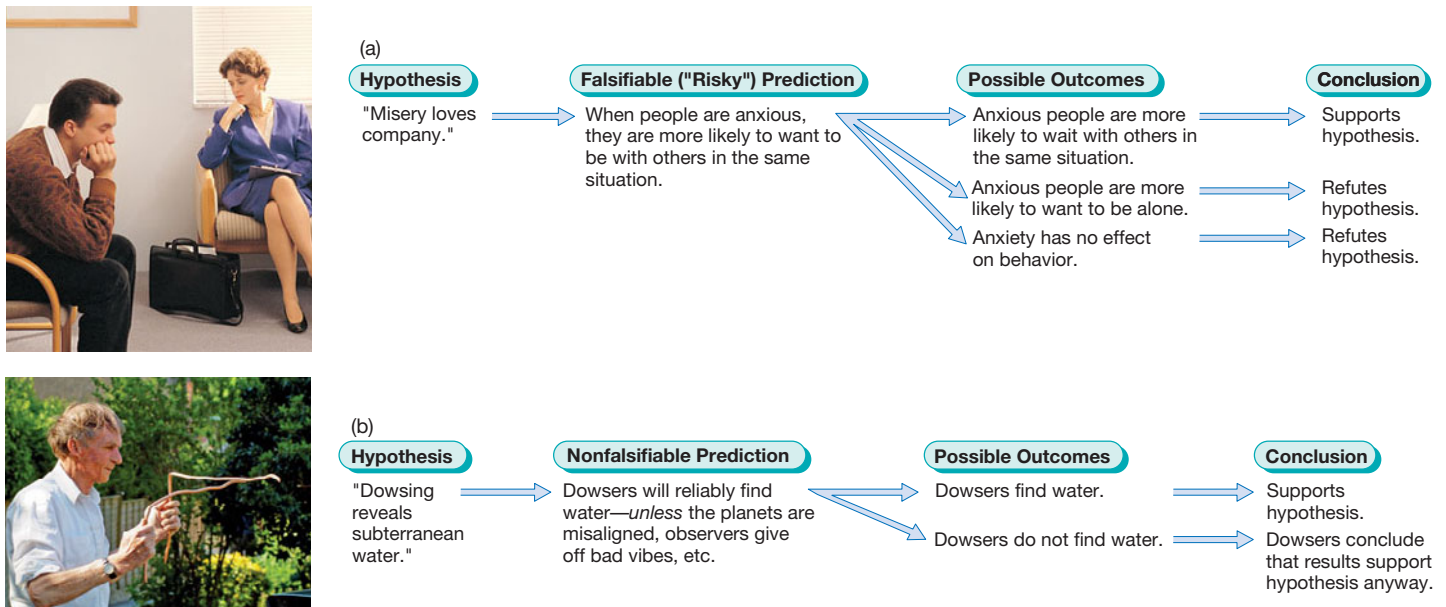


FIGURE 1.1
The Principle of Falsifiability

The scientific method requires researchers to expose their ideas to the possibility of counterevidence, as in row (a). In contrast, people claiming psychic powers, such as dowsers (who say they can find underground water with a “dowsing rod” that bends when water is present), typically interpret all possible outcomes as support for their assertions, as in row (b). Their claims are therefore untestable.

to advance medical and scientific understanding” of autism. (Later in this chapter, we will see how the parents might have mistakenly come to the conclusion that vaccines caused their children’s autism.)

You probably already hold strong beliefs about child rearing, drugs, the causes of crime, racism, the origins of intelligence, gender differences, homosexuality, politics, and many other issues of concern to psychologists. As you read this book, you may find yourself quarreling with findings that you dislike. Disagreement is fine; it means that you are reading actively and are engaged with the material. All we ask is that you think about why you are disagreeing: Is it because the evidence is unpersuasive or because the results make you feel anxious or annoyed?

6 Don’t Oversimplify. A critical thinker looks beyond the obvious, resists easy generalizations, and rejects either–or thinking. Is it better to feel you have control over what happens to you, or to accept with tranquility whatever life serves up? Either answer oversimplifies. As we will see in Chapter 13, control has many important benefits, but sometimes it’s best to go with the flow.

One common form of oversimplification is *argument by anecdote*, generalizing from a personal experience or a few examples to everyone: One

crime committed by a paroled ex-convict means that parole should be abolished; one friend who hates his or her school means that everybody who goes there hates it; one friend who swears that seaweed cured her headaches means that seaweed is beneficial for everyone. Anecdotes are often the source of stereotyping, as well: One dishonest mother on public assistance means everyone on welfare is dishonest; one encounter with an unconventional Californian means they are all flaky. Critical and scientific thinkers want more evidence than one or two stories before drawing such sweeping conclusions.

7 Consider Other Interpretations. A critical thinker creatively formulates hypotheses that offer reasonable explanations of the topic at hand. In science, the goal is to arrive at a **theory**, an organized system of assumptions and principles that purports to explain a set of observations and how they are related. A scientific theory is not just someone’s personal opinion, as in “It’s only a theory” or “I have a theory about why he told that lie.” It is true that some scientific theories are tentative, pending more research, but some, like the theories of gravity and evolution, are accepted by virtually all scientists. Theories that come to be accepted by the scientific community make as few assumptions as possible and account for many empirical findings.

theory An organized system of assumptions and principles that purports to explain a specified set of phenomena and their interrelationships.

Before settling on an explanation of some behavior, however, critical thinkers are careful not to shut out alternative possibilities. They generate as many interpretations of the evidence as they can before choosing the most likely one. Suppose a news magazine reports that people who are chronically depressed are more likely than nondepressed people to develop cancer. Before concluding that depression causes cancer, you would need to consider some other possibilities. Perhaps depressed people are more likely to smoke and to drink excessively, and these unhealthy habits increase their cancer risk. Or perhaps early, as-yet-undetected cancers produce biochemical changes that create the physical and emotional symptoms of depression. Alternative explanations such as these must be ruled out by further investigation before we can conclude that depression is a direct cause of cancer. (It's not, by the way.)

8 Tolerate Uncertainty. Ultimately, learning to think critically teaches us one of the hardest lessons of life: how to live with uncertainty. Sometimes there is little or no evidence available to examine. Sometimes the evidence permits only tentative conclusions. Sometimes the evidence seems strong enough to permit strong conclusions until, exasperatingly, new evidence throws our beliefs into disarray. Critical thinkers are willing to accept this state of uncertainty. They are not afraid to say, “We don’t have answers yet” or “I’m not sure.”



Listen to Science and Pseudoscience on myspsychlab.com

Hypnosis has traditionally been considered a trance state in which people involuntarily do things they ordinarily could not or would not do. But might there be another interpretation of the surprising things that hypnotized people often do? (We will look at competing explanations in Chapter 5.)

In science, tolerating uncertainty means that researchers must avoid drawing firm conclusions until other researchers have repeated, or *replicated*, their studies and verified their findings. Secrecy is a big no-no in science; you must be willing to tell others where you got your ideas and how you tested them so that others can challenge the findings if they think the findings are wrong. Replication is an essential part of the scientific process because sometimes what seems to be a major discovery turns out to be only a fluke.

The need to accept a certain amount of uncertainty does not mean that we must abandon all assumptions, beliefs, and convictions. That would be impossible, in any case: We all need values and principles to guide our actions. The problem is not that people hold convictions; it is that they so often refuse to give up their convictions when they prove to be outdated, dangerous, foolish, or simply wrong.

Critical thinking is a tool to guide us on a life-long quest for understanding—a tool that we must keep sharpening. No one ever becomes a perfect critical thinker, entirely unaffected by emotional reasoning and wishful thinking. We are all less open-minded than we think; it is always easier to poke holes in another person’s argument than to critically examine our own position. Yet we think the journey is well worth the mental effort, because the ability to think critically will help you in countless ways, from saving you money to improving your relationships.

As you read this book, keep in mind the eight guidelines we have described. Practice in critical thinking can help you bulk up your “thinking muscles” and understand psychological concepts better, which is why we have given you many opportunities to apply these guidelines to psychological theories and to the personal and social issues that affect us all. From time to time, a tab with a light bulb symbol (like the one shown here) will highlight a discussion where one or more of our critical-thinking guidelines are especially relevant. In Quick Quizzes, the light bulb will indicate questions that give you practice in applying the guidelines yourself. Keep in mind, however, that critical thinking is important throughout the book, not only where the light bulb appears. Finally, at the end of every chapter, a feature called “Taking Psychology with You” will help you apply critical thinking to a topic in the chapter and take its message home with you. Listen

Thinking Critically about...



Quick Quiz

Bulk up your own thinking muscles by answering these questions.

1. Describe how the guidelines to critical thinking were violated in each of the following cases:
 - a. For years, writer Norman Cousins told how he had cured himself of a rare, life-threatening disease through a combination of humor and vitamins. In a best-selling book, he recommended the same approach to others.
 - b. Benjamin Rush, an eighteenth-century physician, believed that yellow fever should be treated by blood-letting. Many of his patients died, but Rush did not lose faith in his approach; he attributed each recovery to his treatment and each death to the severity of the disease (Stanovich, 2010).
2. Amelia and Harold are arguing about the death penalty. “Look, I just feel strongly that it’s barbaric, ineffective, and wrong,” says Harold. “You’re nuts,” says Amelia, “I believe in an eye for an eye, and besides, I’m absolutely sure it’s a deterrent to further crime.” Which lapses of critical thinking might Amelia and Harold be committing?

Answers:

1a. Cousins oversimplified, arguing by anecdote instead of examining evidence from controlled studies that included people who were not helped by humor and vitamins; and he may have been reasoning emotionally because of his own dramatic recovery. 1b. Rush failed to analyze and test his assumptions; he violated the principle of falsifiability, interpreting a patient’s survival as support for his hypothesis and explaining away each death by saying that the person had been too ill for the treatment to work. Thus, there was no possible counterevidence that could refute the theory (which, by the way, was dead wrong; the treatment was actually as dangerous as the disease). 2. Harold and Amelia are reasoning emotionally (“I feel strongly about this, so I’m right and you’re wrong”). They do not cite evidence that supports or contradicts their arguments. What do studies show about the link between the death penalty and crime? How often are innocent people executed? They have not examined their biases. And they may not be clearly defining the problem: What is the purpose of the death penalty? Is it to deter criminals, to satisfy the public desire for revenge, or to keep criminals from being paroled and returned to the streets?

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YOU are about to learn ...

