

determine whether it does in fact differ depending on the level of the independent variable to which they are exposed.

To illustrate the basic nature of experimentation in psychological research, let's return to the possible effects of magnets on muscle or joint pain. One way in which a psychologist could study this topic through the experimental method is as follows. First, the psychologist would recruit persons who had considerable muscle or joint pain as participants in the research; this could be accomplished through ads in local newspapers, by referrals from physicians, or in other ways. These persons would make appointments to come to the psychologist's office or laboratory; there, the psychologist would give them metal disks and ask them to wear these for some specific amount of time (e.g., for one hour). One group would receive real magnets, while another group (known as a control condition) would receive disks that looked exactly the same but were not magnets. This is the independent variable—whether people wear magnets or nonmagnetized metal disks. At the end of the hour, participants would be asked to rate the amount of muscle or joint pain they felt as they performed a series of simple movements (e.g., raising their arms, moving their legs). They would rate their pain on a simple rating scale (e.g., 0 = no pain, 1 = mild pain, 2 = moderate pain, and so on); pain level would be the dependent variable. The psychologist would then compare the pain reported by the two groups. If the group that received the real magnets reported less pain, this would provide evidence that magnets are effective; if the two groups reported identical levels of pain, this would suggest that perhaps magnets are ineffective.

This, of course, is the simplest form of experiment the psychologist could perform. The researcher could make the study more informative by varying the number of magnets (or metal disks) participants wear (e.g., one disk, two, four, and so on) or by varying the number of hours they wear the disks (0.5, 1.0, 2.0, 4.0 hours). In addition, other variables—such as the strength of the magnets or their specific placement on the body—could also be introduced and varied systematically. The data from such expanded studies would provide more evidence concerning whether, and under what conditions, magnets reduce pain. But the basic logic would remain the same: The experimenter would vary each factor systematically in order to determine whether it had any effect on participants' pain.

### Experimentation: Two Requirements for Its Success

In order to provide clear information on cause-and-effect relationships, experiments must meet two key requirements. The first involves what is termed **random assignment of participants to conditions**. This means that all participants in an experiment must have an equal chance of being assigned to each group in the study—an equal chance of being exposed to each level of the independent variable. The reason for this rule is simple: If participants are not randomly assigned to each condition, it may later be impossible to tell whether differences in their behavior stem from differences they brought with them to the study, from the impact of the independent variable, or both. Imagine that in the study on magnets just described, all of the persons who receive the real magnets are strong believers in the benefits of these devices, while all those who receive the nonmagnetic metal disks are skeptical of such effects. Now assume that those receiving the magnets report less pain. Is this difference due to the effects of the magnets, the participants' belief in the benefits of magnets, or both factors? We can't tell. If, in contrast, the believers and the skeptics are randomly assigned to each condition, a difference between the conditions will be revealing: It will suggest that the magnets really may have some real, measurable effects.

#### Independent Variable:

The variable that is systematically changes in an experiment.

#### Dependent Variable:

The variable that is measured in an experiment.

