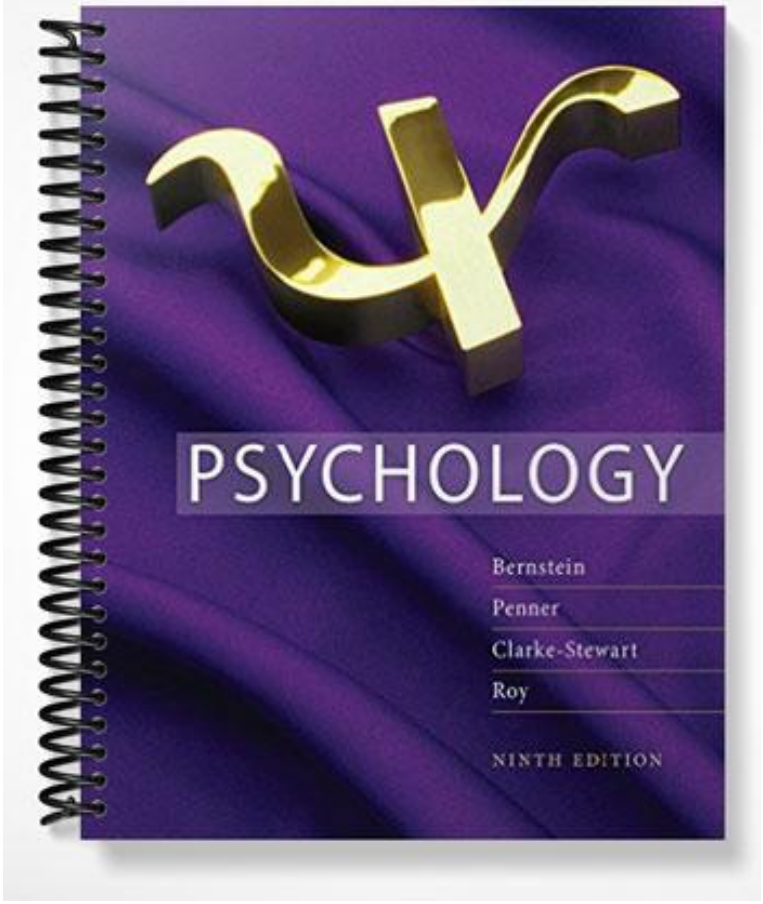
SOLUTIONS MANUAL



CHAPTER 2

Research in Psychology

SUPPLEMENTS FOR CHAPTER TWO

ADDITIONAL RESOURCES

Online Resources

You will find a wealth of resources and web links related to this chapter at our Companion Website at www.cengage.com/psychology/bernstein

The *Online Psychology Laboratory* "provides highly interactive resources for the teaching of psychological science. The peer-reviewed materials include online studies and correlational studies, large data sets, demonstrations, and teaching aids." http://opl.apa.org/

The *Office of Teaching Resources in Psychology* (OTRP) "develops and distributes teaching and advising materials and provides services to teachers of psychology at all levels on behalf of The Society for the Teaching of Psychology." http://teachpsych.org/otrp/

Videos on demand can be viewed from the *Discovering Psychology: Updated Edition 2001* series hosted by Phillip Zimbardo. http://www.learner.org/resources/series138.html

> *Understanding Research*. "This program examines the scientific method and the ways in which data are collected and analyzed — in the lab and in the field — with an emphasis on sharpening critical thinking in the interpretation of research findings."

Classics in the History of Psychology is an online collection of articles developed by Christopher D. Green. http://psychclassics.yorku.ca

Psychology Matters—Psychological Applications in Daily Life on the APA website is a "compendium of psychological research that demonstrates the application and value of psychological science in our everyday lives." http://www.psychologymatters.org/

We're Only Human is an APS blog run by Wray Herbert that applies recent research findings to everyday life. http://www.psychologicalscience.org/onlyhuman/

Suggested Readings

Best, J. (2001). *Damned lies and statistics: Untangling numbers from the media, politicians, and activists.* Berkeley, CA: University of California Press.

Brannigan, G. G., & Marrens, M. R. (1993). *The undaunted psychologist: Adventures in research.* New York: McGraw-Hill.

Hock, R. R. (2009). *Forty studies that changed psychology: Explorations into the history of psychological research (6th ed.).* Upper Saddle River, NJ: Prentice Hall.

Mook, D. (2004). *Classic experiments in psychology.* Westport, CT: Greenwood Press.

Stanovich, K. E. (2010). *How to think straight about psychology (9th ed.).* Boston: Allyn & Bacon.

LEARNING OBJECTIVES

1. Explain the importance of critical thinking in psychology, and list the five questions used by critical thinkers when evaluating information. (see Thinking Critically About Psychology (Or Anything Else))
2. Define hypothesis, and explain the role of hypotheses in scientific research. (see Critical Thinking and Scientific Research)
3. Explain what operational definitions are and give examples of several. (see Critical Thinking and Scientific Research)
4. Define what variables are and give examples of variables that a psychologist might study. (see Critical Thinking and Scientific Research)
5. Define the terms statistical reliability and statistical validity. Explain their importance in psychological research. (see Critical Thinking and Scientific Research)
6. Explain the development and role of theories in psychological research. (see The Role of Theories)
7. Describe each of psychological science's goals of describing, predicting, controlling, and explaining psychological phenomena. (see Research Methods in Psychology)
8. Explain how observational methods work, and give several examples of how psychologists might use naturalistic observation in conducting psychological research. (see Naturalistic Observation: Watching Behavior)
9. Explain how case study methods work, and give several examples of how psychologists might use case studies in conducting psychological research. (see Case Studies: Taking a Closer Look)

10. Explain how survey methods work, and give several examples of how psychologists might use surveys in conducting psychological research. (see Surveys: Looking at the Big Picture)
11. Explain how correlational study methods work, and give several examples of how psychologists might use correlational studies in conducting psychological research. (see Correlational Studies: Looking for Relationships)
12. Explain how experiments work, and give several examples of how psychologists might use experiments in conducting psychological research. (see Experiments: Exploring Cause and Effect)
13. Explain the relationship between control groups and experimental groups in psychological research. (see Experiments: Exploring Cause and Effect)
14. Describe and explain the similarities and differences between independent variables, dependent variables, random variables, and confounds. (see Experiments: Exploring Cause and Effect)
15. Explain why psychologists should randomize participants in their experiments. (see Experiments: Exploring Cause and Effect)
16. Discuss the placebo effect. (see Experiments: Exploring Cause and Effect)
17. Explain how the double-blind design for an experiment reduces the effects of experimenter bias. (see Experiments: Exploring Cause and Effect)
18. Discuss the process of sampling in choosing participants for psychological research. Define representative sampling, biased sampling, and random sampling. (see Selecting Human Participants for Research)
19. Explain how the field of behavioral genetics investigates psychological phenomena. Describe the use of family studies, twin studies, and adoption studies. (see Linkages: Psychological Research Methods and Behavioral Genetics)
20. Define epigenetics. (see Linkages: Psychological Research Methods and Behavioral Genetics)
21. Define the three measures of central tendency, the mean, median, and mode. Explain the importance of these descriptive statistics in describing data collected in psychological research. (see Descriptive Statistics)
22. Define the range and standard deviation, and explain how psychologists use these measures of variability. (see Descriptive Statistics)
23. Define the correlation coefficient, and discuss both its uses and limitations in psychological research. (see Descriptive Statistics)
24. Explain the use of inferential statistics in psychological research. (see Inferential Statistics)
25. Describe the basic ideas behind ethical practices in psychological science. Explain the reasons why psychologists must engage in these practices. (see Ethical Guidelines for Psychologists)
26. Describe the main functions of *Institutional Review Boards*. (see Ethical Guidelines for Psychologists)
27. List some of the laws and guidelines that regulate research practices in psychology. (see Ethical Guidelines for Psychologists)
28. List some ethical dilemmas involved in psychological research, and discuss the ways in which psychological scientists may address them. (see Ethical Guidelines for Psychologists)

CHAPTER OUTLINE

OPENING SCENARIO AND EXAMPLE USED TO ILLUSTRATE CRITICAL THINKING:
Dr. Francine Shapiro, a clinical psychologist, discovered that by moving her eyes back and forth when thinking of distressing events, she relieved her anxiety. She found the same reduction in anxiety when she used this with her clients. She called this EMDR (eye movement desensitization and reprocessing) and has trained over 30,000 therapists in fifty-two countries to use the technique.