- how participants are selected for psychological studies, and why it matters.
- the methods psychologists use to describe behavior.
- the advantages and disadvantages of each descriptive method.

Descriptive Studies: Establishing the Facts

Psychologists gather evidence to support their hypotheses by using different methods, depending on the kinds of questions they want to answer. These methods are not mutually exclusive, however. Just as a police detective may rely on DNA samples, fingerprints, and interviews of suspects to figure out “who done it,” psychological sleuths often draw on different techniques at different stages of an ongoing investigation.

No matter what technique is used, one major challenge facing any researcher is to select the participants (sometimes called “subjects”) for the

study. Ideally, the researcher would prefer to get a **representative sample**, a group of randomly chosen participants that accurately represents the larger population that the researcher is interested in. Suppose you wanted to learn about drug use among college sophomores. Questioning or observing every sophomore in the country would obviously not be practical; instead, you would need to recruit a sample. You could use special selection procedures to ensure that this sample contained the same proportion of women, men, blacks, whites, poor people, rich people, Catholics, Jews, and so on as in the general population of college sophomores. Even then, a sample drawn just from your own school or town might not produce results applicable to the entire country, or even your state.

Plenty of studies are based on unrepresentative samples. The media had a field day when the American Medical Association reported, based on the replies of 664 women who were polled online, that binge drinking and unprotected sex were rampant among college women during spring break vacations. Yet that sample, it turned out, was hardly representative or randomly selected from the general population of college women: It

representative sample
A group of individuals, selected from a population for study, which matches that population on important characteristics such as age and sex.

descriptive methods

Methods that yield descriptions of behavior but not necessarily causal explanations.

case study

A detailed description of a particular individual being studied or treated.

included only women who volunteered to answer questions, and only a fourth of them had ever taken a trip during spring break (Rosenthal, 2006).

A sample's size is less critical than its representativeness. A small but representative sample may yield extremely accurate results, whereas a study that fails to use proper sampling methods may yield questionable results, no matter how large the sample. In practice, psychologists must often settle for a sample of people who happen to be available, and more often than not, this means college students. Most of the time, that's fine; many psychological processes, such as basic perceptual or memory processes, are likely to be the same in students as in anyone else. But because college students differ in many ways from nonstudents, conclusions based on college students do not always generalize to the population at large, and they should be accepted with caution until the research is replicated with nonstudents.

We turn now to the specific methods used most commonly in psychological research. As you read about these methods, you may want to list their advantages and disadvantages to remember them better, and then check your list against the one in Table 1.3 on pages 27–28. We will begin with **descriptive methods**, which allow researchers to describe and predict behavior but not necessarily to choose one explanation over competing ones.

Case Studies

A **case study** (or *case history*) is a detailed description of a particular individual, based on careful observation or on formal psychological testing. It may include information about a person's childhood, dreams, fantasies, experiences, relationships, and hopes—anything that will provide insight into the person's behavior. Case studies are most commonly used by clinicians, but sometimes academic researchers use them as well, especially when they are just beginning to study a topic or when practical or ethical considerations prevent them from gathering information in other ways.

Suppose you want to know whether the first few years of life are critical for acquiring a first language. Can children who have missed out on hearing speech (or, in

the case of deaf children, seeing signs) catch up later? Obviously, psychologists cannot answer this question by isolating children and seeing what happens! So instead they have studied unusual cases of language deprivation.

One such case involved a 13-year-old girl who had been cruelly locked up in a small room since infancy. Her mother, a battered wife, barely cared for her, and no one in the family spoke a word to her. If she made the slightest sound, her severely disturbed father beat her with a large piece of wood. When she was finally rescued, Genie, as researchers called her, did not know how to chew or to stand erect, and her only sounds were high-pitched whimpers. Eventually, she was able to learn some rules of social conduct, and she began to understand short sentences and to use words to convey her needs, describe her moods, and even lie. But even after many years, Genie's grammar and pronunciation remained abnormal. She never learned to use pronouns correctly, ask questions, produce proper negative sentences, or use the little word endings that communicate tense, number, and possession (Curtiss, 1977, 1982; Rymer, 1993). This sad case, along with similar ones, suggests that a critical period exists for language development, with the likelihood of fully mastering a first language declining steadily after early childhood and falling off drastically at puberty (Pinker, 1994).

Case studies illustrate psychological principles in a way that abstract generalizations and cold statistics never can, and they produce a more detailed picture of an individual than other methods do. In biological research, cases of patients with brain damage have yielded important clues to how the brain is organized (see Chapter 4). But in most instances, case studies have serious drawbacks. Information is often missing or is hard to interpret; no one knows whether Genie was born with mental deficits. The observer who writes up the case may have biases that cause him or her to notice some facts and overlook others. The person who is the focus of the study may have selective or inaccurate memories, making conclusions unreliable. Most important, because that person may be unrepresentative of the group that the researcher is interested in, the case study has only limited usefulness for deriving general principles of behavior. For all these reasons, case studies are usually only sources, rather than tests, of hypotheses.

Be wary, then, of the compelling cases or sensationalized stories that some individuals or their psychiatrists promote to the media. Often these stories are only arguing by anecdote, and they are not a basis for drawing firm conclusions about anything.



This picture, drawn by Genie, a young girl who endured years of isolation and mistreatment, shows one of her favorite pastimes: listening to researcher Susan Curtiss playing the piano. Genie's drawings were used along with other case material to study her mental and social development.

Observational Studies

In **observational studies**, the researcher observes, measures, and records behavior while taking care to avoid intruding on the people (or animals) being observed. The purpose of *naturalistic observation* is to find out how people or other animals act in their normal social environments. Psychologists use naturalistic observation wherever people happen to be: at home, on playgrounds or streets, or in schoolrooms, offices, and bars. Observers must also take pains to avoid being obvious about what they are doing so that those who are being observed will behave naturally. Often, however, researchers prefer making their observations in a laboratory setting. In *laboratory observation*, they have more control. They can use cameras and recording devices, determine how many people will be observed at once, maintain a clear line of vision, and so forth.

Suppose that you wanted to know how infants of different ages respond when left with a stranger. The most efficient approach might be to have parents and their infants come to your laboratory, observe them playing together for a while through a one-way window, then have a stranger enter the room and, a few minutes later, have the parent leave. You could record signs of distress, interactions with the stranger, and other behavior, checking your observations against those of others to ensure accuracy. If you did this, you would find that very young infants carry on cheerfully with whatever they are doing when the parent leaves. However, by the age of about 8 months, children will often burst into tears or show other signs of what child psychologists call “separation anxiety” (see Chapter 3).

One shortcoming of laboratory observation is that the presence of researchers and special equipment may cause participants to behave differently than they would in their usual surroundings. Further, observational studies, like other descriptive studies, are more useful for describing behavior than for explaining it. If we observe infants protesting whenever a parent leaves the room, we cannot be sure why they are protesting. Is it because they have become



Psychologists using laboratory observation have gathered valuable information about brain and muscle activity during sleep.

attached to their parents and want them nearby, or have they learned from experience that crying brings an adult with a cookie and a cuddle? Observational studies alone cannot answer such questions.

Tests

Psychological tests, sometimes called *assessment instruments*, are procedures for measuring and evaluating personality traits, emotional states, aptitudes, interests, abilities, and values. Typically, tests require people to answer a series of written or oral questions. The answers may then be totaled to yield a single numerical score, or a set of scores. *Objective tests*, also called *inventories*, measure beliefs, feelings, or behaviors of which an individual is aware; *projective tests* are designed to tap unconscious feelings or motives (see Chapter 11).

At one time or another, you no doubt have taken a personality test, an achievement test, or a

observational study A study in which the researcher carefully and systematically observes and records behavior without interfering with the behavior; it may involve either naturalistic or laboratory observation.

psychological tests Procedures used to measure and evaluate personality traits, emotional states, aptitudes, interests, abilities, and values.

Get Involved! A Study of Personal Space

Try a little naturalistic observation of your own. Go to a public place where people seat themselves, such as a movie theater or a cafeteria with large tables. You might recruit some friends to help you; you can divide the area into sections and assign each observer one section to observe. As individuals and groups sit down, note how many seats they leave between themselves and the next person. On the average, how far do people tend to sit from strangers? Once you have your results, see how many possible explanations you can come up with.

standardize In test construction, to develop uniform procedures for giving and scoring a test.

norms In test construction, established standards of performance.

reliability In test construction, the consistency of test scores from one time and place to another.

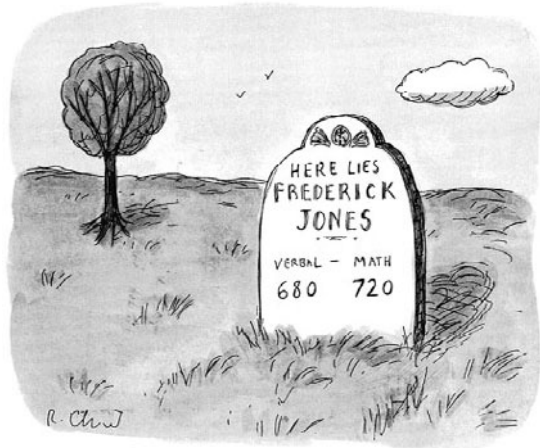
validity The ability of a test to measure what it was designed to measure.

surveys Questionnaires and interviews that ask people directly about their experiences, attitudes, or opinions.

vocational-aptitude test. Hundreds of psychological tests are used in industry, education, the military, and the helping professions. Some are given to individuals, others to large groups. These measures help clarify differences among individuals, as well as differences in the reactions of the same person on different occasions or at different stages of life. Tests may be used to promote self-understanding, to evaluate treatments and programs, or, in scientific research, to draw generalizations about human behavior. Well-constructed psychological tests are a great improvement over simple self-evaluation because many people have a distorted view of their own abilities and traits. In the workplace, employees tend to overestimate their skills and CEOs are overconfident in their judgments; in school and on the job, people are often blissfully unaware of their own lack of competence (Dunning, Heath, & Suls, 2004).

One test of a good test is whether it is **standardized**, that is, whether uniform procedures exist for giving and scoring the test. It would hardly be fair to give some people detailed instructions and plenty of time and others only vague instructions and limited time. Those who administer the test must know exactly how to explain the tasks involved, how much time to allow, and what materials to use. Scoring is usually done by referring to **norms**, or established standards of performance. The usual procedure for developing norms is to give the test to a large group of people who resemble those for whom the test is intended. Norms determine which scores can be considered high, low, or average.