#### Random Assignments of Participants to Experimental Conditions:

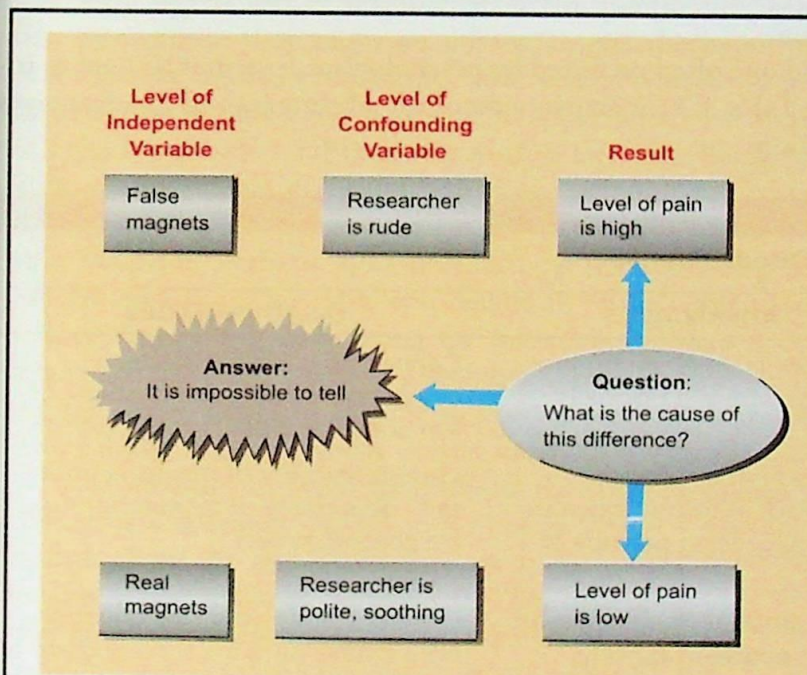
Ensuring that all research participants have an equal chance of being exposed to each level of the independent variable (that is, of being assigned to each experimental condition).



The second requirement essential for successful experimentation is this: To as great a degree as possible, all factors other than the independent variable that might also affect participants' behavior must be held constant. To see why this is, consider what may happen in the study on magnets if those who get the real magnets are treated in a kind and soothing manner by the experimenter, while those who get the nonmagnetic disks are treated in a rude and harsh fashion. Again, those who get the real magnets report less pain. Why? We can't tell, because of **confounding** of variables: The independent variable (exposure to real magnets or blank metal disks) is confounded with another variable (the way in which the experimenter treats the participants). Kind, soothing treatment may help reduce pain, while rude, harsh treatment may increase stress and so intensify pain (see Chapters 4 and 13 for more discussion of this topic). The moral is clear: To the extent that variables other than the independent variable are permitted to change in an experiment, the value of the study may be greatly reduced or even totally eliminated (see Figure 1.10).

### Confounding (of variables):

Confusion that occurs when factors other than the independent variable are permitted to vary across experimental conditions; can invalidate the apparent results of an experiment.



**Figure 1.10**  
**Confounding of Variables:**  
**A Fatal Flaw in**  
**Experimentation**

In the experiment illustrated here, the independent variable—wearing magnets—is confounded with another variable—different treatment by the experimenter. This person is kind and soothing to those who wear real magnets, but rude and harsh to those who wear nonmagnetic metal disks. As a result of this confounding, it is impossible to tell whether any differences between the pain levels of participants in the two conditions stem from the independent variable, the confounding variable, or both.

But why, you may be wondering, would a psychologist (or any other type of scientist) make such a mess of her or his own study? The answer, of course, is that no researcher would do so on purpose. But sometimes confounding of variables occurs because researchers aren't aware of the "other" variable and don't realize that it may be influencing the behavior they are studying. For example, suppose magnets can reduce pain, but only for people below the age of forty. Not realizing this, a researcher assigns more people over age forty to the magnet condition, and fewer people over age forty to the no-magnet group. Now, no difference between the conditions is found. Does this mean that magnets don't reduce pain? The researcher may accept this conclusion but will be on shaky ground, because of the potential influence of the confounding variable of which she or he is unaware.

One important source of confounding is subtle differences in experimenters' behavior that can influence research participants. For instance, a researcher who believes that magnets do have beneficial effects may act



in a slightly friendlier or more reassuring manner toward participants who receive real magnets than toward ones who do not. These subtle differences may be unintentional and unconscious, but they can still affect participants' behavior. Such unintended effects produced by researchers are known as **experimenter effects**, and they can be deadly to the scientific value of a research project. This is one reason why many studies in psychology employ a **double-blind procedure**, in which researchers who have contact with participants do not know the hypothesis under investigation or the condition to which participants have been assigned.

In sum, experimentation is, in several respects, the crown jewel among psychology's research methods. Why, then, isn't it the only method used by psychologists? One reason is that the other methods do indeed offer advantages (e.g., the vast amount of information that can be collected quickly through the survey method, or the high generalizability provided by naturalistic observation). Another reason is that in many cases, practical and ethical constraints prevent psychologists from using experimentation.