I. THINKING CRITICALLY ABOUT PSYCHOLOGY (OR ANYTHING ELSE)
   A. **Critical thinking** is the process of assessing claims and making judgments on the basis of well-supported evidence. The basic questions that provide a strategy for critical thinking include:
      1. *What am I being asked to believe or accept?*
         EMDR causes reduction or elimination of anxiety-related problems.
      2. *What evidence is available to support the assertion?*
         Shapiro discovered that EMDR worked on others, not just herself.
      3. *Are there alternative ways of interpreting the evidence?*
         The effects could be due to people's motivation to change or their desire to please Shapiro. The anxiety might have improved over time without any treatment.
      4. *What additional evidence would help evaluate the alternatives?*
         An ideal method would be to identify people with anxiety, matched in every way, and divide them into three groups: a control group that received no treatment, a group given a motivational treatment but no anxiety treatment, and a group given EMDR. If the EMDR group did better than the passage of time group, then motivational explanations would be less plausible.
      5. *What conclusions are most reasonable?*
         People's belief in EMDR, rather than the treatment itself, may be largely responsible for its positive effects. EMDR has a positive impact on some clients, but further research is needed to understand those effects.
   B. Critical Thinking and Scientific Research
      1. A **hypothesis** is a specific, testable proposition about something to be studied (i.e., an educated guess about what might happen). Hypotheses state in clear, precise words what researchers think may be true and how they will know if it is not.
      2. **Operational definitions** are statements describing the exact operations or methods used to manipulate and/or measure the variables in the research.
         EXAMPLE: An operational definition is the concrete, observable, measurable way a researcher studies an abstract concept. For example, say a researcher is studying the effects of humor on the longevity of terminally ill patients. We all know what humor is, but in his/her study the researcher needs to say how humor is going to be operationally defined or specified. He/she may say that it will be demonstrated by *South Park* television shows or by *Three Stooges* films. The researcher also needs to operationally define or specify longevity—perhaps how many days, or months terminally ill patients live after being exposed to humor.
      3. **Variables** are specific factors or characteristics that are manipulated and measured in research. In the above example, the variables would be humor and longevity.
      4. **Data** (or *data set*) are objective, quantifiable evidence—numbers or scores that represent the variables of interest and provide the basis for conclusions.
      5. *Confirmation bias* occurs when researchers look only for evidence that confirms a hypothesis.
      6. Evidence addressing a hypothesis should be judged in terms of **statistical reliablility** (or **reliability**), the degree to which the evidence is consistent and repeatable, and

statistical validity (or **validity**), the degree to which the evidence accurately represents the topic being studied.

C. The Role of Theories
   1. A **theory** is basically a set of explanations for why something occurs. More precisely, it is an integrated set of statements designed to account for, predict, and even suggest ways of controlling certain phenomena.
   2. Theories are tentative explanations that must be subjected to scientific evaluation based on critical thinking.
   3. Theories are constantly being formulated, evaluated, reformulated and even abandoned based on research results. This means that psychology cannot offer as many definite conclusions as one would want. Research often raises as many questions as it answers.
   4. "Pop" psychologists tend to oversimplify issues, cite evidence for their views without concern for reliability or validity, and ignore evidence that contradicts their theories.
   5. Psychological scientists have to be more cautious, often delaying final judgments about behavior and mental processes until they have collected better evidence. In evaluating theories and deciding among conclusions, they are guided not only by the research methods described in the next section, but by the *law of parsimony* (also known as *simplicity*), sometimes referred to by nonscientists as KISS (Keep It Simple, Stupid).

II. RESEARCH METHODS IN PSYCHOLOGY

The scientific method generally consists of four main goals: *Describe* the phenomenon, *make predictions* about the phenomenon, and introduce enough *control* over the variables in the research to allow an *explanation* of the phenomenon with some degree of confidence. Researchers use *naturalistic observation*, *case studies*, *surveys*, and *correlational studies* to describe and predict behavior and mental processes. They use *experiments* to control variables and establish cause-effect relationships.

A. Observational Methods: Watching Behavior
   1. **Observational methods** include **naturalistic observation**, which is the process of watching without interfering as behavior occurs in the natural environment. Naturalistic observation provides large amounts of very rich data and allows observation of events that would be very difficult to duplicate in laboratory experiments.
      EXAMPLE: Students in elementary education are encouraged to observe children's interactions on the playground without interfering. These observations can provide information about children's social interactions and play behaviors.
   2. Problems with naturalistic observation occur when people act differently because they know they are being observed. Observations can also be distorted if observers expect to see certain behaviors.

B. Case Studies: Taking a Closer Look
   1. A **case study** is an intensive examination of behaviors or mental processes in a particular individual, group, or situation. Case studies often combine observations, tests, interviews, and analysis of written records. Case studies are useful when a phenomenon is new, complex or relatively rare. Case studies are essential in studying some clinical and neurological problems.
      EXAMPLE: Case studies are important for **neuropsychology**, the study of the relationship between brain activity, thinking, and behavior. The text mentions Oliver Sack's *The Man Who Mistook his Wife for a Hat* which presents case studies of patients with very rare brain/perceptual dysfunctions.
   2. A limitation of case studies is that cases are not necessarily representative of people in general. In addition, case studies may also only contain the evidence that a particular researcher considers important.

C. Surveys: Looking at the Big Picture

1. **Surveys** give broad portraits of large groups. A survey (also called interview, questionnaire, or self-report) asks people about their behavior, attitudes, beliefs, opinions, and/or intentions. Surveys are an efficient means of gathering large amounts of data from a large number of people.
2. There are potential problems with the survey method.
   a) Good survey questions must not be "leading" and must be phrased clearly. *EXAMPLE:* In 1992 a survey asked "Does it seem possible or does it seem impossible to you that the Nazi extermination of the Jews never happened?" Because it was phrased confusingly, results were not accurate.
   b) Participants must be selected carefully to properly *represent* the population being studied. *EXAMPLE:* The text notes that to get a complete picture of religious prejudice in America, people from all religious groups need to be surveyed, not just those from a particular denomination like Christians or Muslims.
   c) People may also be reluctant to admit undesirable things about themselves or may say what they feel they *should* say about an issue. *EXAMPLE:* College surveys of cheating are difficult to conduct because students are reluctant to reveal information about themselves that is not positive.

D. Correlational Studies: Looking for Relationships
1. **Correlational studies** examine relationships between variables in order to analyze trends in data, to test predictions, to evaluate theories, and to suggest new hypotheses. The data from naturalistic observations, case studies, and surveys may be examined to see if relationships exist between variables.
   EXAMPLE: The text notes that one theory of aggression is that people learn to be aggressive by seeing aggressiveness in others. Psychologists have used correlational studies to look at children's aggressiveness in relation to the amount of aggressiveness they have seen on television, finding that those who watch a lot of televised violence also tend to be more aggressive than other children.
2. Correlation does not describe cause and effect. The most obvious explanation for the relationship found in a correlational study may not always be the correct one.
   EXAMPLE: As noted above, children who watch a lot of televised violence also tend to be more aggressive. However, perhaps the correlation appears because children who are more aggressive to begin with also choose to watch the most violent television.
3. Psychologists can evaluate these alternative explanations by conducting further correlational studies in which they look for trends in observational, case study, and survey data that support or conflict with these hypotheses.

E. Experiments: Exploring Cause and Effect
1. An **experiment** is the only research method that directly tests cause-and-effect relationships between variables. Experiments are situations in which the researcher manipulates one variable and then observes the effect of that manipulation on another variable, while holding all other variables constant.
2. The **experimental group** receives manipulation, the experimental treatment. The **control group** receives no treatment or some other comparison treatment. This group provides baselines against which to compare the performance of others. If the only difference between the two groups is the treatment, then any differences between the groups at the end of the experiment should be caused by the treatment, not merely correlated with it.
3. The variable that the researcher controls or manipulates is the **independent variable**. The variable that the researcher observes and measures for an effect is the **dependent variable** (because it is affected by, or depends on, the independent variable).
4. Flaws in experimental control include **confounds**, which are factors that might have affected the dependent variable along with or instead of the independent variable.

Three sources of confounds include random variables, participant expectations, and experimenter bias.

a) **Random variables** are uncontrolled (or uncontrollable) factors such as differences among participants (background, physical health, personalities, or vulnerability to stress, etc.) as well as differences in research conditions (time of year, time of day, temperature, noise level, etc.).
   (1) *Random assignment* of participants to experimental or control groups (or **randomizing**) is used to distribute the impact of uncontrolled variables randomly, and most likely evenly, across the groups, minimizing the chance they will distort the results.
   (2) Random assignment is not the same as random sampling (discussed below). Random sampling is used to ensure that the people studied are representative of some larger group, whereas random assignment is used in experiments to create equivalence among various groups.

b) Participants' expectations or what people think about the experimental situation also has an impact. The *placebo effect* is improvement caused by a participant's knowledge and expectations. A **placebo** is a treatment that contains nothing known to be helpful, but that nevertheless produces benefits because a person believes it will be beneficial. To directly avoid such effects, an extra control group, a placebo group, may receive a placebo, a treatment that appears to be the same as the experimental treatment, but which lacks the critical "ingredient." c)

Experimenter bias could also confound results. The experimenter could subtly and unintentionally alter her/his behavior toward the different groups and thus affect the results of the study.

EXAMPLE: The text describes a study in which Rosenthal randomly picked mice from the same populations and told some lab assistants that their mice were "maze-bright," while others were told that their mice were "maze-dull." The mice performed to their experimenters' expectations, even though they were equally maze intelligent. Rosenthal believed that the experimenters' expectations caused them to alter subtly their training and handling techniques, which had an impact on the animals' learning.

   (1) To prevent such effects, in a **double-blind design**, neither participants nor those who deal directly with participants know the results expected nor the identity of the recipient of the experimental or the control treatments.

F. Selecting Human Participants for Research

1. **Sampling** is the process of selecting participants for research.
   a) For the study results to *generalize* to the entire population, **representative sampling** should be used to select participants whose characteristics fairly reflect the larger population in terms of age, gender, ethnicity, socioeconomic status, and so forth. Truly **random sampling** allows every member of a population an equal chance of being selected. **Biased sampling** occurs when not everyone has an equal chance of being selected. A truly random sample is difficult to obtain, so researchers try to draw their participants as randomly as possible from the population of interest.
   b) Not even a truly random sample will create a perfectly representative sample. The people selected may happen to be slightly different from the people not selected (*sampling error*). And, not everyone who is randomly selected will agree to participate (*nonresponse error*). Psychologists sometimes draw participants from populations that are conveniently available (*convenience samples*). However, study conclusions must be limited to reflect the limitations of the samples.

