

# Chapter Two

## THE RESEARCH ENTERPRISE IN PSYCHOLOGY

### Review of Key Ideas

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#### LOOKING FOR LAWS: THE SCIENTIFIC APPROACH TO BEHAVIOR

**1. Explain science's main assumption and describe the goals of the scientific enterprise in psychology.**

- 1-1. A major assumption of science is that events occur in a(an) \_\_\_\_\_ manner.
- 1-2. The three interrelated goals of psychology and the other sciences are: (a) measurement and description, (b) understanding and prediction, and (c) application and control. Match each of the following descriptions with the goal it represents by placing the appropriate letters in the blanks. (There is considerable overlap among these goals; pick the closest match.)
- \_\_\_\_\_ Muscle relaxation techniques are found to be useful in reducing anxiety and improving concentration and memory.
- \_\_\_\_\_ A psychologist develops a test or procedure that measures anxiety.
- \_\_\_\_\_ Researchers find that participants in an experiment conform more to the judgments of someone similar to themselves than to someone who is dissimilar.

Answers: 1-1. lawful (predictable, consistent, regular, orderly) 1-2. c, a, b.

**2. Explain the relations between theory, hypotheses, and research.**

- 2-1. A theory is a system of ideas used to explain a set of observations. One could devise an exhaustive description of human behavior, but the description wouldn't be a theory unless it also included concepts that would \_\_\_\_\_ why the behavior occurs.
- 2-2. Researchers can't test a theory all at once, but they can test one or two hypotheses derived from a theory. For example, evolutionary theory asserts that humans form groups because this behavioral tendency has had survival value. To reflect on this idea, one could test the \_\_\_\_\_ that certain specific aspects of group-oriented behavior occur in all cultures.

- 2-3. The relationship between theory, hypothesis, and research is this: theories suggest \_\_\_\_\_ (questions or predictions), which are then tested in \_\_\_\_\_. If the hypotheses are supported, confidence in the \_\_\_\_\_ is strengthened. If the findings fail to support the hypothesis, confidence in the theory decreases and the theory may be revised or discarded. In this way theory building is a gradual process with the result that over time theories (remain fixed/are subject to revision).

Answers: 2-1. explain 2-2. hypothesis 2-3. hypotheses, experiments (research), theory, are subject to revision.

### 3. Outline the steps in a scientific investigation.

- 3-1. Following are the five steps generally used in performing a scientific investigation. Fill in the missing key words.

- a. Formulate a testable \_\_\_\_\_.
- b. Select the research \_\_\_\_\_ and design the study.
- c. \_\_\_\_\_ the data.
- d. \_\_\_\_\_ the data and draw conclusions.
- e. \_\_\_\_\_ the findings.

- 3-2. Following are descriptions of various phases in the study by Cole and his co-workers (Cole et al., 1996). Indicate which step of this study is being described by placing a letter from the previous question (1, 2, 3, 4, or 5) in the appropriate blank.

\_\_\_\_\_ Sherman and his co-workers thought that disagreement on one topic, affirmative action, might cause people to assumed that they disagree on a more general dimension, such as liberalism-conservatism.

\_\_\_\_\_ The researchers decided to use a survey procedure and rating scales. One of the items, concerning agreement with an affirmative action issue at their college, permitted the groups to be divided into those who were in favor and those who were opposed to the statement.

\_\_\_\_\_ The researchers collected data by administering the surveys to students in their dorm rooms.

\_\_\_\_\_ Analysis of the data indicated that subjects who disagreed on the issue of affirmative action overestimated the extent to which they would disagree on the general dimension of liberalism-conservatism.

\_\_\_\_\_ The authors prepared a report of their findings that was accepted for publication in a technical journal.

Answers: 3-1. (a) hypothesis (b) method (c) collect (d) analyze (e) report (publish, write up) 3-2. a, b, c, d, e.

### 4. Discuss the advantages of the scientific approach.

- 4-1. We all tend to agree with the idea that "haste makes waste." We are also likely to agree with a commonsense saying that has the opposite implication: "a stitch in time saves nine." What are the two major advantages of the scientific approach over the commonsense approach?

**Answers: 4-1.** First, scientific descriptions generally have a clarity and precision lacking in commonsense proverbs. While we have a general idea about the meaning of haste, for example, we don't know precisely when or in what way or how much haste we should avoid. Second, science has an intolerance for error or for contradictory conclusions; commonsense sayings are likely to be contradictory. (Note that the proverbs in our example have contradictory messages: one says to slow down, the other says to hurry up.)

## LOOKING FOR CAUSES: EXPERIMENTAL RESEARCH

### 5. Describe the experimental method, explaining independent and dependent variables, experimental and control groups, and extraneous variables.