Test construction presents two central challenges. First, the test must have **reliability**, producing the same results from one time and place to the next. A vocational-interest test is not reliable if it tells Tom that he would make a wonderful engineer but a poor journalist, and then gives different results when Tom retakes the test a week later. Nor is it reliable if alternate forms of the test, intended to be comparable, yield different results. Second, the test must have **validity**, measuring what it is designed to measure. A creativity test is not valid if what it actually measures is verbal sophistication. The validity of a test is often measured by its ability to predict other, independent measures, or *criteria*, of the trait in question. The criterion for a scholastic aptitude test might be college grades; the criterion for a test of shyness might be behavior in social situations. Among psychologists, controversy exists about the validity of even some widely used tests, such as the Scholastic Assessment Test (SAT) and standardized IQ tests.



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Many people attach a lot of importance to their test scores!

Criticisms and reevaluations of psychological tests keep psychological assessment honest and scientifically rigorous. In contrast, the pop-psych tests frequently found in magazines and newspapers and on the Internet usually have not been evaluated for either validity or reliability. These questionnaires often have inviting headlines such as “What Breed of Dog Do You Most Resemble?” or “What’s Your Love Profile?” but they are merely lists of questions that someone thought sounded good.

Surveys

Psychological tests usually generate information about people indirectly. In contrast, **surveys** are questionnaires and interviews that gather information by asking people *directly* about their experiences, attitudes, or opinions about everything from consumer preferences to sexual preferences. Most of us are familiar with national opinion surveys, such as the Gallup and Roper polls, and the unscientific surveys that are forever popping up on the Internet.

Surveys produce bushels of data, but they are not easy to do well. Sampling is the first difficult problem. When a talk-radio host or TV personality invites people to post comments on their website about a political matter, the results are not likely to generalize to the population as a whole, even if thousands of people respond. Why? As a group, people who listen to Bill O’Reilly are more conservative than fans of Jon Stewart.

Popular polls and surveys (like the one about college women on spring break) also frequently

**Thinking Critically
about Opinion Polls
and Surveys**



suffer from a **volunteer bias**: People who are willing to volunteer their opinions may differ from those who decline to take part. When you read about a survey, or any other kind of study, always ask who participated. A nonrepresentative sample does not necessarily mean that a survey is worthless or uninteresting, but it does mean that the results may not hold true for other groups.

Yet another problem with surveys, as with self-reports in general, is that people sometimes lie, especially when the survey is about a touchy or embarrassing topic (“I would never do that disgusting/dishonest/fattening thing!”) or an illegal act, such as using banned drugs (Tourangeau & Yan, 2007). The likelihood of lying is reduced when respondents are guaranteed anonymity and allowed to respond in private. Researchers can also check for lying by asking the same question several times with different wording to see whether the answers are consistent. Technology can also help: Because many people feel more anonymous when they interact with a computer than when they fill out a paper-and-pencil questionnaire, computerized questionnaires can reduce lying (Turner et al., 1998).

When you hear about the results of a survey or opinion poll, you also need to consider which questions were (and were not) asked, and how the questions were phrased. These aspects of a survey’s design may encourage responses in a particular direction, as political pollsters well know (“Do you favor raising your property tax to spend millions of

dollars to repair your local schools?” is more likely to evoke a *no* than “Do you favor rebuilding schools that are decaying, lack heat, and are infested with rats?”). Many years ago, the famed sex researcher Alfred Kinsey made it his practice always to ask, “How many times have you (masturbated, had nonmarital sex, etc.)?” rather than “Have you ever (masturbated, had nonmarital sex, etc.)?” The first way of phrasing the question tended to elicit more truthful responses than the second because it removed the respondent’s self-consciousness about having done any of those things. The second way of phrasing the question would have permitted embarrassed respondents to reply with a simple but dishonest “No.”

As you can see, although surveys can be extremely informative, they must be conducted and interpreted carefully.



“Are you (a) contented, (b) happy, (c) very happy, (d) wildly happy, (e) deliriously happy?”

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volunteer bias A shortcoming of findings derived from a sample of volunteers instead of a representative sample; the volunteers may differ from those who did not volunteer.

Quick Quiz

How would you describe your understanding of descriptive methods?

- A. Which descriptive method would be most appropriate for studying each of the following topics? (All of them, by the way, have been investigated by psychologists.)
- | | |
|---|-----------------------------|
| 1. Ways in which the games of boys differ from those of girls | a. case study |
| 2. Changes in attitudes toward nuclear disarmament after a TV movie about nuclear holocaust | b. naturalistic observation |
| 3. The math skills of children in the United States versus Japan | c. laboratory observation |
| 4. Physiological changes that occur when people watch violent movies | d. survey |
| 5. The development of a male infant who was reared as a female after his penis was accidentally burned off during a routine surgery | e. test |
- B. Professor Flummox gives her new test of aptitude for studying psychology to her psychology students at the start of the year. At the end of the year, she finds that those who did well on the test averaged only a C in the course. The test lacks _____.

Answers:

1. b 2. d 3. e 4. c 5. a B. validity

✓ Study and Review on myspsychlab.com

correlational study A descriptive study that looks for a consistent relationship between two phenomena.

correlation A measure of how strongly two variables are related to each other.

variables Characteristics of behavior or experience that can be measured or described by a numeric scale; variables are manipulated and assessed in scientific studies.

positive correlation An association between increases in one variable and increases in another, or between decreases in one and in the other.

negative correlation An association between increases in one variable and decreases in another.



YOU are about to learn...

- what it means to say that two things, such as grades and TV watching, are “negatively” correlated.
- whether a positive correlation between TV watching and hyperactivity means that too much TV makes kids hyperactive.

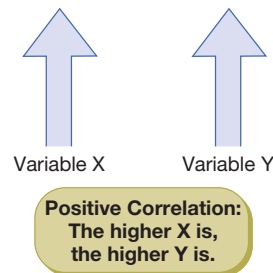
Correlational Studies: Looking for Relationships

In descriptive research, psychologists often want to know whether two or more phenomena are related and, if so, how strongly. Are students’ grade point averages related to the number of hours they spend watching TV shows, playing video games, and texting? To find out, a psychologist would do a **correlational study**.

Measuring Correlations

The word **correlation** is often used as a synonym for “relationship.” Technically, however, a correlation is a numerical measure of the *strength* of the relationship between two things. The things may be events, scores, or anything else that can be recorded and tallied. In psychological studies, such things are called **variables** because they can vary in quantifiable ways. Height, weight, age, income, IQ scores, number of items recalled on a memory test, number of smiles in a given time period—anything that can be measured, rated, or scored can serve as a variable.

A **positive correlation** means that high values of one variable are associated with high values of the other, and that low values of one variable are associated with low values of the other:



Height and weight are positively correlated; so are IQ scores and school grades. Rarely is a correlation perfect, however. Some tall people weigh less than some short ones; some people with average IQs are superstars in the classroom, and some with high IQs get poor grades. Figure 1.2(a) shows a positive correlation between men’s educational level and their annual income.

A **negative correlation** means that high values of one variable are associated with low values of the other:

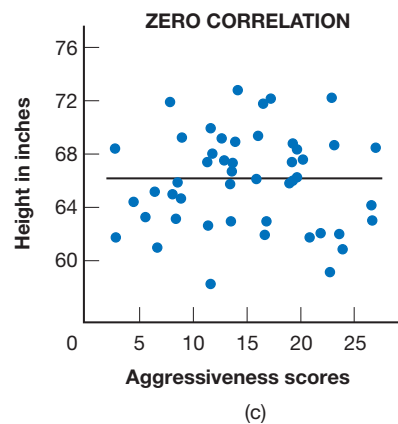
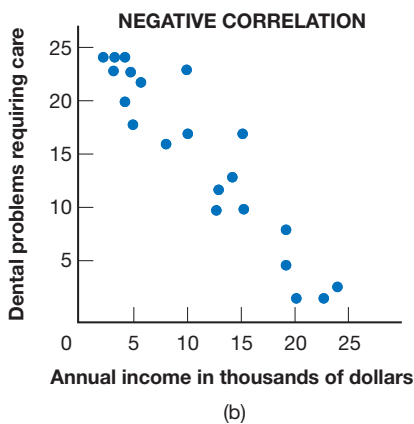
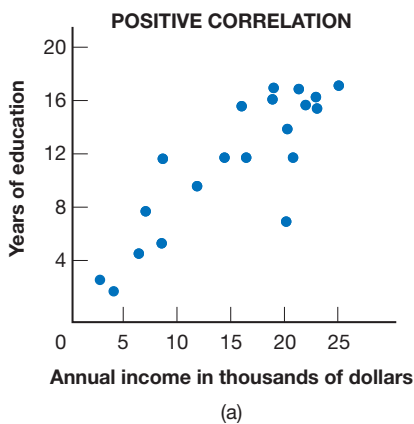
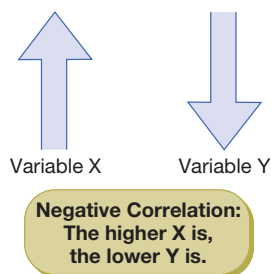



FIGURE 1.2
Correlations

Graph (a) shows a positive correlation: In general, income rises with education. Graph (b) shows a negative correlation: In general, the higher people’s incomes are, the fewer dental problems they have. Graph (c) shows a zero correlation between height and aggressiveness.

Figure 1.2(b) shows a negative correlation between average income and the incidence of dental disease for groups of 100 families. In general, as you can see, the higher the income, the fewer the dental problems. In the automobile business, the age of a car is negatively correlated with its price: The older the car, the lower the price, except for antiques and models favored by collectors. How about hours spent watching TV and average grades? They too are negatively correlated: Lots of hours in front of the television are associated with lower grades (Potter, 1987; Ridley-Johnson, Cooper, & Chance, 1983). See whether you can think of other variables that are negatively correlated. Remember that a negative correlation means a relationship exists; the more of one thing, the less of another. If there is no relationship between two variables, as in Figure 1.2(c), we say that they are *uncorrelated*. Shoe size and IQ scores are uncorrelated.

The statistic used to express a correlation is called the **coefficient of correlation**. This number conveys both the size of the correlation and its direction. A perfect positive correlation has a coefficient of +1.00, and a perfect negative correlation has a coefficient of -1.00. Suppose you weighed ten people and listed them in order, from lightest to heaviest, then measured their heights and listed them in order, from shortest to tallest. If the names on the two lists were in exactly the same order, the correlation between weight and height would be +1.00. If the correlation between two variables is +.80, it means that the two are strongly related. If the correlation is -.80, the relationship is just as strong, but it is negative. When there is no association between two variables, the coefficient is zero or close to zero.