While experimentation is a powerful tool and one often preferred by psychologists, it cannot be used to investigate all questions about behavior. Please see Table 1.3 for an overview of the advantages and disadvantages of all the research methods described in this section.

**Experimenter Effects:**

Unintended effects, caused by researchers, on participants' behavior.

**Double-Blind Procedure:**

Procedure in which the researchers who have contact with participants do not know the hypothesis under investigation.

**Table 1.3**

**Various Research Methods: Advantages and Disadvantages**

METHOD	DESCRIPTION	ADVANTAGES	DISADVANTAGES
Systematic observation	Systematic study of behavior in natural settings	Behavior is observed in the settings where it normally occurs	Cannot be used to establish cause-and-effect relationships; often costly and difficult to perform
Case method	Detailed study of a small number of persons	Detailed information is gathered; individuals can be studied for long periods of time	Generalizability of results is uncertain; objectivity of researcher may be compromised
Surveys	Large numbers of persons are asked questions about their attitudes or views	Large amount of information can be acquired quickly; accurate predictions of large-scale trends can sometimes be made	Generalizability may be questionable unless persons surveyed are a representative sample of a larger population
Correlational research	Researchers measure two or more variables to determine if they are related in any way	Large amount of information can be gathered quickly; can be used in field as well as laboratory settings	Difficult to establish cause-and-effect relationships
Experimentation	The presence or strength of one or more variables is varied	Cause-and-effect relationships can be established; precise control can be exerted over other, potentially confounding variables	Results can be subject to several sources of bias (e.g., experimenter effects); generalizability can be doubtful if behavior is observed under highly artificial conditions



## Ethical Issues in Psychological Research

All research conducted by trained psychologists is currently performed in accordance with strict ethical standards designed to protect the safety, privacy, and well-being of all research participants. These standards, which were developed both by government agencies and by the American Psychological Association, are carefully enforced in all settings where research occurs. Thus, many safeguards are built into the system, and together these assure that the disturbing image of psychological research mentioned above has little connection to reality.

Having said this, we should note that two ethical issues deserving of careful attention do remain. One has to do with the use of **deception**—the temporary withholding of information about a study from the persons who participate in it. The other issue has to do with the use of animals in psychological research.

### Deception: The Ethics of Misleading Research Participants

Suppose you are a participant in a study designed to test the following hypothesis: The more attractive people are, the better first impressions they make on others. To test the hypothesis, the experimenter arranges for you to meet several people—one who is unattractive, another who is average in appearance, and a third who is a real knockout—and then asks you to rate your liking for each. Suppose that before the study begins, the psychologist explains the hypothesis to you. Do you think this knowledge could influence your behavior? Perhaps. One possibility is that, knowing what the psychologist hopes to find, you decide to “help”; this means that you express even greater liking for the attractive person than you might normally do. Another possibility is that you decide to show the researcher that you are not so easy to predict, so you actually report liking the unattractive person most.

It is in order to avoid such effects that psychologists sometimes choose to withhold information about the hypothesis they are investigating and other details of the research. They believe that such information may change participants’ behavior and so render the results of the research useless. While this reasoning is sound, the use of deception also raises important ethical issues. Is it appropriate for psychologists to withhold information from research participants, or even to mislead them? Although this issue remains somewhat controversial, most psychologists believe that deception is permissible, provided that two basic principles are followed.