III. LINKAGES: PSYCHOLOGICAL RESEARCH AND BEHAVIORAL GENETICS

Psychologists try to understand how people's genetic inheritance (their biological *nature)* intertwines with environmental events and conditions before and after birth (often called *nurture)* to shape their behavior and mental processes.

A. **Behavioral genetics** is the study of how genes and environments interact to affect behavior. It aims to explore the relative roles of genetic and environmental factors in creating differences in behavioral tendencies among groups of people and identify the specific genes that contribute to hereditary influences.

1. Early behavior genetics research examined the effects of selective breeding on animal behavior. Interpretation of such research is difficult because it is not behaviors that are inherited but differing sets of physical structures, capacities, etc., that in turn make certain behaviors more or less likely to occur. Nevertheless, these tendencies can be altered by the environment.
2. Research on behavioral genetics in humans depends on correlational studies, usually in the form of family studies, adoption studies, and twin studies.
    a) *Family studies* examine whether similarities in behavior and mental processes are greater in people who are closely related as compared to more distant relatives or unrelated individuals.
    b) *Twin studies* explore the heredity-environment mix by comparing the similarities seen in identical twins with those of nonidentical twins. Twins usually share the same environment and may be treated very similarly by others. Therefore, if identical twins (whose genes are exactly the same) are more alike on some characteristic than nonidentical twins (whose genes are no more similar than those of siblings) that characteristic may have a significant genetic component.
    c) *Adoption studies* examine whether adopted children's characteristics are more like those of their biological parents than those of their adoptive parents.
    d) Results of the Human Genome Project will also have an impact on behavioral genetics research. Pinpointing which genes contribute to individual differences in disorders, as well as to normal variations in personality and mental abilities, is an ongoing process. Finding the DNA differences responsible for the role of heredity in psychology will eventually make it possible to understand exactly how heredity interacts with the environment as development unfolds.
    e) DNA does not tell the whole story of behavioral genetics. **Epigenetics** describes the ways that events within cells can alter the functions of genes, even though the genetic code itself—the sequence of chemicals in the DNA—remains unchanged. The cellular environment can not only affect the expression of an individual's genetic characteristics but may also create structural changes in genes (called *imprinted genes*) that can be passed on to future generations. Epigenetic effects—which can be triggered by many environmental influences, including diseases and stress—have been linked to individual differences in learning, memory, and brain development, and they may also play a role in the appearance of cognitive disorders such as Alzheimer's disease, mental disorders such as schizophrenia and depression, illnesses such as cancer, and health problems such as obesity.

IV. STATISTICAL ANALYSIS OF RESEARCH RESULTS

Scientific investigations usually generate a large amount of data (measurement results, scores, ratings, number of observations, etc.). Statistical analyses are the methods most often used to summarize and analyze data. **Descriptive statistics** describe data, whereas **inferential statistics** are mathematical procedures used to make inferences about what data mean.

A. Descriptive Statistics

1. *Measures of central tendency* describe the typical value or score in a set of data.
    a) The **mode** is the value or score that occurs most often in a data set.

b) The **median** is the halfway point in a set of data (i.e., half of the numbers fall above and half fall below it). The median takes each score into account with equal weight and is less sensitive to extreme scores.
c) The **mean**, or *arithmetic average*, is obtained by summing the values of all scores and then dividing by the total number of scores. The mean is affected by the actual value of each score.

2. *Measures of variability* describe how a set of values are spread out or dispersed.
a) The **range** is the difference between the highest and lowest value of a data set.
b) The **standard deviation (SD)** measures the average difference between each score and the mean of the data set. It tells us how much the scores in a data set vary or differ from one another. The higher the standard deviation, the more variability there is in the data.

3. **Correlation** refer both to how strongly variables are related to others and to the direction of the relationships. A *positive correlation* means two variables increase together or decrease together. A *negative correlation* means that the variables move in opposite directions: when one increases, the other decreases.
a) The **correlation coefficient**, symbolized *r*, is a statistic measuring the strength and direction of a correlation and can vary from +1.00 to -1.00. The absolute value of *r* (.20, .80, etc.) indicates how strong the relationship is between the two variables. The higher the absolute value of *r* the stronger the correlation that exists between the two variables. The plus or minus sign of *r* indicates the direction of the correlation. A plus sign (+) indicates a positive correlation; a minus sign indicates a negative correlation.
b) Correlations do not necessarily indicate a cause-and-effect relationship. They only show that a predictable relationship exists between variables. They cannot explain the relationships.
EXAMPLE: The number of icicles is positively correlated with the number of people wearing coats. Icicles do not cause coat wearing, and coat wearing does not cause icicles. Both are caused by a third variable, freezing temperatures.

B. Inferential Statistics
1. These procedures rely on certain rules of probability to evaluate the likelihood that a difference between groups or a correlation is a significant finding, or might have occurred just by chance.
2. If the results of statistical tests indicates that the correlation coefficient or the difference between two means is larger than would be expected by chance along, that correlation or difference is said to have reached **statistical significance.**

C. Statistics and Research Methods as Tools in Critical Thinking
It is important to use the critical thinking skills outlined previously to evaluate research designs and statistical methods, especially when study results are dramatic or unexpected.
EXAMPLE: The text notes that controlled experiments found that claims (based on case studies) about "facilitated communication" (which supposedly allows autistic people to communicate using a keyboard while being "facilitated" by another person steadying their hands) were groundless. The autistic person's ability to communicate disappeared when the facilitator did not know the question asked of the participant or the facilitator could not see the keyboard.

V. ETHICAL GUIDELINES FOR PSYCHOLOGISTS
A. Psychologists must analyze and report research fairly and accurately. All research must protect the welfare and dignity of participants (human and animal).
1. Human participants must be able to make informed decisions about their voluntary participation. If deception is used, it must be revealed and explained afterward

("debrief"). In the debriefing, all relevant information about the research must be revealed, and any misimpressions created must be corrected.

B. When research involves risks or discomfort, researchers (and research-monitoring committees, like Institutional Review Boards [IRBs]) must determine that the potential benefits outweigh any potential harm.
   1. Empirical studies show that animals used in psychological research are not routinely subjected to extreme pain, starvation, or other inhumane conditions. High standards for animal care and treatment are required by legal and voluntary professional guidelines and by principles of good scientific research.

C. The American Psychological Association has developed *Ethical Principles of Psychologists and Code of Conduct*, a professional code of ethics that emphasizes the importance of ethical behavior and describes specific ways psychologists can protect and promote the welfare of society in general and of the particular people with whom they work.
   1. As teachers, psychologists should strive to give students a complete, accurate, and up-to-date view of each topic, not a narrow, biased point of view.
   2. Psychologists should perform only those services and use only those techniques for which they are adequately trained; for example, a biological psychologist should not conduct therapy.
   3. Except in the most unusual circumstances, psychologists should not reveal information obtained from clients or students, and they should avoid situations in which a conflict of interest might impair their judgments or harm someone else.

KEY TERMS An activity based on the key terms could be used to introduce students to search engines like PsycINFO or PsycARTICLES. This could be done as an in-class demonstration or as an assignment.

behavioral genetics *(p. 48)*

biased sampling *(p. 46)*

case study *(p. 39)*

confound *(p. 43)*

control group *(p. 43)*

correlation *(p. 54)*

correlation coefficient *(p. 54)*

correlational study *(p. 41)*

critical thinking *(p. 33)*

data *(p. 35)*

dependent variable *(p. 43)*

descriptive statistics *(p. 51)*

double-blind design *(p. 45)*

epigenetics *(p. 51)*

experiment *(p. 42)*

experimental group *(p. 42)*

experimenter bias *(p. 45)*

hypothesis *(p. 34)*

independent variable *(p. 43)*

inferential statistics *(p. 51)*

mean *(p. 52)*

median *(p. 52)*

mode *(p. 51)*

naturalistic observation *(p. 37)*

neuropsychology *(p. 39)*

observational methods *(p. 37)*

operational definition *(p. 33)*

placebo *(p. 44)*

randomizing (*random assignment*) *(p. 44)*

random sampling *(p. 46)*

random variable *(p. 44)*

range *(p. 53)*

representative sampling *(p. 46)*

sampling *(p. 45)*

standard deviation (SD) *(p. 53)*

statistical reliability (reliability) *(p. 35)*

statistical significance *(p. 55)*

statistical validity (validity) *(p. 35)*

survey *(p. 39)*

theory *(p. 35)*

variable *(p. 35)*

SUPPLEMENTS

Supplement 2.1 ACTIVITY: Critical Thinking Skills

Break students into small groups to work on designing an *experiment* that evaluates a claim, using one of the options below. Alternatively, this group activity may be converted into an out-of-class assignment. The following questions can be distributed to the groups to consider in their discussions.

Questions

What am I being asked to believe or accept?

What evidence is available to support the assertion?

Are there alternative ways of interpreting the evidence?

What additional evidence would help evaluate the alternatives?

What conclusions are most reasonable?

Devise an experiment to test the assertion:

What is your hypothesis?

What is the independent variable (IV)?

What is the dependent variable (DV)?

Exactly what are you measuring and how (i.e., operational definition)?

What is your experimental group?

What is/are your control group(s)?

What confounding factors might be problematic in this experiment?