- 5-1. Schachter proposed that *affiliation* is caused (in part) by level of *anxiety*. What was his independent variable? \_\_\_\_\_ Dependent variable? \_\_\_\_\_
- 5-2. The variable that is manipulated or varied by the experimenter is termed the \_\_\_\_\_ variable. The variable that is affected by, or is dependent on, the manipulation is termed the \_\_\_\_\_ variable.
- 5-3. What is the name of the variable that *results from* the manipulation? \_\_\_\_\_ What is the name of the variable that *produces* the effect? \_\_\_\_\_
- 5-4. The group of subjects that receives the experimental treatment is known as the \_\_\_\_\_ group; the group that does not is known as the \_\_\_\_\_ group.
- 5-5. Control and experimental groups are quite similar in most respects. They differ in that the experimental group receives the experimental \_\_\_\_\_ and the control group does not. Thus, any differences found in the measure of the \_\_\_\_\_ variable are assumed to be due to differences in manipulation of the \_\_\_\_\_ variable.
- 5-6. In Schachter's study, the experimental group was given instructions that produced a high level of \_\_\_\_\_. Results were that the experimental group, the high anxiety group, had a greater tendency to \_\_\_\_\_ with others than did the control group.
- 5-7. An extraneous variable is any variable other than the \_\_\_\_\_ variable that seems likely to cause a difference between groups as measured by the \_\_\_\_\_ variable.
- 5-8. To review the parts of an experiment: Suppose a researcher is interested in the effect of a drug on the running speed of rats. The \_\_\_\_\_ group is injected with the drug and the \_\_\_\_\_ group is not. Whether or not the rats received the drug would be the \_\_\_\_\_ variable, and running speed would be the \_\_\_\_\_ variable.
- 5-9. Suppose also that the average age of the experimental rats is two years while the average age of the control rats is 3 months. What is the extraneous variable in this experiment? \_\_\_\_\_ Why does this variable present a problem?
- 5-10. Researchers generally control for extraneous variables through random \_\_\_\_\_ of subjects to groups. Write a definition of this procedure:

5-11. Research design may get complicated! For example, (true-false):

\_\_\_\_ While we frequently speak of two group designs (experimental and control), a single group is sometimes used in both procedures.

\_\_\_\_ There may be more than one independent variable, and there may be more than dependent variable.

Answers: 5-1. anxiety, affiliation 5-2. independent, dependent 5-3. dependent, independent 5-4. experimental, control 5-5. treatment, dependent, independent 5-6. anxiety, affiliation 5-7. independent, dependent 5-8. experimental, control, independent, dependent 5-9. age. Any difference between groups could be due to age rather than the independent variable 5-10. assignment. All subjects have an equal chance of being assigned to any group or condition 5-11. T, T.

**6. Describe the Featured Study on how expectations influence reactions to positive and negative outcomes.**

6-1. The featured study examined the effect of expectations on emotional reactions. In which of the following cases, according to the hypothesis of the study, would people have a more negative emotional reaction (be more sad)?

a. They expect something positive to happen, and something positive does happen.

b. They expect something negative to happen, and something positive happens.

6-2. In the featured study, half of the subjects expected good news—that they did not have the “enzyme deficiency”—and half expected bad news, that they did have the deficiency. These two groups were further divided: half of each group was given good news (no deficiency) and half bad (deficiency). Thus, the featured study manipulated two independent variables, so it actually involved \_\_\_\_\_ treatment groups.

6-3. In the results, which of these groups felt a more positive emotional reaction?

a. The group that expected good news and received good news.

b. The group that expected bad news and received good news.

6-4. And which of these groups felt a more positive (less negative) reaction?

a. The group that expected bad news and received bad news.

b. The group that expected good news and received bad news.

6-5. The study illustrates the use of two independent variables, and it also points up one of the unifying themes, that we are not objective observers of reality, that people’s experience of the world is highly \_\_\_\_\_.

Answers: 6-1. b 6-2. four 6-3. b 6-4. a 6-5. subjective.

**7. Explain the major advantages and disadvantages of the experimental method.**

7-1. What is the major advantage of the experimental method?

7-2. What are the two major disadvantages of the experimental method?

7-3. Suppose a researcher is interested in the effect of drinking large amounts of coffee on health (e.g., 30 cups per day over an extended period of time). What would be a major disadvantage of the experimental method in examining this particular question?

**Answers:** 7-1. The major advantage is that it permits researchers to make cause-effect conclusions. 7-2. The major disadvantages are that (a) precise experimental control may make the situation so artificial that it does not apply to the real world, and (b) ethical or practical considerations may prevent one from manipulating independent variables of interest. 7-3. To the extent that excessive coffee drinking is a suspected factor in health problems, it would be unethical and perhaps impossible to require an experimental group to drink that much per day.