The first involves obtaining **informed consent**—providing research participants with as much information as possible about events and procedures a study will involve before they

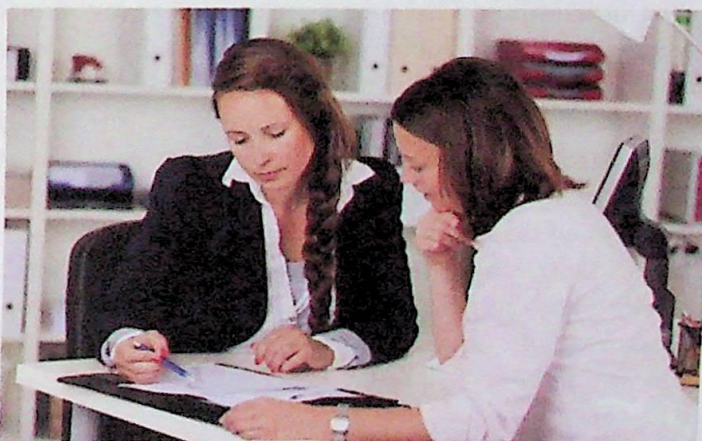
**Deception:** The temporary withholding of information about a study from participants.

**Informed Consent:** A principle requiring that research participants be provided with information about all events and procedures a study will involve before they agree to participate in it.

**Figure 1.11**

#### Careful Debriefing: A Requirement after Experiments That Use Deception

After an experiment is completed, participants should be provided with debriefing—full information about the experiments’ goals and the reasons why temporary deception was used.





agree to participate in it. This must be coupled with a clear statement that they are completely free to leave at any time during the study.

The second principle, known as **debriefing**, requires that research participants be given full information about all aspects of a study, including deception, after they have participated in it. The goal is for participants to leave a study possessing a clear understanding of its major purposes and feeling at least as good as when they entered.

**Debriefing:** Providing research participants with full information about all aspects of a study after they have participated in it.

Existing evidence suggests that informed consent and thorough debriefing go a long way toward eliminating any adverse effects of temporary deception (Mann, 1994; Sharpe, Adair, & Roese, 1992). However, despite such findings, there is still the possibility—confirmed by recent research (e.g., Epley & Huff, 1998)—that exposure to deception can leave participants with increased feelings of suspicion about what researchers tell them. Thus, it is definitely unwise to take the safety or appropriateness of deception for granted. On the contrary, psychologists must always be vigilant to protect the rights and well-being of persons who, by offering their time, effort, and cooperation, help to advance our understanding of human behavior.

### Research With Animals

While most research conducted by psychologists involves human participants, some studies (about 8 percent) are performed with animals (Beckstead, 1991). Why do psychologists conduct such research? For several reasons. First, they may want to study the behavior of endangered species so that they can assist in protecting them from extinction. Research on the mating habits of the giant panda of China has helped to increase the world population of these beautiful animals, which do not readily reproduce in zoos. Second, psychologists conduct research on animals in order to examine the generality of basic principles of behavior—for example, certain forms of learning. Does learning occur in much the same manner across many different species, or does the unique evolutionary history of each species alter this process in important ways? Research conducted with several species can help answer such questions.

The most important reason for conducting research with animals, however, is also the one that raises important ethical issues: some research exposes animal subjects to conditions or treatments that could not be used with human beings. For obvious ethical and legal reasons, researchers cannot operate on the brains of healthy people in order to study the roles of various parts of their brains in memory, learning, or other aspects of behavior. Similarly, researchers cannot place human beings on diets lacking in important nutrients in order to determine how deficiencies affect their development. In these and many other cases, there appears to be no choice: If the research is to be conducted, it must be conducted with animals.

But is it appropriate to expose rats, pigeons, monkeys, or other animals to such treatment? This is a complex issue on which different persons hold sharply contrasting views. Supporters of animals rights contend that the procedures employed in research with animals expose them to harsh or dangerous treatment; this, they contend, makes such research unethical. Psychologists respond in two ways. First, they note that harsh procedures are virtually *never* used in their research; such conditions are much more frequent in medical studies, in which researchers do indeed inject animals with dangerous microbes or drugs in order to develop improved medical treatments. Second, psychologists note that research with animals has contributed to human welfare in many important ways. For example, it has led to improved means for treating emotional problems, controlling high blood pressure, and reducing chronic pain. In addition, psychological research with animals has increased our understanding of the neural mechanisms underlying memory loss, senility, and various



addictions (Miller, 1985). Many persons would contend that these benefits far outweigh the risks to animals studies in psychological research.