Cautions about Correlations

Correlational studies are common in psychology and often make the news. But beware; many supposed correlations reported in the media or on the Internet are based on rumor and anecdote. Some are based on coincidence, which is why they are called *illusory correlations*; they are nonexistent or meaningless.  **Explore**


The alleged link between vaccines and autism is an illusory correlation, a result of the fact that most symptoms of childhood autism emerge at about the same time that children are vaccinated. Some thought the culprit was thimerosal, a preservative that was used in childhood vaccines until 1999, and is now contained in trace amounts in only a few. Yet there is no convincing evidence that thimerosal ever was involved in autism, and after it

was removed from most vaccines, the incidence of autism did not decline, as it would have if thimerosal were to blame. Moreover, major international studies have failed to find any causal connection whatsoever between vaccines and autism (Offit, 2008). As just one example, in a study of the more than 500,000 children born in Denmark between 1991 and 1998, the incidence of autism in vaccinated children was actually a bit *lower* than in unvaccinated children (Madsen et al., 2002). Tragically, rates of measles, a disease that can be lethal, are rising in children whose parents have refused to have them vaccinated.

Even when correlations are meaningful and strong, they can be hard to interpret because *a correlation does not establish causation*. It is easy to assume that if variable A predicts variable B, then A must be causing B, but that is not necessarily so. A positive correlation has been found between the number of hours that children watch television between ages 1 and 3 and their risk of hyperactivity (impulsivity, attention problems, difficulty concentrating) by age 7 (Christakis et al., 2004). Does this mean that watching TV *causes* hyperactivity? Maybe, but it is also possible that children with a disposition to become hyperactive are more attracted to television than those disposed to being calm. Or perhaps the harried parents of distractible children are more likely than other parents to rely on TV as a babysitter. Or it is possible that neither variable causes the other directly: Perhaps parents who allow their young kids to watch a lot of TV have attention problems themselves, and therefore create a home environment that fosters hyperactivity and inattentiveness. Likewise, that negative correlation between TV watching and grades might exist because heavy TV watchers have less time to study, or because they have some personality trait that causes an attraction to TV *and* an aversion to studying, or because they use TV as an escape when their grades are low . . . you get the idea.

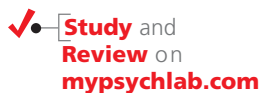
The moral of the story: When two variables are associated, one variable may or may not be causing the other.

coefficient of correlation A measure of correlation that ranges in value from -1.00 to +1.00.

 **Explore**
Correlations
Do Not Show
Causation on
mypsychlab.com



The number of hours toddlers spend watching TV is correlated with their risk of being hyperactive at age 7. Does that mean TV watching causes hyperactivity problems? What other explanations for this correlation are possible?



Quick Quiz

In your experience, are taking quizzes and getting good grades positively correlated?

- Identify each of the following as a positive or negative correlation:
 - The higher a male monkey's level of the hormone testosterone, the more aggressive he is likely to be.
 - The older people are, the less frequently they tend to have sexual intercourse.
 - The hotter the weather, the higher the rate of crimes against people, such as muggings.
- Now see whether you can generate two or three possible explanations for each of the preceding findings.



Answers:

1. a. positive b. negative c. positive 2. a. The hormone may cause aggressiveness; acting aggressively may stimulate hormone production; or a third factor, such as age or dominance, may influence aggressiveness and hormone production independently. b. Older people may have less interest in sex than younger people, have less energy or more physical ailments, or lack partners. c. Hot temperatures may make people edgy and cause them to commit crimes; potential victims may be more plentiful in warm weather because more people go outside; criminals may find it more comfortable to be out committing their crimes in warm weather than in cold. (Our explanations for these correlations are not the only ones possible.)



YOU are about to learn...

- why psychologists rely so heavily on experiments.
- what control groups control for.
- who is “blind” in single- and double-blind experiments, and what they are not supposed to “see.”

The Experiment: Hunting for Causes

experiment A controlled test of a hypothesis in which the researcher manipulates one variable to discover its effect on another.

informed consent The doctrine that human research subjects must participate voluntarily and must know enough about a study to make an intelligent decision about whether to participate.

independent variable A variable that an experimenter manipulates.

dependent variable A variable that an experimenter predicts will be affected by manipulations of the independent variable.

Researchers gain plenty of information from descriptive studies, but when they want to actually track down the causes of behavior, they rely heavily on the experimental method. An **experiment** allows them to *control*, or manipulate, the situation being studied. Instead of being passive recorders of what is going on, researchers actively do something that they believe will affect people's behavior and then observe what happens. These procedures allow experimenters to draw conclusions about cause and effect—about what causes what.

All psychological studies must conform to ethical guidelines, but such guidelines are especially important in experimental research. In colleges and universities, a review committee must approve all studies and be sure they conform to federal regulations. Volunteers in a study must consent to participate and know enough about the study to make an intelligent decision, a doctrine known as **informed consent**. Researchers must protect participants from physical and mental harm, and if any risk exists, must warn them and give them an opportunity to withdraw at any time.

Ethical guidelines also require the humane treatment of research animals, which are used in only a small minority of psychological studies but are crucial to progress in some fields, especially biological psychology and behavioral research. Because of increased concern about the rights and welfare of animals, the American Psychological Association's guidelines for using animals in research have been made more comprehensive, and federal regulations governing the housing and care of animals have been strengthened.

Experimental Variables


Imagine that you are a psychologist whose research interest is multitasking. Almost everyone multitasks these days, and you would like to know whether that's a good thing or a bad thing. Specifically, you would like to know whether or not using a handheld cell phone while driving is dangerous. Motor vehicle statistics show that talking on a cell phone while driving is associated with an increase in accidents, but maybe that's just for people who are risk takers or lousy drivers to begin with. To pin down cause and effect, you decide to do an experiment.

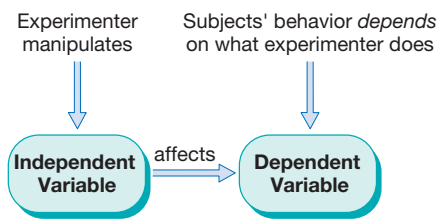
In a laboratory, you ask participants to “drive” using a computerized driving simulator equipped with an automatic transmission, steering wheel, gas pedal, and brake pedal. The object, you tell them, is to maximize the distance covered by driving on a busy highway while avoiding collisions with other cars. Some of the participants talk on the phone for 15 minutes to a research assistant in the next room about a topic that interests them; others just drive. You are going to compare how many collisions the two groups have. The basic design of this

experiment is illustrated in Figure 1.3, which you may want to refer to as you read the next few pages.

The aspect of an experimental situation manipulated or varied by the researcher is known as the **independent variable**. The reaction of the subjects—the behavior that the researcher tries to predict—is the **dependent variable**. Every experiment has at least one independent and one dependent variable. In our example, the independent variable is cell phone use (use versus nonuse). The dependent variable is the number of collisions.

Ideally, everything in the experimental situation except the independent variable is held constant—that is, kept the same for all participants. You would not have some people use a stick shift and others an automatic, unless shift type were an independent variable. Similarly, you would not have some people go through the experiment alone and others perform in front of an audience. Holding everything but the independent variable constant ensures that whatever happens is due to the researcher’s manipulation and nothing else. It allows you to rule out other interpretations.

Understandably, students often have trouble keeping independent and dependent variables straight. You might think of it this way: The dependent variable—the outcome of the study—*depends* on the independent variable. When psychologists set up an experiment, they think, “If I do X, the people in my study will do Y.” The X represents the independent variable; the Y represents the dependent variable:  **Simulate**



Most variables may be either independent or dependent, depending on what the experimenter wishes to find out. If you want to know whether eating chocolate makes people nervous, then the amount of chocolate eaten is the independent variable. If you want to know whether feeling nervous makes people eat chocolate, then the amount of chocolate eaten is the dependent variable.

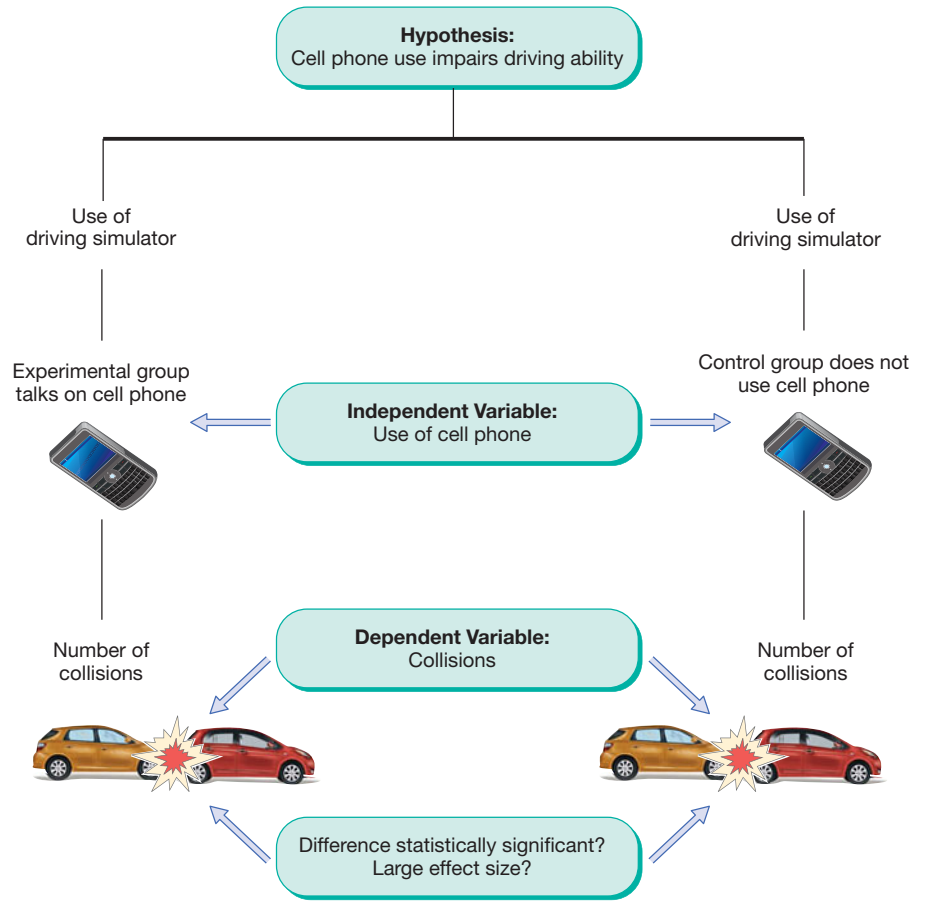



FIGURE 1.3
Do Cell Phone Use and Driving Mix?
The text describes this experimental design to test the hypothesis that talking on a cell phone while driving impairs driving skills and leads to accidents.