#### LOOKING FOR LINKS: DESCRIPTIVE/CORRELATIONAL RESEARCH

**8. Discuss three descriptive/correlational methods: naturalistic observation, case studies, and surveys.**

8-1. Naturalistic observation involves study of human beings or animals in their natural environments conducted (with/without) direct intervention from the observer.

8-2. A case study is an in-depth and generally highly subjective or impressionistic report on (a group of people/a single individual) that may be based on interviews, psychological testing, and so on.

8-3. The third descriptive procedure is the survey technique. Surveys use \_\_\_\_\_ to find out about specific aspects of human attitudes or opinions.

8-4. List the three descriptive/correlational methods in the space below.

**Answers:** 8-1. without 8-2. a single individual 8-3. questionnaires (or interviews) 8-4. naturalistic observation, case studies, surveys.

**9. Explain the major advantages and disadvantages of descriptive/correlational research.**

9-1. While descriptive/correlational methods extend the scope of psychological research, they do not permit scientists to manipulate variables. Consequently, these methods do not permit one to demonstrate conclusively a \_\_\_\_\_ relationship among variables.

9-2. For example, suppose you have data indicating that people who happen to drink a lot of coffee tend to have cardiovascular problems. Is this experimental or descriptive/correlational research?  
\_\_\_\_\_. Would it be correct to conclude (from these data) that coffee drinking causes cardiovascular problems? \_\_\_\_\_

- 9-3. An advantage of the descriptive/correlational methods is that they allow researchers to study phenomena that they could not study with experimental methods. Thus, the descriptive/correlational methods (narrow/broaden) the scope of phenomena studied. A major disadvantage of these techniques is that one generally cannot make \_\_\_\_\_ conclusions from the resulting data.

Answers: 9-1. cause-effect (causal) 9-2. descriptive/correlational (because the variables are not manipulated by the experimenter), no 9-3. broaden, cause-effect (causal).

## LOOKING FOR CONCLUSIONS: STATISTICS AND RESEARCH

### 10. Describe three measures of central tendency and one measure of variability.

- 10-1. To review the meaning of the three measures of central tendency, determine the mean, median, and mode of the following scores: 3, 5, 5, 5, 6, 6, 7, 9, 80.

Mean: \_\_\_\_\_

Median: \_\_\_\_\_

Mode: \_\_\_\_\_

- 10-2. One can describe a group of data with a single number by using one of the measures of central tendency. In the blanks below indicate which measure of central tendency is being described.

\_\_\_\_\_ The score that occurs most frequently.

\_\_\_\_\_ The sum of all scores divided by the total number of scores.

\_\_\_\_\_ Half the scores fall above this measure and half below.

\_\_\_\_\_ Very sensitive to extreme scores.

\_\_\_\_\_ Usually the most useful because it may be used in further statistical manipulations.

\_\_\_\_\_ The middle score.

- 10-3. What is the median of data set A, below? \_\_\_\_\_ of set B? \_\_\_\_\_ Which of these sets is more variable, A or B? \_\_\_\_\_

A. 30, 40, 50, 60, 70    B. 10, 30, 50, 70, 90

- 10-4. What is the name of the major statistic used to represent variability? \_\_\_\_\_  
\_\_\_\_\_

Answers: 10-1. 14, 6, 5 10-2. mode, mean, median, mean, mean, median 10-3. 50, 50, B 10-4. standard deviation.

### 11. Distinguish between positive and negative correlations.

- 11-1. Which of the following relationships are positive and which are negative? (Indicate with a + or – sign.)

\_\_\_\_\_ The better students' grades are in high school, the better their grades tend to be in college.

\_\_\_\_\_ The more alcohol one has drunk, the lower their scores on tests of reaction time.

\_\_\_\_\_ The higher the anxiety, the worse the test performance.

\_\_\_\_\_ The greater the fear, the greater the need for affiliation.

- 11-2.** Which of the following indicates the *strongest correlational relationship*?
- a. 1.12
  - b.  $-.92$
  - c.  $.58$
  - d.  $.87$

Answers: **11-1.** +, -, -, + **11-2.** b (not a, because correlations cannot exceed +1.00 or -1.00).

