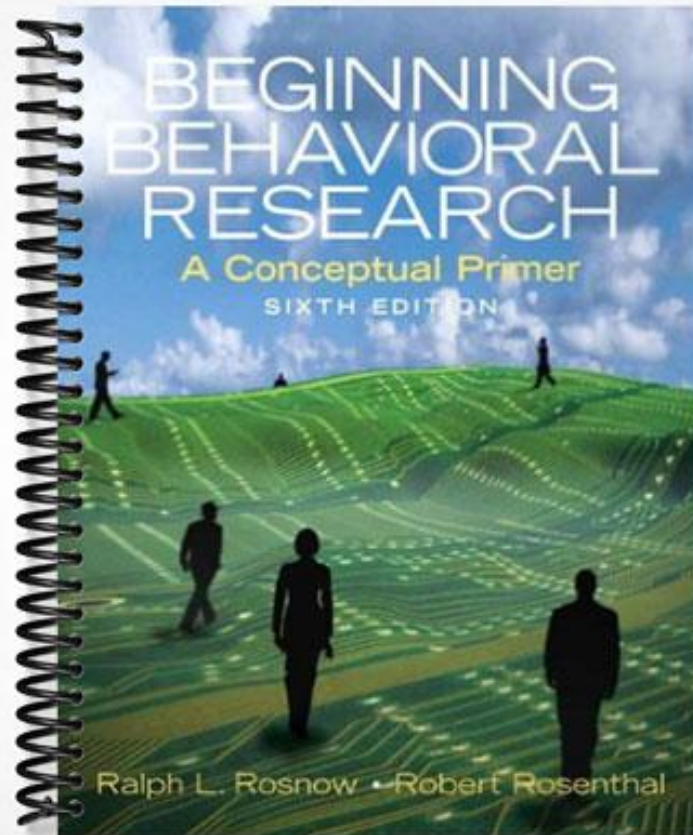


**TEST BANK**



INSTRUCTOR'S MANUAL  
WITH TESTS

to accompany

*Beginning Behavioral Research:  
A Conceptual Primer*

(Sixth Edition)

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## **PREFACE**

The purpose of this Instructor's Manual with Tests is to introduce undergraduate students to methods used by behavioral scientists, as well as to reacquaint new and experienced instructors to them. Each chapter of the text has an outlined summary, and most are followed by classroom-tested instructional activities, discussion topics, and demonstration exercises. Finally, there are multiple-choice and short essay questions that cover the core material for each chapter. The multiple choice questions include the page numbers in the text where the answers are found.

We would like to acknowledge Ralph and Bob for condensing their experienced pedagogy and professionalism into this unique text as they smoothed and sharpened its lessons over numerous editions. They also made helpful comments on earlier drafts of this manual. We also thank the many, many students who have used earlier editions of this text for their feedback. David would like to thank his wife, June, for her support and constructive comments and his young sons, Brian and Andrew, who provided support in their own way.





## CHAPTER 1: *BEHAVIORAL RESEARCH AND THE SCIENTIFIC OUTLOOK*

### CHAPTER OUTLINE

#### I. Why Study Research Methods?

- A. The term “researching” (i.e., exploring a problem systematically) is traditionally called the scientific method in college science courses.
  - 1. This “method” is used in all scientific fields.
  - 2. However, its applications vary from one discipline to another.
- B. Why should we know the scientific method or study techniques of research?
  - 1. We can enhance our understanding of the influence that science has on our lives.
  - 2. We can learn to differentiate between good science and pseudoscience.
  - 3. We can acquire information and skills useful in our daily lives.
  - 4. We can learn about the limits of particular studies.
  - 5. We may find that studying and doing research can be an exciting career.

#### II. Peirce’s Methods of “Fixing Belief”

- A. Charles Sanders Peirce (1839-1914) described four distinct strategies for formulating strongly held beliefs.
- B. The four strategies for the “fixation of belief.”
  - 1. **Method of tenacity** is clinging stubbornly and mindlessly to claims or beliefs just because they have been around a while.
  - 2. **Method of authority** is the acceptance of an idea as being valid because someone in a position of power or authority states it.
  - 3. The **a priori method** is the use of one’s individual powers of reason and logic to make sense of the world.
  - 4. The **scientific method** provides a framework with which to draw on independent realities to evaluate claims.

#### III. Empirical Reasoning and the Scientific Method

- A. The scientific method involves the use of **empirical reasoning**.
- B. Empirical reasoning is a combination of logic, carefully organized observation, and measurement.
- C. It is the use of empirical reasoning that all scientists have in common, despite differences in the particular methods of empirical inquiry they may employ.
- D. Empirical reasoning entered into behavioral science during the late nineteenth century when individuals such as Wilhelm Wundt (1832-1920) and William James (1843-1910) began employing the scientific method utilized by physicists and biologists to study psychological behavior.
- E. Francis Galton (1822-1911) demonstrated the application of empirical reasoning to questions thought to lie completely outside of science.