Experimental and Control Conditions

Experiments usually require both an experimental condition and a comparison, or **control condition**. People in the control condition are treated exactly like those in the experimental condition, except that they are not exposed to the same treatment, or manipulation of the independent variable. Without a control condition, you cannot be sure that the behavior you are interested in would not have occurred anyway, even without your manipulation. In some studies, the same subjects can be used in both the control and the experimental condition; they are said to serve as their own controls. In other studies, people are assigned to either an *experimental group* or a *control group*.

In our cell phone study, we could have drivers serve as their own controls, but for this illustration, we will use two different groups. Participants who talk on the phone while driving make up the experimental group, and those who just drive along silently make up the control group. We want these

 **Simulate**
Distinguishing Independent & Dependent Variables on myspsychlab.com


control condition In an experiment, a comparison condition in which subjects are not exposed to the same treatment as are those in the experimental condition.

random assignment A procedure for assigning people to experimental and control groups in which each individual has the same probability as any other of being assigned to a given group.

placebo An inactive substance or fake treatment used as a control in an experiment.

single-blind study An experiment in which subjects do not know whether they are in an experimental or a control group.

experimenter effects Unintended changes in subjects' behavior due to cues that the experimenter inadvertently gives.

 **Watch the Video of Konrad Lorenz on controlling an experiment on mypsychlab.com**

two groups to be roughly the same in terms of average driving skill. It would not do to start out with a bunch of reckless roadrunners in the experimental group and a bunch of tired tortoises in the control group. We also probably want the two groups to be similar in age, education, driving history, and other characteristics so that none of these variables will affect our results. One way to accomplish this is to use **random assignment** of people to one group or another—such as by randomly assigning them numbers and putting those with even numbers in one group and those with odd numbers in another. If we have enough participants in our study, individual characteristics that could possibly affect the results are likely to be roughly balanced in the two groups, so we can safely ignore them.

Sometimes researchers use several experimental or control groups. In our study, we might want to examine the effects of short versus long phone conversations, or conversations on different topics—say, work, personal matters, and *very* personal matters. In that case, we would have more than one experimental group to compare with the control group. In our hypothetical example, though, we'll just have one experimental group, and all participants in it will drive for 15 minutes while talking about a topic of their own choice.

This description does not cover all the procedures that experimenters use. In some kinds of studies, people in the control group get a **placebo**, a fake treatment or sugar pill that looks, tastes, or smells like the real treatment or medication but is phony. If the placebo produces the same result as the real thing, the reason must be the participants' expectations rather than the treatment itself. Placebos are critical in testing new drugs, because of the optimism that a potential cure often brings with it (see Chapter 12). Medical placebos usually take the form of pills or injections that contain no active ingredients. To see what placebos revealed in a study of Viagra for women's sexual problems, see Figure 1.4.

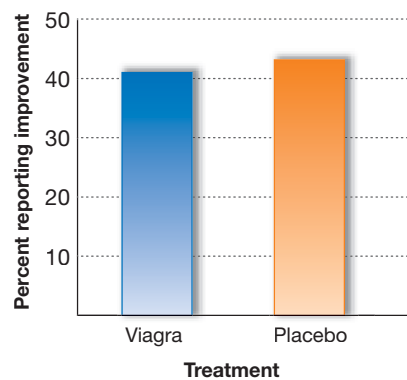



FIGURE 1.4
Does Viagra Work for Women?

Placebos are essential to determine whether people taking a new drug improve because of the drug or because of their expectations about it. In one study, 41 percent of women taking Viagra said their sex lives had improved. That sounds impressive, but 43 percent taking a placebo pill also said their sex lives had improved (Basson et al., 2002).

Control groups, by the way, are also crucial in many nonexperimental studies. Some psychotherapists have published books arguing that girls develop problems with self-esteem and confidence as soon as they hit adolescence. Unless the writers have also tested or surveyed a comparable group of teenage boys, however, there

is no way of knowing whether low self-esteem afflicts teenagers regardless of their sex or is more common among adolescent girls (it's not, as it turns out). If someone makes a claim about a new therapeutic method, asserts that women and men differ in some psychological way, or touts the benefits of a new pill, always ask: What did the control group show?  **Watch**

Experimenter Effects

Because expectations can influence the results of a study, participants should not know whether they are in an experimental or a control group. When this is so, as it usually is, the experiment is said to be a **single-blind study**. But participants are not the only ones who bring expectations to the laboratory; so do researchers. And researchers' expectations and hopes for a particular result may cause them to inadvertently influence the participants' responses through facial expressions, posture, tone of voice, or some other cue. Such **experimenter effects** can be powerful; even an experimenter's friendly smile can affect people's responses in a study (Rosenthal, 1994).

One solution to this problem is to do a **double-blind study**. In such a study, the person running the experiment, the one having actual contact with the participants, also does not know who is in which group until the data have been gathered. Double-blind procedures are standard in drug research. Different doses of a drug are coded in some way, and the person administering the drug is kept in the dark about the code's meaning until after the experiment. To run our cell phone study in a double-blind fashion, we could use a simulator that automatically records collisions and have the experimenter give instructions through an intercom so as not to know which group a participant was in until after the results were tallied.

Advantages and Limitations of Experiments

Because experiments allow conclusions about cause and effect, and because they permit researchers to distinguish real effects from placebo effects, they have long been the method of choice in psychology.

However, like all methods, the experiment has its limitations. Just as in other kinds of studies, the participants are not always representative of the larger population. Moreover, in an experiment, the researcher determines which questions are asked and which behaviors are recorded, and the participants

try to do as they are told. In their desire to cooperate, advance scientific knowledge, or present themselves in a positive light, they may act in ways that they ordinarily would not (Kihlstrom, 1995).

Thus, experimental psychologists confront a dilemma: The more control they exercise over the situation, the more unlike real life it may be. For this reason, many psychologists have called for more **field research**, the study of behavior in natural contexts such as schools and the workplace. Have you ever wondered if women are more “talkative” than men, as the stereotype suggests? A field study of people in their everyday lives would be the best way to answer this question. Indeed, such a study has been done: The participants wore an unobtrusive recording device as they went about their normal lives, talking and chatting. The researchers found no gender differences at all (Mehl et al., 2007).

Every research method has strengths and weaknesses. Did you make a list of each method’s advantages and disadvantages, as we suggested earlier? If so, compare it now with the one in Table 1.3.



Psychologists doing field research have studied diverse questions, such as whether men and women differ in how much they talk and how people in crowded places modify their gaze and body position to preserve a sense of privacy.

TABLE 1.3
Research Methods in Psychology: Their Advantages and Disadvantages

Method	Advantages	Disadvantages
Case study	<ul style="list-style-type: none"> Good source of hypotheses. Provides in-depth information on individuals. Unusual cases can shed light on situations or problems that are unethical or impractical to study in other ways. 	<ul style="list-style-type: none"> Vital information may be missing, making the case hard to interpret. The person’s memories may be selective or inaccurate. The individual may not be representative or typical.
Naturalistic observation	<ul style="list-style-type: none"> Allows description of behavior as it occurs in the natural environment. Often useful in first stages of a research program. 	<ul style="list-style-type: none"> Allows researcher little or no control of the situation. Observations may be biased. Does not allow firm conclusions about cause and effect.
Laboratory observation	<ul style="list-style-type: none"> Allows more control than naturalistic observation. Allows use of sophisticated equipment. 	<ul style="list-style-type: none"> Allows researcher only limited control of the situation. Observations may be biased. Does not allow firm conclusions about cause and effect. Behavior may differ from behavior in the natural environment.

Continued

double-blind study An experiment in which neither the participants nor the individuals running the study know which participants are in the control group and which are in the experimental group until after the results are tallied.

field research Descriptive or experimental research conducted in a natural setting outside the laboratory.

TABLE 1.3 (Continued)

Method	Advantages	Disadvantages
Test	Yields information on personality traits, emotional states, aptitudes, and abilities.	Difficult to construct tests that are reliable and valid.
Survey	Provides a large amount of information on large numbers of people.	If sample is nonrepresentative or biased, it may be impossible to generalize from the results. Responses may be inaccurate or untrue.
Correlational study	Shows whether two or more variables are related. Allows general predictions.	Does not permit identification of cause and effect.
Experiment	Allows researcher to control the situation. Permits researcher to identify cause and effect and to distinguish placebo effects from treatment effects.	Situation is artificial, and results may not generalize well to the real world. Sometimes difficult to avoid experimenter effects.

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Quick Quiz

There are many advantages and no disadvantages of taking this quiz.

- A. Name the independent and dependent variables in studies designed to answer the following questions:
- Whether sleeping after learning a poem improves memory for the poem.
 - Whether the presence of other people affects a person's willingness to help someone in distress.
 - Whether people get agitated from listening to heavy metal.
- B. On a talk show, Dr. Blitznik announces a fabulous new program: Chocolate Immersion Therapy (CIT). "People who spend one day a week doing nothing but eating chocolate are soon cured of eating disorders, depression, drug abuse, and poor study habits," claims Dr. Blitznik. What should you find out about CIT before signing up?

Answers:

A. 1. Opportunity to sleep after learning is the independent variable; memory for the poem is the dependent variable. 2. The presence of other people is the independent variable; willingness to help others is the dependent variable. 3. Exposure to heavy metal music is the independent variable; agitation is the dependent variable. **B.** Some questions to ask: Is there research showing that people who go through CIT did better than those in a control group who did not have the therapy, or who had a different therapy, say, Broccoli Immersion Therapy? If so, how many people were studied? How were they selected, and how were they assigned to the therapy and nontherapy groups? Did the person running the experiment know who was and was not getting CIT? How long did the apparent cures last? Has the research been replicated?



YOU are about to learn...

- why averages can be misleading.
- how to tell whether a finding is strong or trivial.
- why some findings are significant statistically yet unimportant in practical terms.
- how psychologists can combine results from many studies to better understand the problem.