**12. Discuss correlation in relation to prediction and causation.**

- 12-1.** Suppose you have data indicating that the more money people make the less depressed they report being on a mood survey. Thus, if you know the incomes of people in a comparable group, you should be able to \_\_\_\_\_, with some degree of accuracy, their self-reported depressed mood.
- 12-2.** The accuracy of your prediction will depend on the size of the correlation coefficient. Which of the following correlation coefficients would allow you to predict with the greatest accuracy?
- a.  $+.41$
  - b.  $+.54$
  - c.  $-.65$
- 12-3.** What kind of conclusion is justified on the basis of the previous relationship, a conclusion involving prediction or one involving a statement about causation? \_\_\_\_\_
- 12-4.** Consider the relationship described in an earlier question: You discover that the more money people make, the greater their happiness. Which of the following conclusions is justified? Explain why.
- a. Money makes people happy.
  - b. Happiness causes people to earn more money.
  - c. Both happiness and money result from some unknown third factor.
  - d. any of the above
- 12-5.** Again consider the relationship between money and happiness. Assume that money does not cause happiness and happiness does not cause money. What possible *third factor* can you think of that could cause both? (I'm asking you to make a wild speculation here just to get the idea of how third variables may operate.)
- 12-6.** We aren't justified in making causal conclusions from a correlation, but we can predict. Let's examine what prediction means in the case of our hypothetical example. If the relationship really exists, what prediction would you make about people who are rich? What prediction would you make concerning people who are unhappy?

Answers: 12-1. predict 12-2. c 12-3. prediction (Generally, one can't make causal conclusions from a correlation.) 12-4. d. Any of the statements is a possible *causal* explanation of the relationship, but we don't know which one(s) may be correct because the data are correlational. Therefore, *no causal conclusions* are justified. 12-5. For example, poor health might cause one to be both unhappy *and* poverty stricken (while good health would cause one to be both happy and wealthy). Intelligence or aggressiveness or stubbornness or a number of other physiological or behavioral factors could be causally related *both* to income and to happiness without those two factors being causes of one another. 12-6. You would predict that a group that was rich would also be happy and that a group that was unhappy would be poor. No causation is implied in these statements.

### 13. Explain the meaning of statistical significance.

- 13-1. In the hypothetical experiment described in your text there are two groups, largely equivalent except that the \_\_\_\_\_ group receives the computerized tutoring sessions and the \_\_\_\_\_ group does not. What is the hypothesis of this experiment?
- 13-2. Researchers statistically evaluate the hypothesis by comparing means and determining the likelihood or probability that a difference between means of the size obtained (or larger) would occur by \_\_\_\_\_. If the probability that such a difference would occur by chance is very low, say less than 5 times in 100, the researchers would conclude that the difference (is/is not) due to chance. They would declare the difference statistically \_\_\_\_\_ at the \_\_\_\_\_ level of significance.
- 13-3. Statistically significant does not mean important or significant in the usual sense of that word. What does statistically significant mean?

Answers: 13-1. experimental, control. The hypothesis is that special tutoring would increase reading scores. 13-2. chance, is not, significant, .05 13-3. It means that a difference that large would be rare on a chance basis, so it is assumed *not* to be due to chance. Or, more simply, it is assumed that the difference between means is due to treatment.

## LOOKING FOR FLAWS: EVALUATING RESEARCH

### 14. Explain what makes a sample representative and discuss the problem of sampling bias.

- 14-1. Sampling bias exists when the sample is not representative of the \_\_\_\_\_ from which it was drawn.
- 14-2. Dr. Brutalbaum distributes a questionnaire in an attempt to find out how the students in a particular course react to his teaching. Unfortunately, the day he selects for the evaluation is the day before a scheduled vacation, and about half the students are absent. He knows, however, that he does not have to test the entire class, and the sample that remains is large enough. Is the sample representative? Define the concept representative sample. Which of the four common flaws is illustrated?

Answers: 14-1. population 14-2. Probably not representative. A representative sample is one that is similar in composition to the population from which it is drawn. In this case, it seems likely that students who attend are different from those who do not (e.g., perhaps more enthusiastic, harder working, etc.). Thus, the flaw illustrated is *sampling bias*.



**15. Explain when placebo effects are likely to be a problem.**

- 15-1.** A student in Brutalbaum's class orders some audio tapes that promise to produce sleep learning. (Brutalbaum is dubious, because from his observations students sleep a lot in class but still don't seem to learn very much.) The student runs the experiment in Brutalbaum's class. She describes the anticipated sleep-learning benefits to the class and then *gives the sleep tapes to a random half of the students and nothing to the other half*. After the next test she analyzes the results. The mean test score of the experimental group is statistically significantly higher than that of the control group. What is the flaw in this experiment?
- a. sampling bias
  - b. possible placebo effects
  - c. time of day
  - d. none of the above
- 15-2.** What are placebo effects?
- 15-3.** How would you change the study described above to reduce or eliminate the possibility of placebo effects?