What will you do to specifically deal with the confounding factors (e.g., random assignment, placebo, double-blind design)?

Option 1

Distribute the following scenario: You receive a computer-generated form letter in the mail. It states, "You have been approved by our Award Manager to receive a fun-filled vacation in Florida, consisting of a five-day stay in Key West plus a weekend at Disney World in Orlando. All you have to do to receive this fabulous, once-in-a-lifetime dream trip is call us—today!"

Option 2

Distribute a product advertisement from a magazine to each group. Be sure that each ad is making a specific claim. Examples of product ads that work well include those for prescription drugs, cleaning products, software, insurance, and vehicles.

Option 3

Locate recent newspaper articles describing research. Copy and distribute one to each group.

Option 4

Locate and copy recent election poll results either on-line or in print media. Each group can make a presentation of their results.

Supplement 2.2 DISCUSSION: Steps in Scientific Research

All scientific research must adhere to the guidelines of the *scientific method*. This is what makes psychology a science, rather than an intuitive venture. There are several standard stages in pursuing the scientific method, and few students are familiar with these steps. Therefore, it is helpful to ask students to examine a question or problem using the scientific method. The question of whether brightly colored rooms increase happiness is an example explored below.

Step One: Identify the Problem

The most important, and probably the most difficult, part of scientific research is developing a statement of the problem that can be studied. As the text states, most interesting questions are simply too large to study and must be "pared down" to something manageable. The testable question often is

not as interesting as the original question, but accumulations of data about testable questions will be of value in assessing the original question. So, rephrase the original question into a question that can be studied and evaluated.

Original question: *Do bright colors cause people to be happy and muted colors cause them to be sad?*

Testable question: *Does studying in a brightly colored room increase happiness in college students?*

Step Two: Develop an Operational Definition

The next step involves development of *operational definitions* of each variable. This means that each variable must be stated in terms of the operations and methods which will be used to measure each variable.

- *People* are operationally defined as college students.
- *Brightly colored room* is operationally defined in terms of certain colors, such as red and orange. In a controlled experiment, this variable can be further defined in terms of the color in relation to some known standard (e.g., Color #34 on the Blank Scale of Intensity).
- *Happiness* is operationally defined in terms of some measurable, observable behavior(s). Possibilities include the number of times the student smiles or a comparison of a mood inventory rating filled out when one enters and then exits the brightly colored room.

Step Three: Collect Data

Once the problem is identified and all the variables are defined, data must be collected systematically. Data can be collected through any of the research methods discussed in the text.

- Data can be collected using *naturalistic observation*: Observing students studying in a brightly colored room and recording behaviors such as the number of smiles, interactions with other students, time spent studying in the room, or other behaviors. This would give *descriptive data*. Patterns seen in these data may help *predict* future student behavior.
- Data can be collected by using a *survey* about study locations, asking students if they felt happier studying in brightly colored rooms. This would also give descriptive data, which can be used to predict future student behavior.
- Data can be collected with a *case study*: Observing and/or questioning one student intensively, for an extended period of time, about his or her preferred study places, which particular study locations were chosen, mood self-reporting during each study session, and so on. Again, descriptive and predictive data can be collected.
- Data can be collected with an *experiment*. Many possible experiments can be constructed. For example, randomly selected students can be assigned to one of two groups. The *control group* would study for a set time period in a neutrally colored room. The *experimental group* would study for the same time period in a brightly colored room. Later, both groups of students can fill out a mood inventory. The *independent variable* would be room color. The *dependent variable* would be the amount of happiness as measured on the inventory. The experiment thus gives the researcher some control in explaining the phenomenon of interest.

It is wise to use many methods of investigation to collect data. Ideally, research moves from *describing* data, to making *predictions*, to *controlling* the phenomenon, and then to offering *explanations*.

Step Four: Report the Findings

Research is not worth much if kept to yourself. Reporting the results encourages others to consider and examine your data. Through data reports, especially with replications from others, research findings slowly gain acceptance by other scientists. The results may help psychologists in other fields. In addition, only if research results are disseminated to people outside academia can those results be applied. Here are some examples:

Industrial-organizational psychologists might be interested in studying the effect of room color on employee productivity.

Personality psychologists might be interested in differences in student personality that might explain differences in happiness.

Clinical psychologists might be interested in the mood-altering effects of room color in the treatment of depression.

Supplement 2.3 HANDOUT: Scientific Research Steps

Psychology is a scientific, rather than an intuitive, venture and follows standard steps.

Step One: Identify the Problem

Rephrase the original question into a question that can be studied and evaluated.

Original question: *Do bright colors cause people to be happy and muted colors cause them to be sad?*

Testable question: *Does studying in a brightly colored room increase happiness in college students?*

Step Two: Develop an Operational Definition

State each variable in terms of the operations and methods that will measure it.

People: College students.

Brightly colored room: A red room.

Happiness: The number of times a student smiles or a score on a mood inventory survey.

Step Three: Collect Data

NATURALISTIC OBSERVATION: Observe students studying in differently colored rooms and record the number of smiles.

SURVEY: Ask students about their moods in differently colored study locations.

CASE STUDY: Examine one student intensively, determining preferred study places and self-reported mood during each study session.

EXPERIMENT: Place randomly selected students in a *control group* (study in a neutrally-colored room) or an *experimental group* (study in a red room). Then have all students fill out a mood inventory. The *independent variable* is room color; the *dependent variable* is mood inventory score.

It is best to use many methods. Ideally, research moves from design, to describing, to predicting, to controlling, and then to explaining.

Step Four: Report the Findings

Reporting the results encourages others to consider, examine, and apply your research.

Supplement 2.4 ACTIVITY: Research and "Psychic" Demonstrations

These demonstrations can be used on the first day of class as an "ice-breaker," to introduce research methods, or to help develop *critical thinking* skills. It is a memorable way to present concepts like *experiment*, *independent* and *dependent variable*, and the like, without a single pair of eyes glazing over in the process. Challenge students to use experimental methods to figure out how certain magic tricks are accomplished. Present these as examples of your "psychic" ability, and ask skeptical students to support alternate *hypotheses* (Morris, 1981). Many students will be eager to debunk your alleged mystical powers, and students already convinced of the existence of "paranormal" phenomena might begin to challenge their ideas scientifically, if only to show that psychic abilities could *not* have been demonstrated through trickery. It is important that you practice these examples of your "psychic" ability first.

Warm-Up Activities

Ask students to (a) choose a number between 1 and 10, (b) pick a color, and (c) draw a picture. After they have chosen a number, ask them to concentrate on that number and try to send it to you using mental "waves." Research has shown that most people are likely to choose 5 or 7, to choose red or blue, and to draw either a tree or a house. Use an overhead transparency and write down 7, then scratch it out and write down 5 instead, explaining, "I first thought it was 7, but then I got a really strong perception of 5." Collectively, you will thereby have hit the choice of the majority of the class. You can use a similar procedure to determine the color they chose and the picture they drew.

You may want to follow with a similar demonstration, using a randomly selected student. Ask the person to select a number between 2 and 9. Explain that you will ask the person to transform the number in several ways. First, multiply the selected number by 9. Second, add the two digits of the product. (The result will always be 9.) Third, subtract 5 from the result. (The result has to be 4.) Fourth, think of the letter in the alphabet that is in the same position as the number just obtained. (This will always be D, since A=1, B=2, C=3, D=4.) Fifth, think of a country beginning with the letter just determined. (Most people will choose *Denmark*.) Sixth, think of an animal that begins with the last letter of the country name. (Most people will choose *kangaroo*.) Seventh, think of a color that begins with the last letter of the animal just selected. (Most people will choose *orange*.) Finally, ask the person to write down the name of the color and concentrate on it. You can now "read" the participant's mind by naming the color. A more dramatic way to do this would be to have the participant write down the country, animal, and color. As they concentrate on these three, you can say something like, "There are no orange kangaroos in Denmark," and then have the person reveal what was written.

Option 1

When this is done properly, it is *very* convincing. Obtain two identical phone books. Give one of these phone books to an accomplice before class, and have the accomplice stand out of students' sight during class (e.g., in the hallway). In class, randomly choose a student and give him or her the other phone book. (A dramatically random way to choose this student is to hit a ping-pong ball into the class, with the student catching it becoming the participant.) Randomly select several other students to specify, respectively, a page, column, and line number in the phone book, which you repeat loudly enough for your accomplice to hear. The student with the phone book should thus be able to find a totally randomly selected name and phone number from the book. Ask that student to write down the phone number and concentrate on it. Unbeknownst to the students, your accomplice has identified the same phone number. The accomplice writes the number in large letters on a piece of cardboard, held out of students' view but so that you can still read it.

Option 2

Bring to class a box (or a clean wastebasket), a pad of paper, and a pen. Stand at the front of the room with the pad and pen, and ask students to name some European cities. Paris will eventually be mentioned. You should appear to write down each city name on a separate piece of paper, crumple it up, and throw it into the wastebasket. In fact, write "Paris" on EVERY sheet, no matter what the students say. After doing this several times (be sure to wait until after Paris is actually mentioned), the wastebasket will have several crumpled papers, all of which say "Paris" but which the students assume are all different. Then ask a student to choose one of the crumpled balls (holding the wastebasket high so that the student cannot see into it), open it, and concentrate on the city name. Students are amazed when you say "Paris." Of course, you cannot repeat the trick in the same class, for obvious reasons.