Evaluating the Findings


If you are a psychologist who has just done an observational study, a survey, or an experiment, your work has only just begun. Once you have some results in hand, you must do three things with them: (1) describe them, (2) assess how reliable and meaningful they are, and (3) figure out how to explain them.

Why Psychologists Use Statistics

Let's say that 30 people in the cell phone experiment talked on the phone and 30 did not. We have recorded the number of collisions for each person on the driving simulator. Now we have 60 numbers. What can we do with them?

The first step is to summarize the data. The world does not want to hear how many collisions each person had. It wants to know what happened in the cell phone group as a whole, compared to what happened in the control group. To provide this information, we need numbers that sum up our data. Such numbers, known as **descriptive statistics**, are often depicted in graphs and charts.

A good way to summarize the data is to compute group averages. The most commonly used type of average is the **arithmetic mean**. (For two other types, see the Appendix.) The mean is calculated by adding up all the individual scores and dividing the result by the number of scores. We can compute a mean for the cell phone group by adding up the 30 collision scores and dividing the sum by 30. Then we can do the same for the control group. Now our 60 numbers have been boiled down to 2. For the sake of our example, let's assume that the cell phone group had an average of 10 collisions, whereas the control group's average was only 7.

We must be careful, however, about how we interpret these averages. It is possible that no one in our cell phone group actually had 10 collisions. Perhaps half the people in the group were motor-ing maniacs and had 15 collisions, whereas the others were more cautious and had only 5. Perhaps almost all of the participants had 9, 10, or 11 collisions. Perhaps the number of accidents ranged from 0 to 15. The mean does not tell us about such variability in the subjects' responses. For that, we need other descriptive statistics. For example, the **standard deviation** tells us how clustered or spread out the individual scores are around the mean; the more spread out they are, the less typical of everybody the mean is. (For details, see the Appendix.) Unfortunately, when research is reported in the news, you usually hear only about the mean.  **Simulate**

At this point in our experiment, we have one group with an average of 10 collisions and another with an average of 7. Should we break out the champagne? Try to get on CNN? Call our mothers? Better hold off. Perhaps if one group had an average of 15 collisions and the other an average of 1, we could get excited. But rarely does a psychological study hit you between the eyes

with a sensationally clear result. In most cases, there is some possibility that the difference between the two groups was due simply to chance. Perhaps the people in the cell phone group just happened to be a little more accident-prone, and their collisions had nothing to do with talking on the phone.

To find out how impressive the data are, psychologists use **inferential statistics**. These statistics do not merely describe or summarize the data; they permit researchers to draw inferences (conclusions based on evidence) about how meaningful the findings are. Like descriptive statistics, inferential statistics involve the application of mathematical formulas to the data. (Again, see the Appendix for details.)

Historically, the most commonly used inferential statistics have been **significance tests**, which tell researchers how likely a result was to have occurred by chance. In our cell phone experiment, a significance test will tell us how likely it is that the difference between the experimental group and the control group occurred by chance. It is not possible to rule out chance entirely, but if the likelihood that a result occurred by chance is extremely low, we say that the result is *statistically significant*.

By convention, psychologists consider a result to be significant if it would be expected to occur by chance 5 or fewer times in 100 repetitions of the study. Another way of saying this is that the result is significant at the .05 ("point oh five") level. If the difference could be expected to occur by chance in 6 out of 100 studies, we would have to say that the results failed to support the hypothesis—that the difference we obtained might well have occurred merely by chance—although we might still want to do further research to be sure. You can see that psychologists refuse to be impressed by just any old result.

By the way, many studies similar to our hypothetical one have confirmed the dangers of talking on a cell phone while driving. In one study, cell phone users, whether their phones were handheld


descriptive statistics Statistics that organize and summarize research data.

arithmetic mean An average that is calculated by adding up a set of quantities and dividing the sum by the total number of quantities in the set.

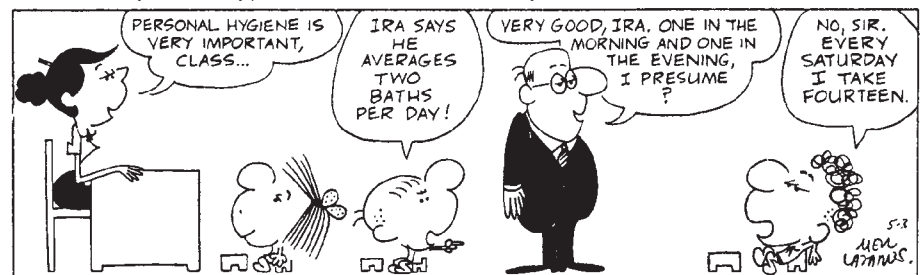
standard deviation A commonly used measure of variability that indicates the average difference between scores in a distribution and their mean.

inferential statistics Statistical procedures that allow researchers to draw inferences about how statistically meaningful a study's results are.

significance tests Statistical tests that assess how likely it is that a study's results occurred merely by chance.

 **Simulate**
Doing Simple
Statistics on
myspsychlab.com

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Averages can be misleading if you don't know the extent to which events deviated from the statistical mean and how they were distributed.

or hands-free, were as impaired in their driving ability as intoxicated drivers were (Strayer, Drews, & Crouch, 2006). Because of such research, some states have made it illegal to drive while holding a

cell phone to your ear. Others are considering making any cell phone use by a driver illegal. We will revisit this topic, and the general issue of multitasking, in Chapter 7.

✓ Study and Review on mypsychlab.com

Quick Quiz

Don't try this quiz while you're driving—or doing other tasks!

Check your understanding of the descriptive–inferential distinction by mentally placing a check in the appropriate column for each phrase:

	Descriptive Statistics	Inferential Statistics
1. Summarize the data	_____	_____
2. Give likelihood of data occurring by chance	_____	_____
3. Include the mean	_____	_____
4. Give a measure of statistical significance	_____	_____
5. Tell you whether to call your mother about your results	_____	_____

Answers:

1. descriptive 2. inferential 3. descriptive 4. inferential 5. inferential

From the Laboratory to the Real World

The last step in any study is to figure out what the findings mean. Trying to understand behavior from uninterpreted findings is like trying to become fluent in Swedish by reading a Swedish–English dictionary. Just as you need the grammar of Swedish to tell you how the words fit together, psychologists need hypotheses and theories to explain how the facts that emerge from research fit together.

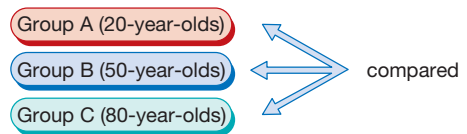
Choosing the Best Explanation Sometimes it is hard to choose between competing explanations. Does cell phone use disrupt driving by impairing coordination, by increasing a driver's vulnerability to distraction, by interfering with the processing of information, by distorting the driver's perception of danger, or by some combination of these or other factors? Several explanations may fit the results equally well, which means that more research will be needed to determine the best one.

Sometimes the best interpretation of a finding does not emerge until a hypothesis has been tested in different ways. If the findings of studies using different methods converge, there is greater reason to be confident about them. On the other hand, if they conflict, researchers will know they must modify their hypotheses or do more research.

Here is an example. When psychologists compare the mental-test scores of young people and old people, they usually find that younger people consistently outscore older ones. In a **cross-sectional study**, different groups are compared at the same time:

Cross-Sectional Study

Different groups compared at one time:



But other psychologists prefer to investigate mental abilities across the life span. In a **longitudinal study**, the same people are followed over a period of time and are reassessed at regular intervals:

Longitudinal Study

Same group compared at different times:



In contrast to cross-sectional studies, longitudinal studies find that as people age, they sometimes continue to perform as well as they ever did on many mental tests. A *general* decline in ability may

cross-sectional study

A study in which individuals of different ages are compared at a given time.

longitudinal study

A study in which individuals are followed and periodically reassessed over a period of time.

not occur until people reach their 70s or 80s (see Chapter 3). Why do results from the two types of studies conflict? Probably because cross-sectional studies measure generational differences. Younger generations tend to outperform older ones because they are better educated or are more familiar with the tests used. Without longitudinal studies, we might falsely conclude that all types of mental ability inevitably decline sharply with advancing age.

Judging the Result's Importance Sometimes psychologists agree on the reliability and meaning of a finding, but not on its ultimate relevance for theory or practical application. A result may be statistically significant at the “point oh-five level,” yet may be small and of little consequence in everyday life because the independent variable does not explain most of the variation in people’s behavior (Cumming et al., 2007; Erceg-Hurn & Mirosevich, 2008). Conversely, a result may not quite reach statistical significance yet be worth following up on. Many scholarly journals now encourage the use of statistical procedures that reveal the **effect size**—that is, how powerful the independent variable really is (how much of the variation in the data the variable accounts for). If the independent variable explains 5 percent of the variation, it’s not very powerful, even if the result is statistically significant; if it explains 40 percent, it’s pretty impressive.



Thinking Critically about “Significant” Research Findings

One popular statistical technique, called **meta-analysis**, combines and analyzes data from many studies on a particular topic instead of assessing

each study’s results separately. Meta-analysis tells the researcher how much of the variation in scores across *all* the studies in the analysis can be explained by a particular variable. Suppose we did ten studies on everybody’s favorite subject, gender differences. We might get contradictory results, or some results that were significant and others that were not. Meta-analysis can come to the rescue, providing us with a clearer picture.

For example, what is the reason for the gender gap in math achievement, which persists in some nations but not others? Is it largely due, as the stereotype holds, to a “natural” male superiority in math, or to gender differences in educational and professional opportunities to succeed in the sciences? A meta-analysis of studies across 69 nations, representing nearly 500,000 students ages 14 to 16, found that although boys have more positive attitudes toward math than girls, average effect sizes in actual mathematics achievement are very small. However, *national* effect sizes show considerable variability; that is, a male-female math gap is wider in some countries than others. The most powerful predictors of that cross-national variation were whether boys and girls were equally likely to be enrolled in school; the percentage of women in research jobs; and women’s representation in their nation’s government (Else-Quest, Hyde, & Linn, 2010).

Techniques such as meta-analysis are useful because rarely does one study prove anything, in psychology or any other field. That is why you should be suspicious of headlines that announce a sudden major scientific breakthrough based on a single study. Such breakthroughs do occur, but they are rare.

effect size The amount of variance among scores in a study accounted for by the independent variable; thus it is a measure of the strength or power of that variable.

meta-analysis A procedure for combining and analyzing data from many studies; it determines how much of the variance in scores across all studies can be explained by a particular variable.