**Answers:** 15-1. b 15-2. Placebo effects: the tendency for people's behavior to change because of their expectation that the treatment will have an effect 15-3. Include a placebo treatment. For example, the experimenter might have given the control group a placebo tape that was the same as the sleep tape in every respect except for the supposedly critical information. (And if the experiment were double-blind, see below, it would also be much improved.)

**16. Describe the typical kinds of distortions that occur in self-report data.**

- 16-1.** Brutalbaum is now concerned about class attendance and decides to find out what proportion of students miss class regularly. He distributes a questionnaire asking students to indicate how many classes they have missed. Which of the four common flaws is he likely to encounter? \_\_\_\_\_
- 16-2.** For a number of reasons, people may not answer questions correctly, including the fact that they may not understand the question or may not remember accurately. Respondents also frequently want to create a favorable impression, the response tendency known as the social \_\_\_\_\_ bias. People may also be predisposed to respond in particular ways regardless of the question, for example, to agree or disagree regardless of content. This type of response tendency is known as a response \_\_\_\_\_.

**Answers:** 16-1. distortions in self-report 16-2. desirability, set.

**17. Describe Rosenthal's research on experimenter bias.**

- 17-1. When we ask a question, we frequently expect a particular answer. When scientists form a hypothesis, they also may expect a particular answer, and in some cases the scientist's hypotheses or expectations may influence the answers that they obtain. When a researcher's expectations about the outcome of a study influence the results, then the flaw in procedure known as \_\_\_\_\_ has occurred.
- 17-2. Experimenter bias or influence may occur in subtle ways. Rosenthal has repeatedly demonstrated that when the experimenter merely knows which treatment condition a subject is in, the fact of that knowledge or expectation alone may influence the subject's behavior. For this reason it is extremely important in research to maintain the \_\_\_\_\_ procedure, in which neither subjects nor experimenters know which treatment condition the subject is in.

Answers: 17-1. experimenter bias 17-2. double-blind.

**LOOKING AT ETHICS: DO THE ENDS JUSTIFY THE MEANS?**

**18. Discuss the pros and cons of deception in research with human subjects.**

- 18-1. In the space below present one or two of the arguments in favor of using deception and one or two arguments against.

Answers: 18-1. On the con side, deception is, after all, lying; it may undermine people's trust in others; it may cause distress. On the pro side, many research issues could not be investigated without deception; the "white lies" involved are generally harmless; research indicates that deception studies are not actually harmful to subjects; the advances in knowledge obtained may improve human well-being. Despite these positive aspects, the issue of deception creates a moral dilemma that will continue to be debated.

**19. Discuss the controversy about the use of animals as research subjects.**

- 19-1. What is the major reason that some people object to using animal subjects in research? In view of this objection, what moral considerations are raised by those who favor using animals in research?

Answers: 19-1. Many people believe that it is morally wrong to use animals in research, especially in painful or harmful treatments that would be unacceptable for human subjects. In defense of the practice, others cite the significant advances in treatment of a variety of mental and physical disorders that have resulted from animal research. The question to some degree involves the issue of whether or not saving human lives or finding remedies for human illnesses and disabilities justifies the sacrifice of, or pain inflicted on, research animals.

**20. Summarize the major ethical principles governing psychological research.**

**20-1.** Among the APA's guidelines for research are the following (true-false):

- 1. Participation should be voluntary and subjects should be allowed to withdraw from the study at any time.
- 2. Participants should not be subjected to dangerous or harmful treatments.
- 3. If a study requires deception, participants should be debriefed as soon as possible
- 4. Participants' right to privacy should be assured.

**20-2.** Concerning research with animals (true-false):

- 1. Harmful or painful procedures can never be used.
- 2. Research animals are entitle to decent living conditions.

**Answers:** 20-1. T, T, T, T, T 20-2. F (If potential benefits of the research are substantial, the guidelines permit the use of harmful or painful procedures in animal research), T.

**REFLECTING ON THE CHAPTER'S THEMES**

**21. Explain how this chapter highlighted two of the text's unifying themes.**

**21-1.** One of the text's unifying themes is that psychology is \_\_\_\_\_, which means that its conclusions are based on systematic \_\_\_\_\_ and that it tends to be (skeptical/credulous).

**21-2.** In what way did the discussion of methodology suggest that psychology tends to be skeptical of its results?

**21-3.** People's experience of the world is highly subjective. Which of the methodological problems discussed point up psychology's awareness of the subjective nature of our experience? ,

**Answers:** 21-1. empirical, observation (research), skeptical 21-2. Researchers constantly look for methodological flaws and subject their results to critical scrutiny by other scientists. 21-3. Behavioral scientists try to guard against subjective reactions by building in appropriate experimental controls for *placebo effects* and *experimenter bias*. The Featured Study also illustrates the effect of expectations on reaction to an event.