Explanations

Ask the students to try to come up with their own explanations for what happened. Ask them to take their explanations and use them to make a prediction, or *hypothesis*. At this point you can include the proper experimental terminology such as, "Your *hypothesis* then is that I memorized the phone book." In the process of asking students how they might test their hypotheses, the concepts of *independent variables*, *dependent variables*, and other experimental ideas will arise, though the terms themselves may not be used. You can label them (e.g., "OK, in scientific research terms, whether or not I am blindfolded would be called an independent variable.") Students will challenge other students' designs and point out such things as *confounds*, *sampling errors*, *experimenter bias*, and the need for a *double-blind* design. This should yield lively discussion.

Eventually, your students will ask how you really did each trick. If you ever want to use the trick again, you cannot give the answer. Our solution to this problem is to say something like the following: "Some of your hypotheses were very close to the truth. However, scientists never know for sure when they have found the truth; they can only eliminate plausible alternative hypotheses and reach a conclusion with a statistically significant, but not absolutely certain, likelihood of being correct. Like scientists, you will have to be satisfied with this situation."

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Supplement 2.5 ACTIVITY: Design a Study

These activities help introduce psychological research methods. Option 1 introduces *experimental design*, while Option 2 introduces *naturalistic observation*.

Option 1

The basic idea for this option is to outline a rudimentary *experiment* and let students correct mistakes and slowly add to and refine the experimental design. The key is to ask students continually to explain their suggestions and make clear their reasoning. With your guidance, such a discussion will help students learn about how to design and interpret experiments.

Research Scenario

Provide students with the following flawed experiment that tries to test the claim that a new pill can raise IQ.

> *An ad asks for participants in a psychology experiment. The first 50 responders go into group #1 that gets a "smart pill" and the second 50 go into group #2 that does not receive a pill. After a while you measure the IQ of each group and find that group #1 has a higher IQ.*

Ask the class, "What's wrong with concluding that the pill makes people smarter?"

Discussion

Usually students will identify the need to do something with group #2, and they are likely to offer the concept of a *placebo*. Suggest some poor choices for a placebo (e.g., alcohol or amphetamine) and wait for people to explain why such choices are poor. The key concept is that in an experiment, the groups are set up so they should be essentially identical in every way except for the one single thing—the *independent variable*—that you control, the thing that you are hypothesizing to cause the effect you are measuring. Thus, the placebo needs to look, smell, taste, contain the same fillers, dissolve the same ways in the stomach, and in every way resemble the smart pill, except for the one difference of not containing the active ingredient thought to make people smart. Ask people to justify this reasoning.

At some point people will seize on the idea that the two groups may simply happen to differ in IQ before the test. Key concepts include *self-selection*, *confounds*, and *random assignment*. Point out that the two groups do differ in one way other than the independent variable—they arrived for the experiment at different times and thus could differ in all sorts of ways (perseverance, motivation, punctuality, etc.). This illustrates self-selection because the participants, not the experimenter, chose which groups to enter by virtue of systematic differences in their behaviors. Could these differences explain a group IQ difference? Having such extra differences between groups confounds the study's interpretation. Thus, group assignment can be controlled with a random process (ask for examples, such as picking numbers from a hat) and not by a process that could follow a nonrandom pattern (e.g., the prefix of a U.S. social security number, which reflects where one lived when the number was assigned).

A common suggestion is to explicitly control certain variables between the groups—match them for gender, educational background, socioeconomic demographics, and so forth. Certainly, this would improve the study. However, even with this feature, one still needs random assignment since there may be factors that no one knows about—and which therefore cannot be explicitly balanced ahead of time.

There may be an objection to the use of the IQ measure, questioning its *validity* as an intelligence measure. Here you can introduce the concept of a *dependent variable*. Distinguish this from the concept of an *operational definition*—how we measure the dependent variable for the purposes of a study. Point out the difference between a study's data—which we can know with, more or less, certainty—and what you think such data might mean—about which we can only speculate. Consequently, we might be able

to conclude that a pill changes IQ, but then explain that such a finding depends on how much we believe IQ is a measure of intelligence. This understanding allows you to open the way for critical thinking with many studies later in the course.

Some people will still want you to measure IQ before and after the experiment. Such a feature would help make a better study. Nevertheless, use the opportunity to point out that such a feature would not be necessary to reasonably attribute causality in terms of the pill raising IQ because, if the assignment to conditions is truly *randomized*, there is no reason to predict any differences in any one specific thing between the two groups.

You might assign numbers to IQ averages between the groups and create a discussion of *statistical significance*. For example, say group #1's average IQ was 109, and group #2's was 101. Would you call this a real difference? How would you know? Try drawing a *frequency distribution* with lots of variability for each group, then again doing so with very little *variability*, and encourage them to discuss how their answers would change for the different data sets.

Option 2

To help students understand *naturalistic observation*, start by providing them with the following scenario:

> *You are a researcher interested in studying _____ (e.g., parent-child relationships, how people interact when saying goodbye to loved ones, romantic couples' behaviors in public locations, etc.). You have decided to conduct a naturalistic observation by observing people in _____ (the nearby airport, a shopping mall, etc.).*
>
> *Before you begin your study, you need to prepare a checklist of the behaviors you are studying, so you can then carefully record how often and when they occur. Please write a list of the specific behaviors you are going to look for at the _____ (location). Make sure to include both verbal and nonverbal behaviors.*

Provide students with a topic of study and a location, or allow students to select their own. You may wish to discuss with students the importance of describing behaviors without interpreting them (e.g., not "a person looks sad" but rather "a person cries and frowns") as students create their behavior checklists.

As an addition, you may wish to assign students to use their checklists in a public location and then write short response papers reporting on their experiences, how complete their behavior checklists were, and how well the "study" worked.

Linkage with industrial-organizational psychology: Ask students to create a checklist and conduct a naturalistic observation in a workplace setting (this would give students a chance to experience part of a *job analysis*.).

Supplement 2.6 ACTIVITY: Correlational Studies and Experiments

These exercises help review the characteristics of *experiments* and the differences between *correlational studies* and true experiments. Included below are two scenarios, followed by some questions. The scenarios can be distributed as part of a small group activity during class or can be converted into individual take-home assignments.

Scenario 1

Dr. Sarah N. Dipety conducted an experiment to see whether chocolate can improve memory better than plain sugar can improve memory. To recruit participants, Dr. Dipety put the following ad in the local newspaper, "Earn $20 for participating in a one-week study on eating habits. Call Dr. Dipety at the Department of Psychology." Forty people answered the ad and came to Dr. Dipety's lab, where they were given 35 candies to eat during the week. Participants were told to swallow, not chew, each candy with a glass of water every three hours (i.e., five candies per day). All candies were coated with a tasteless shell that would dissolve in the stomach. Inside this shell, some candies were filled with chocolate, others with plain sugar. The first twenty participants that phoned Dr. Dipety were given candies filled with chocolate; the second twenty participants were given candies filled with plain sugar. Participants did not know which candies they were receiving. After the participants finished their one-week study, they went to Dr. Dipety's office. At that time, each person was given a memory test about items they might have seen in Dr. Dipety's lab during the previous visit. The results of the study showed that people who swallowed the chocolate candies remembered the items in Dr. Dipety's lab more often than the people who swallowed the plain sugar candies.

Instructions

In this experiment, identify the following: *independent variable*, *dependent variable*, *experimental group*, *control group*, *placebo*, *biased sampling*, and *assignment to conditions*.

Solution

Independent variable: Type of candy filling (chocolate or plain sugar).

Dependent variable: Performance on the memory test.

Experimental group: Participants who ate the chocolate-filled candies.

Control group: Participants who ate the plain sugar-filled candies.

Placebo: The plain sugar-filled candies.

Biased sampling: Advertising in the newspaper will not allow every member of the population an equal chance of being selected for the study. This is a tough problem to overcome, though, for practical reasons. One improvement might be to advertise in several sources, in many parts of the community, so that more people have a chance to volunteer. Even then, however, the sampling is biased because certain people may be more likely to volunteer than others.

Assignment to conditions: Random assignment was not used. Group assignment was made according to when participants contacted the researcher. This is a poor method of group assignment. Earlier participants may be systematically different than the later participants (e.g., they may be more disciplined or more eager). A better method would use a randomization procedure like having each participant draw a number from a hat, with all even numbers being assigned to the experimental group and all odd numbers assigned to the control group.

Scenario 2

Dr. Williams conducted a study to see if people who watch many basketball games are better basketball players than people who do not watch many basketball games. Dr. Williams assembled a random sample of 1,000 people. He judged each person on several different aspects of basketball ability, and gave each person a total score ranging from 1 (bad) to 100 (good) to assess their basketball ability. After the assessment of ability, each person responded to a questionnaire that asked, "How many basketball games do you watch per week?" Dr. Williams found a positive correlation (r = .6) between watching basketball games and basketball ability.

Instructions

This is a *correlational* study; therefore, *causation* cannot be determined from the study itself. If you wanted to continue researching this phenomenon, what *hypotheses* might you make about why this pattern was observed? How could you test your hypotheses with *experiments*?

Solution

There are at least three hypotheses that you might suggest. (These hypotheses are not mutually exclusive—more than one could be right or wrong.) First, you might guess that watching basketball *causes* people to play basketball better. An experiment could test this by randomly making some people (*the experimental group*) watch basketball and others (*the control group*) watch other sporting events. Thus, the type of sport watched on TV would be the *independent variable*. The basketball ability of participants in both groups could then be assessed (*the dependent variable*).