Psychology in the News REVISITED

Now that you have finished this chapter, you are ready to explore more deeply what psychologists have learned about human behavior.

At the start of each of the remaining chapters, we will present a real news story, one that raises some fascinating psychological questions. Then, at the end of the chapter, we will revisit the story to show how the

material you have learned can help you answer those questions. For now, if you are ready to share the excitement of studying human behavior; if you love mysteries and want to know not only who did it but also why they did it; if you are willing to reconsider what you think you think . . . then you are ready to read on.

Psychology in the News

Zenitones on Parade in Pasadena
PHOTOGRAPH BY JEFFREY M. HARRIS FOR GETTY IMAGES

Count Finds No Evidence Linking Vaccines to Autism
BY JEFFREY M. HARRIS FOR GETTY IMAGES

Brain Boy Reunited with Father After Five-Year Custody Battle
BY JEFFREY M. HARRIS FOR GETTY IMAGES

Mexico City Legalizes Gay Marriage
BY JEFFREY M. HARRIS FOR GETTY IMAGES

PHOTOGRAPH BY JEFFREY M. HARRIS FOR GETTY IMAGES

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Taking Psychology with You

What Psychology Can Do for You—and What it Can't

If you intend to become a psychologist or a mental health professional, you have an obvious reason for taking a course in psychology. But psychology can contribute to your life in many ways, even if you do not plan to work in the field. Here are a few things psychology can do for you:

Make you a more informed person. One purpose of education is to acquaint people with their cultural heritage and with human achievements in literature, the arts, and science. Because psychology plays a large role in contemporary society, being a well-informed person requires knowing something about psychological methods and findings.

Satisfy your curiosity about human nature. When the Greek philosopher Socrates admonished his students, “Know thyself,” he was only telling them to do what most people want to do anyway. Psychology—along with the other social sciences, literature, history, and philosophy—can contribute to a better understanding of yourself and others.

Help you increase control over your life. Psychology cannot solve all your problems, but it does offer helpful techniques for handling your emotions, improving your memory, and eliminating unwanted habits. It can also foster an attitude of objectivity that is useful for analyzing your behavior and your relationships.

Help you on the job. A bachelor's degree in psychology is useful for getting a job in a helping profession, such as a welfare case-worker or a rehabilitation counselor. Anyone who works as a nurse, doctor, member of the clergy, police officer, or teacher can also put psychology to work on the job. So can waiters, flight attendants, bank tellers, salespeople, receptionists, and others whose jobs involve

customer service. Finally, psychology can be useful to those whose jobs require them to predict people's behavior: labor negotiators, politicians, advertising copywriters, managers, product designers, buyers, market researchers, magicians....

Give you insights into political and social issues. Crime, drug abuse, discrimination, and war are not only social issues but also psychological ones. Psychological knowledge alone cannot solve the complex political, social, and ethical problems that plague every society, but it can help citizens make informed judgments about them. If you know how social and cultural practices affect rates of illegal drug use and abuse, this knowledge may affect your views about drug policies.

We are optimistic about psychology's role in the world, but we want to caution you that sometimes people expect things from psychology that it can't deliver. Psychology can't tell you the meaning of life. A philosophy about the purpose of life requires not only knowledge but also reflection and a willingness to learn from life's experiences. Nor does psychological understanding relieve people of responsibility for their actions. Knowing that your short temper is a result, in part, of your unhappy childhood does not give you a green light to yell at your family or mistreat your own kids. Most important, as we have repeatedly

emphasized, psychology will not provide you with simple answers to complex questions.

Yet despite the complexity of behavior and the lack of simple answers to human problems, psychologists have made enormous progress in unraveling the secrets of the human brain, mind, and heart. The study of psychology will provide you with sound information, empirical findings, and the skills of critical thinking, all of which can help guide your thinking and your decisions. At the end of each chapter, starting with the next one, “Taking Psychology with You” will suggest ways to apply psychological findings to your own life—at school, on the job, or in your relationships.



*“I still don't have all the answers,
but I'm beginning to ask the right questions.”*

Summary

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The Science of Psychology

- *Psychology* is the discipline concerned with behavior and mental processes and how they are affected by an organism's external and internal environment. Psychology's methods and reliance on *empirical evidence* distinguish it from pseudoscience and "psychobabble."
- Psychological findings sometimes confirm, but often contradict, common sense. An introductory psychology course can correct many misconceptions about human behavior. But a finding from research does not have to be surprising or counterintuitive to be scientifically important.
- Psychology's forerunners made some valid observations and had some useful insights, but without rigorous empirical methods, they also made serious errors in the description and explanation of behavior, as in the case of *phrenology*.
- The official founder of scientific psychology was Wilhelm Wundt, who established the first psychological laboratory in 1879, in Leipzig, Germany. Wundt emphasized the analysis of experience into basic elements, through *trained introspection*. A competing approach, *functionalism*, which was inspired in part by the evolutionary theories of Charles Darwin, emphasized the functions of behavior. One of its leading proponents was William James.
- Psychology as a method of psychotherapy was born in Vienna, with the work of Sigmund Freud and the establishment of *psychoanalysis*.
- Five points of view predominate today in psychology. The *biological perspective* emphasizes bodily events associated with actions, thoughts, and feelings, and also genetic contributions to behavior. Within this perspective, a popular new specialty, *evolutionary psychology*, emphasizes the purposes and functions of behavior, as functionalism did. The *learning perspective* emphasizes how the environment and a person's history affect behavior; within this perspective, *behaviorists* reject mentalistic explanations and *social-cognitive learning theorists* combine elements of behaviorism with the study of thoughts, values, and intentions. The *cognitive perspective* emphasizes mental processes in perception, problem solving, belief formation, and other human activities. The *sociocultural perspective* explores how social contexts and cultural rules affect an individual's beliefs and behavior. And the *psychodynamic perspective*, which originated with

Freud's theory of psychoanalysis, emphasizes unconscious motives, conflicts, and desires; it differs greatly from the other approaches in its methods and standards of evidence.

- Each approach has made important contributions to psychology, but many, if not most, psychologists draw on more than one school of thought.

What Psychologists Do

- Psychologists do research and teach in colleges and universities, provide mental health services (*psychological practice*), and conduct research and apply findings in a wide variety of nonacademic settings. *Applied psychology* is concerned with the practical uses of psychological knowledge. *Basic psychology* is concerned with knowledge for its own sake.
- *Psychotherapist* is an unregulated term for anyone who does therapy, including people who have no credentials or training at all. Licensed therapists differ according to their training and approach. *Clinical psychologists* have a Ph.D., an Ed.D., or a Psy.D.; *psychiatrists* have an M.D.; *psychoanalysts* are trained in psychoanalytic institutes; and licensed clinical social workers, counselors with various specialties, and marriage, family, and child counselors may have a variety of postgraduate degrees. Many psychologists are concerned about an increase in poorly trained psychotherapists who lack credentials or a firm understanding of research methods and findings.

Critical and Scientific Thinking in Psychology

- One benefit of studying psychology is the development of *critical-thinking* skills and attitudes. Critical thinkers ask questions, define terms clearly, examine the evidence, analyze assumptions and biases, avoid emotional reasoning, avoid oversimplification, consider alternative interpretations, and tolerate uncertainty. These activities not only are useful in ordinary life but also are the basis of the scientific method. Scientists are required to state hypotheses and predictions precisely and formulate operational definitions ("define your terms"); to gather empirical evidence; to comply with the *principle of falsifiability* ("analyze assumptions") and resist the *confirmation bias*; to be cautious

in settling on a theory (“consider other interpretations”); and to resist drawing firm conclusions until results are replicated (“tolerate uncertainty”).

Descriptive Studies: Establishing the Facts

- Psychological scientists try whenever possible to use samples that are representative of the larger population they wish to describe. In practice, they must often rely on college students as subjects. Most of the time, that does not pose a problem, but some conclusions based on college student samples may not generalize to the larger population, and thus should be accepted with caution until the research is replicated with nonstudents.
- *Descriptive methods* allow psychologists to describe and predict behavior but not necessarily to choose one explanation over others. Such methods include case studies, observational studies, psychological tests, and surveys, as well as correlational methods.
- *Case studies* are detailed descriptions of individuals. They are often used by clinicians, and they can be valuable in exploring new research topics and addressing questions that would otherwise be difficult to study. But because information is often missing or hard to interpret, and because the person under study may not be representative of people in general, case studies are typically sources rather than tests of hypotheses.
- In *observational studies*, researchers systematically observe and record behavior without interfering in any way with the behavior. *Naturalistic observation* is used to find out how people behave in their natural environments. *Laboratory observation* allows more control and the use of special equipment; behavior in the laboratory, however, may differ from behavior in natural contexts.
- *Psychological tests* are used to measure and evaluate personality traits, emotional states, aptitudes, interests, abilities, and values. A good test is one that has been *standardized*, is scored using established *norms*, and has both *reliability* and *validity*. Critics have questioned the reliability and validity of even some widely used tests, such as the IQ test and the SAT.
- *Surveys* are questionnaires or interviews that ask people directly about their experiences, attitudes, and opinions. They are difficult to do well; sampling problems are often an issue, and the results can be affected by a *volunteer bias*. Findings can also be affected by biased questions and by the fact that respondents sometimes lie, misremember their experiences, or misinterpret the questions.

Correlational Studies: Looking for Relationships

- In descriptive research, studies that look for relationships between phenomena are known as *correlational*. A *correlation* is a measure of the strength of a positive or negative relationship between two variables, and is expressed by the *coefficient of correlation*. An *illusory correlation* may occur because of a coincidental link between two variables. A correlation does not necessarily demonstrate a causal relationship between the variables.

The Experiment: Hunting for Causes

- *Experiments* allow researchers to control the situation being studied, manipulate an *independent variable*, and assess the effects of the manipulation on a *dependent variable*. Because of the element of manipulation, ethical guidelines are especially important in experimental research. These guidelines govern studies with human beings, who must give *informed consent* before participating, and also with animals, which must be treated humanely.
- Experimental studies usually require a comparison or *control condition*, and often involve *random assignment* of subjects to experimental and control groups. In some studies, people in the control group receive a *placebo*. *Single-blind* and *double-blind* procedures can be used to prevent the expectations of the subjects or the experimenter from affecting the results. Because experiments allow conclusions about cause and effect, they have long been the method of choice in psychology. However, like laboratory observations, experiments create a special situation that may call forth behavior not typical in other environments. Many psychologists, therefore, have called for more *field research*.