**PERSONAL APPLICATION • FINDING AND READING JOURNAL ARTICLES**

**22. Describe the nature of technical journals.**

**22-1.** A journal publishes technical material in a field, generally the results of research or other scholarly activity. Since journal articles are written primarily for (the layman/other professionals), they frequently contain technical language that makes it difficult for people outside the field to understand.

22-2. In psychology, most journal articles are reports of research or other empirical studies. Some journals also publish articles that summarize findings from a large number of studies; these articles are known as \_\_\_\_\_ articles.

Answers: 22-1. other professionals 22-2. review.

**23. Explain how to use *PsychINFO* and discuss the advantages of computerized literature searches.**

23-1. PsychINFO is a computerized database that contains abstracts or concise \_\_\_\_\_ of articles published in psychological journals.

23-2. To find information about a particular journal article referred to in the popular press, for example, you could begin your search by entering the name of the \_\_\_\_\_. If you have an idea of when the article was published you could further narrow your search by entering the approximate \_\_\_\_\_ in which the article might have been published.

23-3. You can also search under topic. To further reduce your search, enter \_\_\_\_\_ topics (e.g., insomnia and mood). By pairing two topics you are more likely to find articles relevant to your particular question.

23-4. The advantages of computerized over manual searches (in the print journal *Psychological Abstracts*) include:

- a. speed or power
- b. decreased likelihood of missing relevant articles
- c. the option of pairing topics in a search
- d. all of the above

Answers: 23-1. summaries 23-2. author, years (dates, time period) 23-3. two 23-4. d.

**24. Describe the standard organization of journal articles reporting on empirical research.**

24-1. In the blanks below list the six parts of the standard journal article in the order in which they occur. (The initial letters of each section are listed on the left.)

A \_\_\_\_\_

I \_\_\_\_\_

M \_\_\_\_\_

R \_\_\_\_\_

D \_\_\_\_\_

R \_\_\_\_\_

24-2. In the blanks below match the name of the sections of the standard journal article with the descriptions.

- \_\_\_\_\_ States the hypothesis and reviews the literature relevant to the hypothesis.
- \_\_\_\_\_ A list of all the sources referred to in the paper.
- \_\_\_\_\_ A summary.
- \_\_\_\_\_ Presents the data; may include statistical analyses, graphs, and tables.
- \_\_\_\_\_ Describes what the researchers did in the study; includes participants, procedures, and data collection techniques.
- \_\_\_\_\_ Interprets or evaluates the data and presents conclusions.

Answers: 24-1. abstract, introduction, method, results, discussion, references 24-2. introduction, references, abstract, results, method, discussion.

### CRITICAL THINKING APPLICATION • THE PERILS OF ANECDOTAL EVIDENCE: “I HAVE A FRIEND WHO . . .”

25. Explain why anecdotal evidence is flawed and unreliable.

- 25-1. Anecdotal evidence consists of personal stories that support a particular point of view. Anecdotes are frequently persuasive because they are concrete and vivid and, therefore, easy to \_\_\_\_\_.
- 25-2. What’s wrong with anecdotal evidence? First, one cannot generalize from a single case. Although a political candidate’s story about a coal miner named Bob (or a physician named Alice, etc.) may be memorable, Bob’s experiences cannot be \_\_\_\_\_ to other people or situations.
- 25-3. Second, people tend to represent themselves in the most favorable light. To the extent that Bob is the source of the anecdote, Bob’s self-report data may reflect the social \_\_\_\_\_ bias.
- 25-4. In addition, stories change with the telling, so that later versions may bear little resemblance to the original event. Stories one has heard second- or third-hand, so-called \_\_\_\_\_ evidence, are likely to be particularly unreliable.
- 25-5. Nor is it likely that Bob, or the story about Bob, was picked randomly. The candidate selects an anecdote to make a particular point, a process similar to \_\_\_\_\_ bias in a research setting. The clear alternative to anecdotal evidence is to solve problems based on solid evidence, the so-called \_\_\_\_\_-based decision-making process.

Answers: 25-1. remember 25-2. generalized 25-3. desirability 25-4. hearsay 25-5. sampling, evidence.