Second, you might guess that better basketball ability *causes* people to watch more basketball on TV. An experiment could test this by randomly teaching some people (*the experimental group*) to play basketball and teaching others (*the control group*) to play some other sport. Thus, the sport being taught would be the *independent variable*. The amount of time that each group spends watching basketball on TV could then be assessed (*the dependent variable*).

Third, you might guess that a third factor, such as peer pressure, causes *both* increased basketball ability and increased watching of basketball on TV. An experiment could test this by randomly forcing some people (*the experimental group*) to join a social group that you already know is most interested in basketball, and forcing other people (*the control group*) to join a social group that you already know is most interested in an alternative sport. Thus, the sports preference of the social groups would be the *independent variable*. Basketball ability and basketball TV watching (both are *dependent variables* in this experiment) could be assessed.

Supplement 2.7 ACTIVITY: Correlation and Causation

This activity helps demonstrate that *correlations* alone are not statements of *causation*. It reinforces the point that several different causal explanations can produce the same data pattern, which does not help one to "choose" between competing explanations for a result.

Demonstration

Project the following scenario for the entire class (students can work individually or in small groups). Give students a few minutes to explain the hypothetical finding of a *positive correlation* between class attendance and course grades. Ask students to volunteer some of their responses and write these on the board or an overhead transparency for everyone to see.

> *Suppose that a very large-scale study finds that there is a positive correlation between student attendance and grades. In other words, across very large numbers of students, frequent class attendance and high tests scores generally tend to be associated with each other, and infrequent class attendance and low tests scores generally tend to be associated with each other. Assuming this finding is accurate, state as many reasons as you can think of to explain the cause of this relationship. Why would class attendance and tests scores be positively correlated?*

Discussion

Student responses should fit into at least three categories of causal explanations.

> *A causes B*: increased attendance might cause higher grades (e.g., going to class more may give students greater knowledge for their tests).
>
> *B causes A*: success or failure on class tests could have repercussions on subsequent attendance (e.g., doing well on tests may make students feel good about going to class the next time, motivating them to want to go to class).
>
> *C causes A and B*: a third factor could affect both attendance and grades (e.g., a scholarship may be revoked for some students if either class attendance or course grades fall too low).

A discussion of these different responses should focus on the fact that all three categories of causal explanation may or may not be correct, but all of them would have predicted the exact same data. Thus, the *correlation* would be useless in deciding which type of explanation was more likely to be correct as compared to the others. One way to illustrate this point is to ask students to predict the data pattern of any of the three cause-and-effect patterns noted above. Ask, one at a time, each of the following questions:

1. What data pattern should we find between attendance and grades if attending class gives students more knowledge for tests?
2. What data pattern should we find between attendance and grades if getting good grades makes it more fun for students to come to subsequent class meetings?
3. What data pattern should we find between attendance and grades if some of the students have scholarships that could be revoked if either class attendance or course grades fall too low, but other students do not have such scholarships?

For each question, students should respond that a *positive correlation* would be expected. Conclude the discussion by asking students, "So, if we find a positive correlation between class attendance and grades, what does this result tell us about which of these *causal explanations* must be the correct one?"

Supplement 2.8 ACTIVITY: Interpreting a Correlation Matrix

This activity is designed to give students a chance both to see what *correlational* results look like for a researcher and also to have an opportunity to try to interpret these results. You should lecture on statistics and correlations before this activity is given. The questions may be completed in class, or alternately this may be given as a homework assignment. If completed during class, pair up students to work together. In this way, students can help each other interpret the correlations.

Before students begin the activity, you may wish to discuss how dummy variables may be used to include noncontinuous variables (e.g., sex) in correlational studies. (In this data set, male was coded as 0 and female was coded as 1.) Additionally, you may wish to point out to students that correlations which may seem small (e.g., 0.2 or 0.3) still may be significant and important in psychological research.

The following numbers are results from research conducted at the University of Illinois at Urbana-Champaign. The data were collected from personality questionnaires administered to participants once, without manipulation.

Correlational Results

	Sex	Extraversion	Self-Esteem	Anxiety	Independence	Artistic
Extraversion	.096					
Self-Esteem	-.002	.472**				
Anxiety	.136	-.304**	-.851**			
Independence	-.034	.412**	.589**	-.332**		
Artistic	.160*	.282**	.008	.121	.355**	
Leadership	-.032	.555**	.899**	-.763**	.647**	-.113

* Correlation is statistically significant at the 0.05 level (2-tailed).

** Correlation is statistically significant at the 0.01 level (2-tailed).

Questions for Analysis

Based on the correlation matrix above:

1. Are there any variables that are unrelated?
2. Are any of the variables related to each other? Which ones?
3. If so, in what direction? (i.e., if variable X increases, does variable Y increase or decrease?)
4. Can we conclude causality from these data?

Answer Key

1. Self-esteem & Artistic; Anxiety & Artistic; Artistic & Leadership; Sex & Extraversion; Sex & Self-esteem; Sex & Anxiety; Sex & Independence; Sex & Leadership.
2. See table below.
3. See table below.
4. No.

Related Variables	Type of Correlation
Sex & Artistic	Positive
Extraversion & Self-esteem	Positive
Extraversion & Anxiety	Negative
Extraversion & Independence	Positive
Extraversion & Artistic	Positive
Extraversion & Leadership	Positive
Self-esteem & Anxiety	Negative
Self-esteem & Independence	Positive
Self-esteem & Leadership	Positive
Anxiety & Independence	Negative
Anxiety & Leadership	Negative
Independence & Artistic	Positive
Independence & Leadership	Positive

Adapted from an activity by Suzanne Juraska, Personnel Decisions Research Institutes.

Supplement 2.9 ACTIVITY: Positive Psychology Methodology

These activities should facilitate class discussion of research methodology. Following is a summary of an *experiment* that researchers in the area of positive psychology did to explore the efficacy of exercises they had devised to increase happiness.

Option 1

Possible responses to the discussion questions that follow the study summary:

1. What is a convenience sample? Is it a representative sample?

   A convenience sample is comprised of whoever is handy at the time. It is not representative because the conveniently available participants may differ from the larger population in many respects.

2. What problems can you think of concerning how the study participants were recruited?

   People who visit a happiness site do so for a reason. Perhaps they are searching for happiness; perhaps they are less happy than the general population. They may be more motivated to participate and to report positive change than the general population.

3. What concerns do you have about the demographic make-up of the study participants?

   The participants were highly educated for the most part. They may have been better at verbalizing problems and working out solutions than the general population.

4. What are some strengths of doing an experiment via the Internet? What are some weaknesses?

   It is easier to conduct studies via the Internet. Researchers do not have to worry about the cost and logistics of arranging for laboratory space, making sure the participants can all be present at certain times, and so on. On the other hand, researchers give up a lot of control when using the Internet. They can never be sure who the participants really are and if they are actually the ones completing the measures.

5. What is a manipulation check? Why is it used?

   A manipulation check is basically a trick question to see whether the participant is lying or not. People have the best intentions, but may not do the behaviors they have said they would do. If this is the case, the data may be tainted and not usable. Therefore, a manipulation check is used as assurance that the promised behaviors were indeed carried out.

6. Why do you think the *using signature strengths in a new way* and *three good things* exercises worked better than the other three?

   The researchers believed the exercises to be self-reinforcing. "They involve skills that improve with practice, that are fun, and thus are self-maintaining" (Seligman, et al., 2005).

7. What does the fact that positive effects from the two effective exercises only began to show after time and continued usage of them suggest?

   One week may not be a sufficient amount of time for people to benefit from the exercises.

Option 2

Students may enjoy exploring Seligman's *Authentic Happiness* site. They could complete some of the questionnaires available at http://www.authentichappiness.sas.upenn.edu/. Class discussion could focus on the validity of the questions' wording and potential response biases.

Happiness Exercise Study Summary

Happiness produces many more benefits than just feeling good. Happy people are healthier, more successful and more socially engaged (Lyubomirsky, King, & Diener, 2005). Thus, positive psychology is interested in finding ways to boost happiness. At least one hundred techniques claiming to increase happiness permanently have been proposed and about forty of them have been made into replicable and teachable forms (Seligman, Steen, Park, & Peterson, 2005). However, do these techniques really work or are they, at best, placebos?

To answer these questions Seligman and colleagues (Seligman, Steen, Park, & Peterson, 2005) used a *random assignment, placebo*-controlled design. The researchers designed five happiness exercises and one placebo control exercise. Each exercise was delivered via the Internet and could be completed within one week. One exercise focused on building gratitude, two focused on increasing awareness of what is most positive about oneself, and two focused on identifying strengths of character. They compared the results of these exercises with those of a plausible placebo control: journaling for one week about early memories. Then, Seligman and colleagues followed their participants for six months, periodically measuring symptoms of both depression and happiness.

The researchers recruited a convenience sample from among visitors to the website created for Seligman's (2002) book *Authentic Happiness* by creating a link called "Happiness Exercises." Visitors were advised that their participation was an opportunity to help test new exercises designed to increase happiness. Over the course of approximately one month, Seligman and colleagues enlisted 577 adults, 42 percent male and 58 percent female. The majority were between the ages of 35 and 54 (64 percent), were Caucasian (77 percent), and classified their income level as "average" or above (about 75 percent). Most were highly educated, 39 percent had a degree from a four-year college and 27 percent had some graduate school education. Only 4 percent of the participants did not have education or vocational training after high school.