This issue is a complex one, so there are no easy answers. Whether the benefits of research with animals—medical or psychological—justify such studies is a value judgment, largely outside the realm of science. Only you, as an individual who thinks critically, can make up your own mind.

## REVIEW QUESTIONS

- What is the basic nature of experimentation?
- Why is random assignment of participants to conditions required in experiments?
- What is confounding of variables in an experiment?
- What are experimenter effects and the double-blind procedure?
- What is deception? Informed consent? Debriefing?

### Qualitative Methods

These methods involve interpretive study of a problem or issue in which the researcher is the key to the whole process of research. They yield data that are in the form of words, pictures, artifacts, etc. By providing thick or rich description and explanation of the underlying processes as they unfold in specific context the qualitative researcher enables us to experience the chronological flow or sequence of events leading to certain outcomes. Thus, meaning and emergent reality gets more attention. While conducting qualitative studies, the subjectivity plays a key role as it makes interpretation and reflection possible. The approach to understanding and description is context dependent. Instead of emphasis on why question it gives more emphasis on what happens, when happens, and how happens. The goal of such studies is to enable holistic view from the perspective of the insider.

The qualitative methods have some interesting properties that need attention.

1. They reduce the power differential between researcher and participants.
2. By using negative case analysis these methods expand the scope of explanation.
3. The researcher is not a detached observer of some objective reality. Instead his/her position is explicitly recognized and his/her values are taken as vantage points.
4. Reality is considered as constructed through the processes of communication and negotiation.

Qualitative data come in various forms and from diverse sources. The qualitative data are used independently or to supplement some quantitative study. They may be obtained with the help of diverse methods including case study, interview, discourse analysis, ethnography, conversational analysis, thematic analysis, and grounded theory. Qualitative methods invite to come to our senses so that we can fully listen to people, and expand our repertoires of expand our repertoire of strategies of knowledge generation, to include emotional sensitivity, intuitive understanding, and reflective awareness. The researcher remains open and attentive to the unfolding moment.

Qualitative research challenges the objectivist view that there is a concrete knowable reality that exists independently of our thought processes. It maintains that the meaning making is embedded in the values, preferences, and understanding of the inquirer. As a result, knowledge is subject to differing viewpoints and interpretations and also subject to revision as a result of changing circumstances.



# Psychology *part of Your Life*

## Study Psychology—or Any Other Subject—Effectively

Psychologists know most about memory, and motivation. (See Chapters 5, 6 and 10.) These topics are directly relevant to you as a student: you must be motivated to study, must know what you are learning and must remember them accurately. Knowledge of these topics can be very useful to you in your studies. Drawing on what psychologists know about these topics, here are some ways to get the most out of the time

**Preview.** Research on memory indicates that it is easier to retain information if you organize it within a cognitive framework. To study, try to see “the big picture” by looking at the outline at the start of each chapter and reading through the pages once or twice before you start. You’ll know what to expect and have a framework for organizing the information that follows.

**Minimize distractions.** To get the most information into your memory, you must devote careful attention to the material. You should reduce all distractions. Study in a quiet place, turn off the TV, and put those magazines out of sight. Turn off your phone. The result? You’ll have more study time.

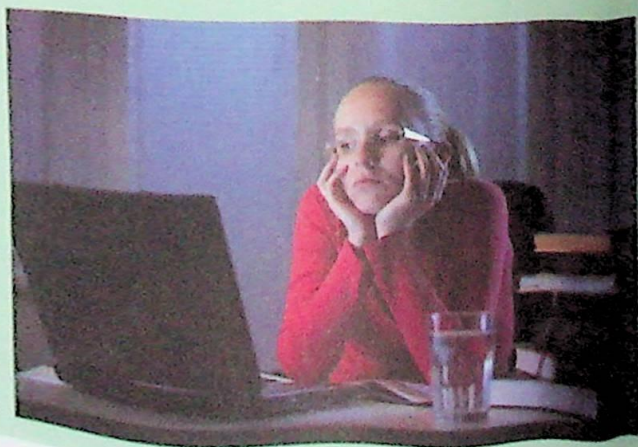
**Study at once.** All-nighters are inefficient. Research findings indicate that you learn and remember new information better if learning is spaced out over time. If you cram it into a single long session, you’ll forget it. Spread your study sessions out; if you study in short sessions, this will give you a much better return on your effort (see Figure 1.12)