# Review of Key Terms

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Anecdotal evidence  
 Case study  
 Confounding of variables  
 Control group  
 Correlation  
 Correlation coefficient  
 Data collection techniques  
 Dependent variable  
 Descriptive statistics  
 Double-blind procedure  
 Experiment  
 Experimental group  
 Experimenter bias  
 Extraneous variables

Hypothesis  
 Independent variable  
 Inferential statistics  
 Journal  
 Mean  
 Median  
 Meta-analysis  
 Mode  
 Naturalistic observation  
 Operational definition  
 Participants  
 Placebo effects  
 Population  
 Random assignment

Replication  
 Research methods  
 Response set  
 Sample  
 Sampling bias  
 Social desirability bias  
 Standard deviation  
 Statistical significance  
 Statistics  
 Subjects  
 Survey  
 Theory  
 Variability  
 Variables

- \_\_\_\_\_ 1. Any of the factors in an experiment that are controlled or observed by an experimenter or that in some other way affect the outcome.
- \_\_\_\_\_ 2. A tentative statement about the expected relationship between two or more variables.
- \_\_\_\_\_ 3. Precisely defines each variable in a study in terms of the operations needed to produce or measure that variable.
- \_\_\_\_\_ 4. Persons or animals whose behavior is being studied; means the same thing as *participants*.
- \_\_\_\_\_ 5. Differing ways of conducting research, which include experiments, case studies, surveys, and naturalistic observation.
- \_\_\_\_\_ 6. A research method in which independent variables are manipulated and which permits causal interpretations.
- \_\_\_\_\_ 7. A condition or event that an experimenter varies in order to observe its impact.
- \_\_\_\_\_ 8. The variable that results from the manipulation in an experiment.
- \_\_\_\_\_ 9. The group in an experiment that receives a treatment as part of the independent variable manipulation.
- \_\_\_\_\_ 10. The group in an experiment that does not receive the treatment.
- \_\_\_\_\_ 11. Any variables other than the independent variables that seem likely to influence the dependent measure in an experiment.
- \_\_\_\_\_ 12. Distribution of subjects in an experiment in which each subject has an equal chance of being assigned to any group or condition.
- \_\_\_\_\_ 13. A link or association between variables such that one can be predicted from the other.
- \_\_\_\_\_ 14. The statistic that indicates the degree of relationship between variables.
- \_\_\_\_\_ 15. A research method in which the researcher observes behavior in the natural environment without directly intervening.
- \_\_\_\_\_ 16. An in-depth, generally subjective, investigation of an individual subject.
- \_\_\_\_\_ 17. A questionnaire or interview used to gather information about specific aspects of subjects' behavior.

- \_\_\_\_\_ 18. Procedures for making empirical observations, including questionnaires, interviews, psychological tests, and physiological recordings.
- \_\_\_\_\_ 19. Mathematical techniques that help in organizing, summarizing, and interpreting numerical data.
- \_\_\_\_\_ 20. Statistics helpful in organizing and summarizing (but not interpreting) data.
- \_\_\_\_\_ 21. Statistical procedures used to interpret data in an experiment and draw conclusions.
- \_\_\_\_\_ 22. A statistical procedure that combines the results of many studies.
- \_\_\_\_\_ 23. A descriptive statistic and measure of central tendency that always falls in the exact half-way point of a distribution of data.
- \_\_\_\_\_ 24. The arithmetic average.
- \_\_\_\_\_ 25. The score that occurs most frequently.
- \_\_\_\_\_ 26. The spread or dispersion of data, including the extent to which scores vary from the mean.
- \_\_\_\_\_ 27. A measure of variability in data.
- \_\_\_\_\_ 28. A judgment inferred from statistics that the probability of the observed findings occurring by chance is very low.
- \_\_\_\_\_ 29. A repetition of a study to determine whether the previously obtained results can be duplicated.
- \_\_\_\_\_ 30. A group of subjects taken from a population.
- \_\_\_\_\_ 31. A larger group from which a sample is drawn and to which the researcher wishes to generalize.
- \_\_\_\_\_ 32. Exists when a sample is not representative of the population from which it was drawn.
- \_\_\_\_\_ 33. Also known as subjects, the individuals whose behavior is systematically observed in a study.
- \_\_\_\_\_ 34. Occurs when a researcher's expectations influence the results of the study.
- \_\_\_\_\_ 35. Effects that occur when subjects experience a change due to their expectations (or to a "fake" treatment).
- \_\_\_\_\_ 36. The tendency to respond in a particular way (e.g., agreeing) that is unrelated to the content of questions asked.
- \_\_\_\_\_ 37. Occurs when an extraneous variable makes it difficult to sort out the effects of the independent variable.
- \_\_\_\_\_ 38. The tendency to answer questions about oneself in a socially approved manner.
- \_\_\_\_\_ 39. A research strategy in which neither the subjects nor experimenters know which condition or treatment the subjects are in.
- \_\_\_\_\_ 40. A periodical that publishes technical and scholarly material within a discipline.
- \_\_\_\_\_ 41. A system of interrelated ideas used to explain a set of observations.
- \_\_\_\_\_ 42. Support for a particular point of view through the use of personal (and frequently vivid) stories.