Participants were told that their assigned exercise was not guaranteed to make them happier and that they might even be assigned an inert (*placebo*) exercise. No initial financial incentives were offered for doing the exercises. However, to insure good follow-up, the researchers did tell participants that upon completion of follow-up tests at one week, one month, three months, and six months after completing the exercise, they would be entered into a lottery. The lottery prizes included one $500 award and three $100 awards.

After participants agreed to the terms presented, they answered a series of basic demographic questions and completed two questionnaires: one measuring happiness and the other depression. Then, participants received a *randomly assigned* exercise. Participants were encouraged to print out or write down the instructions for their exercise and keep them accessible during the week to come. They were instructed to return to the web site to complete follow-up questionnaires after completing their assigned exercise.

During the exercise week, participants received two reminder e-mails. The first reminder, sent early in the week, repeated the instructions for the assigned exercise. It also included contact information. Participants were encouraged to contact the researchers with any questions or concerns. The second reminder sent later in the week, reminded participants to return to the website for the follow-up questionnaires.

When participants returned to the web site after their exercise, they completed the same two questionnaires measuring happiness and depression that they had completed at the beginning of the study. In addition, participants answered a "manipulation check" question to gauge whether they had in fact completed the exercise as instructed during the relevant time period.

Of the 577 participants who completed baseline questionnaires, 411 (71 percent) completed all five follow-up assessments. The baseline happiness or depression scores did not differ between participants

who dropped out of the study and those who remained, nor were there different dropout rates among the six exercises. Analyses include only those 411 participants who completed all follow-up questionnaires.

Brief descriptions of the five exercises:

- *Placebo control exercise: early memories* – Write about your early memories every night for one week.
- *Gratitude visit* – Within one week write and then deliver a letter of gratitude in person to someone who had been especially kind to you but had never been properly thanked.
- *Three good things in life* – For one week write down three things that went well each day and provide a causal explanation for each good thing.
- *You at your best* – Write about a time when you were at you best and then reflect on the personal strengths displayed in your story. Review this story once every day for a week and reflect on the strengths you identified.
- *Using signature strengths in a new way* – Take an inventory of character strengths online at www.authenichappiness.org . You will receive individualized feedback about your top five strengths (Peterson, Park, & Seligman, 2005). Use one of these top strengths in a new and different way every day for one week.
- *Identifying signature strengths* – This exercise was the same as the one described above except it did not have the instruction to use signature strengths in new ways. Participants were asked to take the survey, to note their five highest strengths, and to use them more often during the next week.

Participants in all conditions tended to be happier and less depressed at the immediate post-test (after doing the assigned exercise for one week). One week later and at every testing period thereafter, however, participants in the placebo control condition were no different than they had been at the beginning of the study.

At the immediate post-test (after doing the assigned exercise for one week), participants in the gratitude visit condition were happier and less depressed. In fact, participants in the gratitude visit condition showed the largest positive changes in the whole study. This boost in happiness and decrease in depressive symptoms was maintained at follow-up assessments one week and one month later. However, by three months, participants in the gratitude visit condition were no happier or less depressed than they had been at the beginning of the study.

Participants in the three good things exercise began to show beneficial effects at one month following the post-test. At the one-month follow-up, participants in this exercise were happier and less depressed than they had been at the beginning, and they stayed happier and less depressed at the three month and six month follow-ups.

A similar long-term improvement occurred for participants in the using signature strengths in a new way condition. Immediate effects were less pronounced than for the three good things condition, but at the one month follow-up and beyond, participants in this condition were happier and less depressed than they had been at the beginning of the study. In contrast, participants in both the less specific identifying signature strengths condition and in the you at your best condition showed an effect only at the immediate post-test.

In summary, two of the exercises, using signature strengths in a new way and three good things, increased happiness and decreased depressive symptoms for six months. Another exercise, the gratitude visit, caused large positive changes for one month. The two other exercises, you at your best and identifying signature strengths and the placebo control exercise resulted in positive but very brief effects on happiness and depressive symptoms.

Seligman and colleagues wondered what caused the long-term benefits of the two exercises. Regardless of their exercise, participants were asked explicitly to do their assigned exercise for only one week. When the researchers contacted participants for one week, one month, three month, and six month follow-ups, they asked whether participants had continued the exercise for more than one week on their own. The majority of participants in the two conditions with long-term effects answered "yes" to a question about whether they were continuing the exercise on their own. Apparently, continued practice of an exercise affected positive outcomes at follow-up. The more participants actively continued their assigned exercise on their own and beyond the prescribed one-week period, the stronger the long term benefits.

Discussion Questions

1. What are the independent and dependent variables of this study?
2. What is a convenience sample? Is it a representative sample?
3. What problems can you think of concerning how the study participants were recruited?
4. What concerns do you have about the demographic make-up of the study participants?
5. What are some strengths of doing an experiment via the Internet? What are some weaknesses?
6. What is a manipulation check? Why is it used?
7. Why do you think the *using signature strengths in a new way* and *three good things* exercises worked better than the other three?
8. What does the fact that the positive effects from the two effective exercises only began to manifest themselves following time and their continued usage suggest?

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Supplement 2.10 DISCUSSION: Animals in Scientific Research

Humans use animals in many ways, research being a quite small part of our total involvement. By far the greatest number of animals (over 95 percent) are used for food and clothing. In addition, a large number of animals are killed in the course of protecting our crops and other food sources. Animals die from causes as varied as hunting and highway construction, both directly and as a result of destruction of their habitats. Some things that kill animals are not very good for us either, like air and water pollution. In short, we make many decisions, actively or by default, that kill animals. On the other hand, we seem to be the only species with concern for the welfare of other non-symbiotic species.

Some psychological studies involve the use of animals. In many cases, they are laboratory rats, bred specifically for research and teaching purposes. Standard procedures in the laboratory are designed to minimize these animals' pain. Surgery is carried out under surgical-depth anesthesia, such that the only pain involved is the brief anesthetics that you have probably experienced. To motivate animals to perform behavioral tasks, psychologists occasionally use mild electrical shock (usually to the feet). The intensity of these shocks is generally such that they are annoying, rather than excruciatingly painful; similar to those you may have experienced after walking across a carpeted floor and then touching a metal handrail, but perhaps more stressful for the rat that has never had such an experience before.

Most research does *not* cause excruciating pain to animals, in spite of the claims of the most vocal opponents of animal research. Most scientists go to considerable effort to minimize the pain to which animals are subjected. There are several reasons that scientists do not want to cause unnecessary pain to the animals. One is that scientists do not differ very much from the population at large in not wanting to see animals suffer. A second reason is that there are laws regulating the care of research animals (and also laws protecting human research participants). However, the main reason is that it just doesn't make sense, in terms of "clean," interpretable research results, to add *confounds* like unnecessary stress to one's experiments. Pain or other stressors cause release of hormones, alter brain neurotransmitter systems, and probably cause other changes that can affect experimental outcomes. Thus, most animal experiments in psychology and other research areas are improved by eliminating unnecessary pain or suffering.

Some studies in psychology and other biomedical research areas do cause pain to animals. To understand head or spinal injury or malignant tumors, we must do things to animals that we hope never happen to us. Research in veterinary medicine similarly requires that some animals endure pain for the ultimate benefit of others. Consider the alternative: Would you accept implantation of a very painful and probably fatal tumor in order to protect other people? You might be willing to endure great pain or sacrifice your life to protect other members of your family, but wouldn't you really prefer that one or more laboratory rats make the sacrifice?

The nature of pain is very poorly understood, and new research with animals has been making major progress in understanding the neural mechanism underlying perception of pain and new ways we might control it in humans (and animals). Necessarily, some of these experiments involve subjecting animals to painful treatments, usually for quite brief periods. The pain they endure is nowhere near the equivalent of what cancer patients must endure (and the pain is brief in animals in contrast to cancer patients). The goal of these experiments is to understand pain and the neuropsychological mechanisms that govern it. There are costs in terms of the pain to which a relatively small number of animals are subjected, but we hope the outcome will benefit both humans and other animals that now suffer excruciating pain as a result of accidents or diseases.

Some animal welfare advocates argue that (1) most research is unnecessary because it provides basic knowledge, rather than knowledge that is directly applicable to human disorder; (2) alternatives such as tissue cultures and mathematical models could be substituted for animals in most cases; and (3)

scientists are simply too lazy, too tradition bound, or too cruel to convert their experiments to these more humane methods.

Consider these points in turn. First, basic research provides knowledge that can be applied to clinical situations. For example, it has recently been found that some types of cancer may result from abnormal activation of certain genes, termed oncogenes, in the cells of the human body. Scientists did not discover genes (or cells) in the process of seeking cures for cancer. That information, and most other knowledge ultimately applied to treating human disease, came from basic research. This example illustrates a crucial point: To understand disease, mental or physical, we must understand the workings of the brain and body. Basic research provides that knowledge. Most of the applications of basic research are rarely known at the time they are done, and these applications are not always good—consider atomic bombs and chemical warfare. Nevertheless, without these applications of basic research, there would be no knowledge to apply to human problems.