Evaluating the Findings

- Psychologists use *descriptive statistics*, such as the *arithmetic mean* and *standard deviation*, to summarize data. They use *inferential statistics* to find out how impressive the data are. *Significance tests* tell researchers how likely it is that the results of a study occurred merely by chance. The results are said to be *statistically significant* if this likelihood is very low.
- Choosing among competing interpretations of a finding can be difficult, and care must be taken to avoid going beyond the facts. Sometimes the best interpretation does not emerge until a hypothesis has been tested

in more than one way, such as by using both *cross-sectional* and *longitudinal methods*.

- Statistical significance does not always imply real-world importance because the amount of variation in the data accounted for by a particular variable—the *effect size*—may be small. Conversely, a result that does not quite reach significance may be potentially useful. Therefore, many psychologists are now turning to other statistical measures such as the technique of *meta-analysis*, which reveals how much of the variation

in scores across many different studies can be explained by a particular variable.

Taking Psychology with You

- Psychology is useful in many ways—for your personal life, your professional life, and your understanding of the world. But critical thinkers realize that psychology cannot solve all of their problems or absolve them of responsibility for faults and misdeeds.

Key Terms

Use this list to check your understanding of terms and people in this chapter. If you have trouble with a term, you can find it on the page listed.

psychology 4	psychoanalyst 10	positive correlation 22
empirical 4	psychiatrist 10	negative correlation 22
phrenology 5	critical thinking 12	coefficient of correlation 23
Wilhelm Wundt 6	hypothesis 13	experiment 24
trained introspection 6	operational definition 13	informed consent 24
functionalism 6	principle of falsifiability 14	independent variable 25
William James 6	confirmation bias 14	dependent variable 25
Sigmund Freud 6	theory 15	control condition 25
psychoanalysis 6	replicate 16	experimental and control groups 25
biological perspective 6	representative sample 17	random assignment 26
evolutionary psychology 6	descriptive methods 18	placebo 26
learning perspective 7	case study 18	single-blind study 26
behaviorists 7	observational studies 19	experimenter effects 26
social-cognitive learning theorists 7	naturalistic observation 19	double-blind study 26
cognitive perspective 7	laboratory observation 19	field research 27
sociocultural perspective 8	psychological tests 19	descriptive statistics 29
psychodynamic perspective 8	standardization 20	arithmetic mean 29
psychological practice 9	norms 20	standard deviation 29
basic psychology 9	reliability 20	inferential statistics 29
applied psychology 9	validity 20	significance tests 29
counseling psychologist 10	surveys 20	cross-sectional study 30
school psychologist 10	volunteer bias 21	longitudinal study 30
clinical psychologist 10	correlational study 22	effect size 31
psychotherapist 10	correlation 22	meta-analysis 31
	variable 22	

The Science of Psychology

Psychology is the discipline concerned with behavior and mental processes and how they are affected by an organism's physical state, mental state, and external environment. Unlike pseudoscientific approaches to behavior, it relies on **empirical** data.

The Birth of Modern Psychology

- Wilhelm Wundt founded the first psychology laboratory in Leipzig, Germany, in 1879, and emphasized the analysis of experience through trained introspection.
- American William James emphasized the adaptive nature of behavior, an approach known as **functionalism**.
- Sigmund Freud developed **psychoanalysis**, an early form of psychotherapy, in Vienna, Austria.

Today's Five Major Psychological Perspectives

- The **biological perspective** focuses on how bodily events interact with the external environment to affect behavior, feelings, and thoughts.
- The **learning perspective** emphasizes the environment's effect on behavior.
- The **cognitive perspective** emphasizes mental processes in reasoning, memory, perception, language, problem solving, and beliefs.
- The **sociocultural perspective** focuses on the influence of social and cultural forces on behavior.
- The **psychodynamic perspective** looks at unconscious dynamics, such as inner forces, conflicts, and instinctual energy.

What Psychologists Do

- Conduct research in **basic psychology**, to gain knowledge for its own sake; and **applied psychology**, to find practical uses for knowledge.
- Teach.
- Provide mental health services (psychological practice).
- Consult with business, governmental, and other groups to apply the findings of research.

- Psychotherapist is an unregulated term.
- Clinical psychologists have Ph.D., Ed.D., or Psy.D. degrees.
- Psychiatrists have M.D. degrees.
- Psychoanalysts have completed training in psychoanalytic institutes.

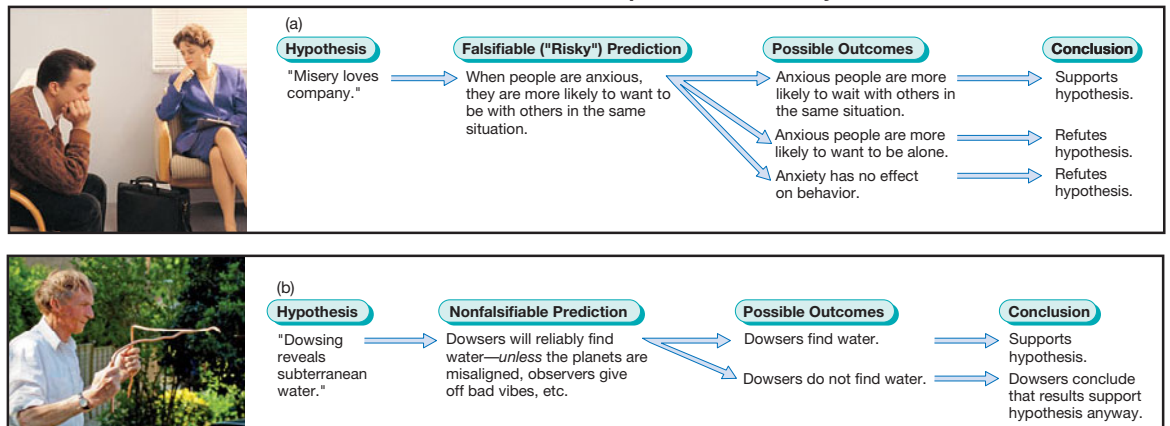
Critical and Scientific Thinking in Psychology

Critical thinking rests on eight basic guidelines:

- Ask questions.
- Define terms.
- Examine the evidence for a claim.
- Analyze assumptions (beliefs taken for granted) and biases (beliefs that prevent us from considering the evidence fairly).
 - **Principle of falsifiability**, the statement of a hypothesis in such a way that it can be disproved by counterevidence
 - **Confirmation bias**, the tendency to look for and accept evidence that supports our beliefs and ignore evidence that disconfirms them.
- Avoid emotional reasoning.

- Avoid oversimplification.
- Consider alternative explanations.
 - In science, the goal is to develop a **theory**, an organized system of assumptions and principles that explain a set of phenomena and their interrelationships.
- Tolerate uncertainty.
 - In science, resist drawing firm conclusions until others have *replicated* the study and gotten the same results.

Principle of falsifiability



Research Methods in Psychology

Representative Samples

A **representative sample** is a group of participants that accurately represents the larger population that the researcher is interested in.

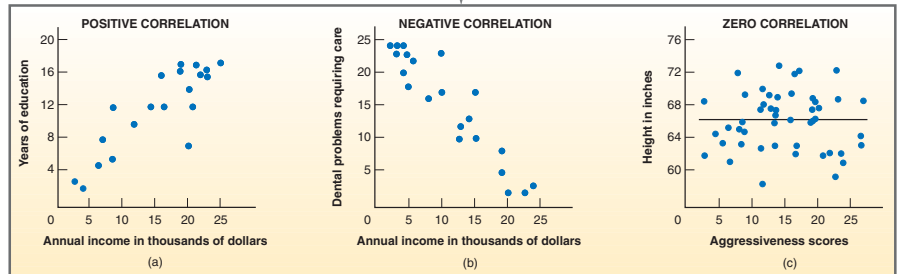
Descriptive Studies: Establishing the Facts

- **Case study:** a detailed description of a particular individual, based on observation or formal psychological testing.
- **Observational study:** careful observation, measurement, and recording of behavior without intruding on the subjects.
- **Psychological tests:** assessment instruments that measure and evaluate personality traits, emotional states, aptitudes, interest, abilities, and values.
- **Surveys:** questionnaires or interviews that ask people directly about their experiences, attitudes, or opinions.

Correlational Studies: Looking for Relationships

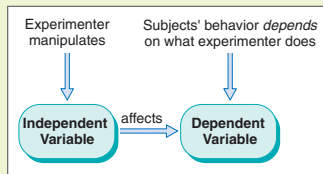
A **positive or negative correlation** is a measure of the strength of a relationship between two variables.

- A **Coefficient of correlation** summarizes the strength and direction of a relationship.
- A correlation does not establish cause and effect.



The Experiment: Hunting for Causes

- **Experiments** allow researchers to control all aspects of a situation except the **independent variable**, which is manipulated to determine its effects on a **dependent variable**.



- Experiments usually require a **control condition** in which subjects are not exposed to the experimental condition.
- Participation in an experimental or control group is determined by **random assignment**.
- Drug experiments typically include the use of a **placebo**, an inactive substance used as a control.

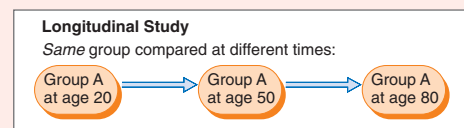
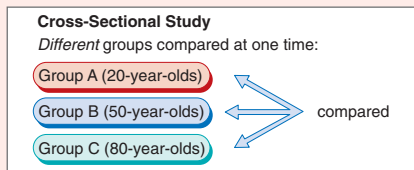
Experimenter Effects

The expectations of participants can influence a study's results. To counteract this problem, experimenters may conduct:

- A **single-blind study**, an experiment in which subjects do not know whether they are in an experimental or a control group.
- A **double-blind study**, an experiment in which neither the participants nor the experimenters know which participants are in the control group and which are in the experimental group until after the results are tallied.

Evaluating the Findings

- **Descriptive statistics** (including the **arithmetic mean** and **standard deviation**) organize and summarize data.
- **Inferential statistics** help to determine how meaningful the findings are.
- **Significance tests** measure the probability that the study's findings could have occurred by chance.
- Interpretation of findings may need to await studies using different methods. For example, **cross-sectional** studies compare subjects of different ages; **longitudinal** methods follow subjects over many years.



- Statistical procedures can reveal the **effect size**, how powerful the independent variable is.
- **Meta-analysis** combines and analyzes data from many studies to determine how much of the variance across all studies can be explained by a particular variable.