- Set specific, challenging goals—but make sure these are attainable. One of the key findings of industrial/organizational psychology is that setting certain kinds of goals can increase both motivation and performance on many different tasks. This principle can be of great help to you in studying, and it’s relatively easy to apply. First set a concrete goal for each session—for example, “I’ll read twenty pages and review my class notes.” Merely telling yourself “I’ll work until I’m tired” is less effective, because it fails to give you something concrete to shoot for. Second, try to set challenging goals, but ones you can attain. Challenging goals will encourage you to “stretch”—to do a little bit more. But impossible ones are simply discouraging. You are the world’s greatest expert on your own limits and your own work habits, so you are the best judge of what would be a challenging but attainable goal for you. Set such goals, when you begin, and the results may surprise you.

**Figure 1.12**

### All-Nighters: Not the Best Strategy

Findings of psychological research indicate that we learn more efficiently when we spread our work sessions out over time. For this reason, all-nighters are usually not the best or most efficient way to study.





- Reward yourself for progress. As you'll see in Chapter 5, people often perform various activities to attain external rewards, ones delivered to them by others. But in many cases we can provide our own rewards; we can pat ourselves on the back for reaching goals we've set or for other accomplishments. This "pat on the back" can take many different forms: eating a favorite dessert, watching a favorite TV program, visiting friends. Again, you are the world's greatest expert on your own rewards, so you can readily choose ones that are appropriate. Whatever you choose, however, be sure to provide yourself with rewards for reaching your goals; you deserve it, and these intervals of pleasure will add to your efficiency.
- Engage in active, not passive, studying. As you probably know, it is possible to sit in front of a book or a set of notes for hours without accomplishing much—except day dreaming! In order to learn new information and retain it, you must do mental work—that's an inescapable fact of life. You must think about the material you are reading, ask yourself questions about it, relate this new information to things you already know, and so on. The Review Questions sections in each chapter are designed to help you do this, but in the final analysis, it's up to you. To the extent that you really try to answer the questions and engage in other forms of active learning, you will absorb more information, more efficiently.

## Summary and Review

### Modern Psychology: What It Is and How It Originated

- **What is the definition of psychology as it exists today?** Psychology is the science of behavior and cognitive processes.
- **What ideas in philosophy and findings in natural science contributed to the establishment of psychology as an independent field?** Philosophy supplied the ideas that knowledge can be gathered through careful reasoning (rationalism) and through careful observation (empiricism). Natural science provided new information suggesting that human behavior could be studied through scientific means.
- **According to structuralism, functionalism, and behaviorism, what should psychology study?** These three early schools suggested, respectively, that psychology should study the structure of consciousness, the functions of consciousness, or observable behavior.

### Psychology: Its Grand Issues and Key Perspectives

- **What are the three "grand issues" about behavior addressed by psychology?** The three issues and stabil-

ity versus change, nature versus nurture, and rationality versus irrationality.

- **What are the major perspectives adopted by psychologists, and how do they differ?** Major perspectives in psychology include the behavioral, cognitive, biological, evolutionary, developmental, psychodynamic, and social approaches. These perspectives focus on different aspects of behavior but are complementary rather than competing in nature.