Can mathematical models or tissue cultures substitute for animals in research? Mathematical models are very precise statements of scientific hypotheses. They are formulated in order to more precisely evaluate experimental results. We have very good mathematical models of how airplanes fly, which are far more accurate than our models of how most drugs work, for example. Nonetheless, we do not put airline passengers on a plane that has been designed from a mathematical model without first testing it, using real models in wind tunnels and full-scale planes in extensive test flights. Even if we knew as much about how a drug worked as we do about airplanes, we would not be close to ready to give it to humans. Drugs have effects on not only the target system but also other systems in the body, and most of the side effects on other systems are harmful. All drugs are compromises, the good effects outweighing the bad, given the disorder we are trying to treat. Without knowing the bad effects, which might be lethal, we obviously cannot administer the drug. These side effects cannot be known without tests in animals. Even with these tests, mistakes are made. The fact that the tranquilizer Thalidomide deformed babies of pregnant mothers was discovered when it was given to humans. This tragedy might have been avoided if more extensive animal research had been done prior to the use of the drug in humans.

In vitro or tissue culture experiments do not avoid the use of animals, since animals (sometimes humans) provide the tissue. Tissue culture experiments can be very useful because they allow us to isolate the system of interest from many confounding influences of their bodily organs, and because basic knowledge gained from one system often applies to others. Much screening of food additives for potential hazards such as carcinogenic (cancer-inducing) properties is carried out on cell cultures. However, the results must be shown to apply to tissue in the living animal or person before they are complete and biomedically useful. Moreover, treatments developed through tissue culture must be tested for possible side effects on (or via) other tissue.

The bottom line is that, while tissue cultures and mathematical models are important research methods, they are not, in most cases, substitutes for animal research. Nor does tissue culture, in most cases, avoid the use of animals. The degree to which research in biological psychology can use tissue culture is, of course, rather limited, since most questions about behavior must be asked of whole organisms.

Finally, to the extent that substitutes for animals are desirable in various cases, you should consider this: There are substitutes for animal protein in a balanced human diet. A well-balanced diet, based upon our current knowledge of human nutritional needs, can be obtained without consuming any animal tissue. In contrast, animal tissue is absolutely necessary for the biomedical research that will be required to cure diseases and disorders like schizophrenia, senile dementia, cancer, muscular dystrophy, and a very long list of other diseases.

There is an even broader issue. Animal lives and habitats have been sacrificed in significant numbers to provide the facilities in which *all* your courses are taught, to provide the paper for your textbooks, and to provide heat and light the classrooms. Society has decided that these lives are an acceptable cost to

achieve our goal of an educated population. While you probably have not thought of it in this way, you supported that decision in choosing to attend college, just as your choosing to eat animal protein (if you do) costs other animal lives. We submit that, whether you recognize the outcomes of your actions upon animals or choose to ignore them, the outcomes remain the same—animal lives are lost. We further submit that the decision to utilize animals directly in scientific research is no different from any other decision that costs animal life. The consequences are merely more direct and evident.

Adapted from William Greenough, with the assistance of Eric Jakobsson and the Biological Psychology Faculty, University of Illinois at Urbana-Champaign.

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Supplement 2.11 SERVICE-LEARNING: Participant Observation

Naturalistic observation is the process of watching behavior, without interfering, as it occurs in the natural environment. *Participant observation* is a process of inquiry involving watching behavior while playing an established participant role in a setting (Atkinson & Hammersley, 1998). Participant observation is a qualitative approach that is used in ethnography. Ethnography usually refers to research in social science that has some or all of the following characteristics: an emphasis on exploring natural social phenomena rather than specific hypothesis testing, a tendency to work with unstructured data, studying a small number of cases (or only one) in detail, and interpretive and humanistic data analysis that primarily takes the form of rich description and explanation (Atkinson & Hammersley, 1998).

Students can gain exposure to the concept of participant observation via involvement in service-learning. Service-learning is a form of experiential education in which students engage in service to address human and community needs while participating in structured reflection to connect those experiences to course content. This form of inquiry can provide opportunities for students to develop psychosocial and observational skills, an appreciation for diversity and a better understanding of the complex social contexts in which people live their lives, and to explore personal and professional issues in ways typically unavailable in traditional introductory psychology courses (Eyler & Giles, 1999; Eyler, Root, & Giles, 1998; Giles & Eyler, 1994).

Structuring Participant-Observation as Service-Learning

Students should engage in direct human service activity in a community-based setting for a minimum of twenty hours over the course of the semester. They should plan on volunteering once per week for about two hours, although this service schedule should be flexible to meet the needs of the community site as long as the minimum service hours are obtained. Students should create mutual goals and a tentative service plan in collaboration with a supervisor in a community-based setting, and they are responsible for documenting and providing verification of the service hours at the end of the course. It is helpful to provide a service log for students to verify their service placement and hours of service.

Ask students to consult with you about appropriate activities and settings and to sign a service contract before beginning work at a community site. In general, the service experience must include regular one-on-one or group interaction with people to provide the best opportunities to observe behavior and to make linkages to psychology content. Thus, service experiences that primarily include activities like office work, physical labor, grant writing, event planning, etc., are NOT appropriate for this course. There are many excellent opportunities to work in local contexts addressing a variety of social issues, including work with senior citizens, with people experiencing mental illness and substance abuse problems, with families who are homeless or in transition from a domestic violence situation, with international families and refugees, with runaway teenagers, with special education students, in after school programs or youth centers, in community art programs, in buddy or mentoring programs, tutoring, and in advocacy work, for example. Many college campuses have an office of volunteer programs or service-learning center where instructors and students can gain assistance in locating service opportunities in the community. Some centers also sponsor volunteer web sites, which post updated descriptions of local service opportunities.

It is important to remind students that it is essential that the youth, families, staff, and/or community members who may be encountered during their service-learning experiences are treated with respect and dignity. Students must comply with the rules and regulations of the community partner/organization, and appointments for service must be consistent and reliable. Students must be conscientious about the influence of their own words and behaviors, and interactions with community participants must always be safe and nurturing. The service experiences should be reciprocal in

nature—students are not the only ones who have something to offer to the relationship(s). They should look for opportunities to learn from others as well.

Reflection linking course objectives to service-learning is an essential component of the service-learning paradigm (Bringle & Hatcher, 1995; 1999). Final papers can be used as a means of service-learning reflection; however, providing weekly opportunities for written reflection can be especially helpful in reinforcing introductory psychology concepts. One method of ongoing reflection is incorporating a service-learning applied concepts journal. Full credit for written responses should be contingent upon successful completion of the service requirement.

Instructions for Service-Learning Applied Concepts Journal

The service-learning applied concepts journal is an important means of reflection with the objective of strengthening connections between experiential and academic learning. Journal entries will be submitted weekly and require writing a short (a few sentences) but precise example of four concepts in your psychology textbook. Examples must be given for major concepts in the book (important concepts are highlighted in bold or italicized print in the text) and must be based on your experiences in the service setting. The examples must be drawn from reflections on the service experience and demonstrate a clear comprehension and accurate application of the concepts. You may use concepts from any of the chapters. You may revisit chapters that we covered earlier in the semester to apply concepts or jump ahead in the readings. Please attempt to apply concepts from all of the chapters and do not repeat the same concepts. You will not receive credit for repeating concepts—challenge yourself to apply different concepts over the course of the semester.

Examples of Appropriate Concept Application

1. concept = animism (chapter 12)

Qui is a six-year-old girl that attends the after school program where I spend my time. She brought in a toy hippo this week and named him "Skipper." Qui talked to Skipper all day and made Skipper kiss all of the other children and insisted that she couldn't do anything about it because Skipper wouldn't listen to her. This is an example of animism, in Piaget's preoperational period, when children believe that inanimate objects are alive and have feelings, intentions, and consciousness.

2. concept = cerebellum (chapter 3)

While working at the nursing home, I've been spending time with Ruth, and she has been showing me how to do embroidery. To do this, Ruth must frequently thread needles and make small stitches, which are finely coordinated movements that are controlled by the cerebellum, a part of the hindbrain that controls fine movements and stores learned associations that involve movement. Ruth also plays the violin, and the well-rehearsed movements required for this skill also are associated with the cerebellum.

3. concept = stroboscopic motion (chapter 5)

I taught some children how to make cartoon "flip books" this week, which entailed stapling a stack of small sheets of paper together and drawing cartoon figures on each page in slightly varied poses. When the pages are quickly flipped, the figures appear to be moving across a page. This perception of motion is an illusion called stroboscopic motion, in which images flashed in quick succession are perceived as moving. Each drawing presents a slightly different view of the cartoons, separated by the "blank-out" as each page flips. The image of the preceding page remains in the sensory memory just long enough to bridge the blank until the next image appears. This creates the illusion of movement.

4. concept = empathy (chapter 16)

While volunteering with GROW, a mutual help group, I've noticed that many of the members exhibit behaviors used by client-centered therapists. Client-centered therapy, a treatment that allows clients to decide what to talk about without direction or judgment, includes the process of empathy. Empathy is an emotional understanding of what someone might be thinking and feeling. Horatio was talking about how he feels alienated from his wife because she doesn't understand why he is reluctant to take his medication. In response to his story, Janice said that she understands how he feels because she isolates herself from her family so she doesn't have to argue about the medications. Janice explained that she doesn't feel like herself because of the side effects of the drugs. Horatio agreed and elaborated on his own problems with side effects.

Adapted from an activity by Valeri Werpetinski, University of Illinois at Urbana-Champaign.

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Supplement 2.12 DISCUSSION: The Ethics of a Classic Study of Obedience

Unit 1: Issue 2 in Brent Slife's *Taking Sides* (2009) presents two different perspectives on the ethics of Stanley Milgram's obedience study. This could be used as the basis for in-class or online discussion.

Slife, B. (2009). *Taking sides: Clashing views on psychological issues* (16th ed.). Guilford, CT: Dushkin/McGraw-Hill.