Answers: 1. variables 2. hypothesis 3. operational definition 4. subjects 5. research methods 6. experiment 7. independent variable 8. dependent variable 9. experimental group 10. control group 11. extraneous variables 12. random assignment 13. correlation 14. correlation coefficient 15. naturalistic observation 16. case study 17. survey 18. data collection techniques 19. statistics 20. descriptive statistics 21. inferential statistics 22. anecdotal evidence 23. median 24. mean 25. mode 26. variability 27. standard deviation 28. statistical significance 29. replication 30. sample 31. population 32. sampling bias 33. participants 34. experimenter bias 35. placebo effects 36. response set 37. confounding of variables 38. social desirability bias 39. double-blind procedure 40. journal 41. theory.

## Review of Key People

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Neal Miller

Robert Rosenthal

Stanley Schachter

- |       |   |
|-------|---|
| _____ | 1. Studied the effect of anxiety on affiliation.  |
| _____ | 2. Studied experimenter bias, a researcher's unintended influence on the behavior of subjects.  |
| _____ | 3. Asserted that the benefits of animal research (e.g., the resulting treatments for mental and physical disorders) far outweigh the harm done. |

Answers: 1. Schachter 2. Rosenthal 3. Miller.

## Self-Quiz

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1. Which of the following is a major assumption of science?
  - a. Events occur in a relatively orderly or predictable manner.
  - b. Cause and effect is indicated by correlational relationships.
  - c. In contrast to the behavior of lower animals, human behavior is in part a function of free will.
  - d. Events are largely randomly determined.
2. An experimenter tests the hypothesis that physical exercise helps people's mood (makes them happier). Subjects in the experimental group participate on Monday and Tuesday and those in the control group on Wednesday and Thursday. What is the *independent* variable?
  - a. the hypothesis
  - b. day of the week
  - c. the exercise
  - d. the mood (degree of happiness)
3. Regarding the experiment described in the previous question: What is the *dependent* variable?
  - a. the hypothesis
  - b. day of the week
  - c. the exercise
  - d. the mood (degree of happiness)
4. Regarding the experiment described above: What is an *extraneous* (confounding) variable?
  - a. the hypothesis
  - b. day of the week
  - c. the exercise
  - d. the mood (degree of happiness)



5. The major advantage of the experimental method over the correlational approach is that the experimental method:
  - a. permits one to make causal conclusions
  - b. allows for prediction
  - c. is generally less artificial than correlational procedures
  - d. permits the study of people in groups
  
6. In looking through some medical records you find that there is a strong relationship between depression and chronic pain: the stronger the physical pain that people report, the higher their scores on an inventory that measures depression. Which of the following conclusions are justified?
  - a. Depression tends to produce chronic pain.
  - b. Chronic pain tends to produce depression.
  - c. Both chronic pain and depression result from some unknown third factor.
  - d. any of the above could be true
  
7. What is the mode of the following data? 2, 3, 3, 3, 5, 5, 7, 12
  - a. 3
  - b. 4
  - c. 5
  - d. 6
  
8. What is the median of the following data? 1, 3, 4, 4, 5, 6, 9
  - a. 3
  - b. 4
  - c. 4.57
  - d. 6
  
9. Researchers find a negative relationship between alcohol consumption and speed of response: the more alcohol consumed, the slower the response speed. Which of the following fictitious statistics could possibly represent that correlation?
  - a.  $-4.57$
  - b.  $-.87$
  - c.  $.91$
  - d.  $.05$
  
10. The term *statistical significance* refers to:
  - a. how important the data are for future research on the topic
  - b. the conclusion that there are no reasonable alternative explanations
  - c. the inference that the observed effects are unlikely to be due to chance
  - d. the representativeness of the sample
  
11. An instructor wishes to find out whether a new teaching method is superior to his usual procedures, so he conducts an experiment. Everyone in his classes is quite excited about the prospect of learning under the new procedure, but of course he cannot administer the new teaching method to everyone, so some students are disappointed. A random half of the students receive the new method and the remaining half receive the old. What is the most obvious flaw in this experiment?
  - a. Subjects should have been systematically assigned to groups.
  - b. The sample is not representative of the population.
  - c. Placebo effects or experimenter bias are likely to affect results.
  - d. Distortions in self-report will affect results.
  
12. What procedure helps correct for experimenter bias?
  - a. extraneous or confounding variables
  - b. sleep learning or hypnosis
  - c. a higher standard for statistical significance
  - d. use of the double-blind procedure