### Psychology 2000: Trends for the New Millennium

- **What is the multi-cultural perspective, and how do psychologists take account of it in their research and practice?** In psychology, the multicultural perspective is recognition of the important influence on behavior of cultural and ethnic diversity. This perspective is now a major focus and many lines of research and is reflected in widely accepted guidelines for the practice of psychology.
- **What is evolutionary psychology, and how does it contribute to our understanding of human behavior?** This new branch of psychology suggests that human beings have been subject to the process of



biological evolution and, as a result, possess many evolved psychological mechanisms that influence our behavior.

- **What is meant by the “exportation of psychology”?** The use of psychological knowledge to solve practical problems in other fields.

### Psychology and the Scientific Method

- **Why can psychology be viewed as a branch of science?** Psychology can be viewed as a branch of science because psychologists adopt the scientific method in their efforts to study human behavior.
- **What values are central to the scientific method?** Values central to the scientific method include accuracy, objectivity, skepticism, and open-mindedness.
- **What are theories, and what is their role in the scientific method?** Theories organize existing knowledge and make predictions that can be tested in research. They help scientists attain explanations of natural phenomena—understanding of why certain events or processes occur as they do.
- **Why are common sense and “folk wisdom” such uncertain guides to human behavior?** Common sense often suggests inconsistent and contradictory conclusion about behavior, and it is influenced by several important forms of bias.
- **What are the confirmation bias, the availability heuristic, and intuitive thinking, and what role do they play in our efforts to understand human behavior?** These are cognitive errors we make in thinking about the world around us. They often lead us to false conclusions about human behavior.
- **What is critical thinking, and what role does it play in psychology?** Critical thinking closely examines all claims and assumptions, carefully evaluates existing evidence, and cautiously assesses all conclusions. Such thinking is a basic aspect of the scientific method and is an integral part of efforts by psychologist to understand behavior.

### Research Methods in Psychology: How Psychologists Answer Questions about Behavior

- **What is naturalistic observation?** Naturalistic observation involves carefully observing behavior in the setting where it normally occurs.
- **What is the correlational method of research, and how do psychologists use it?** This is a basic method in which researchers carefully observe two or more variable to see if changes in one are related to changes in the other. Psychologists use it to make predictions about one variable from observations of another variable.
- **Why are even strong correlations between variables not evidence that changes in one cause changes in the other?** Even strong correlations don't necessarily indicate causality because changes in both variables may stem from the influence of some other variable.
- **What is the basic nature of experimentation?** In experimentation, researchers produce systematic changes in one variable (the independent variable) in order to observe whether these changes affect another variable (the dependent variable).
- **Why is random assignment of participants to conditions required in experiments?** Because if participants are *not* randomly assigned to each condition, it may later be impossible to tell whether differences in their behavior stem from differences they brought with them to the study, from the impact of the independent variable, or both.
- **What is confounding of variables in an experiment?** Confounding occurs when one or more variables other than the independent variable are permitted to vary during an experiment.
- **What are experimenter effects and the double-blind procedure?** Experimenter effects are unintentional effects on research participants' behavior produced by researchers. Such effects can be prevented by double-blind procedures, in which experimenters who have contact with research participants do not know the hypothesis or the condition to which participants have been randomly assigned.
- **What is deception? Informed consent? Debriefing?** Deception is the temporary withholding of information about a study from research participants. Obtaining informed consent involves informing participants about all procedures to be used in a study before they agree to participate in it. Debriefing involves providing participants with full explanation of all aspects of a study after they participate in it.
- **What ethical issues are raised by research with animals?** Critics of such research suggest that it is unethical to expose animals to treatments or conditions that can potentially harm them.



## Critical Thinking Questions

### Appraisal

Most psychologists view their field as being scientific in nature. Do you agree? Explain why you accept this view.

### Controversy

Do you think that there is such a thing as “human nature”—a set of tendencies or preferences all human beings possess because they are the result of the evolutionary history of our species?

### Making Psychology Part of Your Life

Suppose that one day you read a news story reporting that results of a survey indicate that 40 percent of women and 30 percent of men have little or no interest in sex. How could you use critical thinking to interpret this report? What kinds of questions would you ask about the source of the data, the way the study was conducted, and the background (e.g., age) of the participants?