#### IV. Applications in Behavioral Research

- A. Empirical reasoning has been applied to questions about human nature, cognition, perception, and behavior.
- B. Stephen J. Ceci and his colleagues employed empirical reasoning to investigate the accuracy of children's eyewitness testimony.
- C. Solomon Asch used empirical reasoning to study conformity and the reasons why people go along with certain consensual opinions.

#### V. Extraempirical Factors in Science

- A. Although the scientific method is distinguished by its reliance on the primary use of empirical procedures, extraempirical factors also play an important role in ascertaining what is true.
- B. Aesthetic considerations play a part.
- C. Researchers have a penchant for poignant analogies and metaphors for visualizing one thing in terms of another (i.e., **perceptibility**).
- D. Opinions and arguments are articulated in the accepted **rhetoric** of the particular field they represent.
  - 1. Rhetoric includes specialized terms and structure of reporting.
  - 2. Peer-reviewed journals rely upon this rhetoric.

#### VI. The Context of Behavioral Science

- A. **Behavioral science** is an umbrella term that includes cognitive and emotional functioning as well as social science and behavioral economics.
- B. The objective of behavioral and social science is to describe and explain how and why humans think, feel, and behave as they do.
- C. To develop a more complete and integrated picture of human nature, behavioral and social scientists have come to embrace **methodological pluralism** and **theoretical ecumenism**.

#### VII. Three Lines of Empirical Research

- A. Descriptive conclusions tell us *how things are*.
  - 1. The goal of **descriptive research** is a description of what is happening behaviorally.
  - 2. Causal explanations are not of direct concern except perhaps speculatively.
  - 3. This orientation is often considered a necessary first step in the development of a program of research because it establishes the foundation of any future undertaking.
  - 4. Descriptive research is rarely regarded as sufficient as it does not allow one to address questions concerning why something happens or how what happens is related to other events.
- B. Relational (or "correlational") conclusions tell us *how things are in relation to other things*.
  - 1. Relational (or correlational) research involves measuring and relating two or more variables or conditions.

2. Based on coordinated observations, one should be able to make a quantitative statement concerning the relationship, or correlation, between the variable of interest.
  - a. Are *X* and *Y* significantly related?
  - b. What is the pattern of the relationship (e.g., linear or nonlinear)?
  - c. What is the strength of the relationship?
- C. Experimental conclusions tell us *how things are and how they got to be that way*.
  1. The objective is the identification of causes (i.e., what leads to what) through the manipulation of conditions thought to be responsible for the effect.
  2. Relational research rarely provides causal explanations, and then only under very special circumstances.

### VIII. Some Traits of Good Researchers

- A. Enthusiasm
- B. Open-mindedness
- C. Common sense
- D. Role-taking ability
- E. Creativity and inventiveness
- F. Confidence in one's own judgment
- G. Ability to communicate
- H. Care about details
- I. Integrity and honest scholarship

### LECTURE IDEAS AND ACTIVITIES

1. To demonstrate the pervasiveness of science in modern society as well as the utility of understanding the process of science, assemble a collection of articles that report on recent scientific findings. The science section of the Tuesday *New York Times* is particularly useful for finding such articles (<http://www.nytimes.com>). Another Internet resource is *Science Daily* (<http://www.sciencedaily.com>). Discuss the findings reported in these articles, emphasizing how an understanding of the scientific process can help one better evaluate or question the findings or conclusions reported in the media.

2. Jacobson, Mulick, and Schwartz (1995) discuss how the reliance on pseudoscientific findings has led to the acceptance by professionals of some therapeutic treatments that appear to have negligible, if any, benefit for the afflicted individual. Jacobson et al. argue that one example of the reliance on pseudoscientific research practices to establish the efficacy of a therapeutic intervention is the controversial case of facilitated communication. Jacobson et al. describe the disparity between the controlled, scientific research studies that have found very little, if any, support for this type of intervention with autistic individuals and its unquestioned acceptance by its proponents. Jacobson et al. discuss possible reasons why proponents of facilitated communication have rejected sound scientific practices in favor of practices that can be described as representing pseudoscience. Not surprisingly, this article sparked debate concerning whether scientific practices can really establish the efficacy of facilitated communication (e.g.,

Allen & Allen, 1996; Biklen, 1996; Fernald, 1996; Jacobson et al., 1996; Knox, 1996). You might want to assign these articles and have your students debate the criteria that one should use to establish the effectiveness of a treatment intervention. You may also want to discuss whether treatments that have become popular based solely on pseudoscientific evidence are really that detrimental to society as a whole or to the individuals they are intended to help. In other words, is it always necessary to establish the efficacy of a treatment intervention using practices that can be characterized as “good science?”

Allen, B., & Allen, S. (1996). Can the scientific method be applied to human interaction? *American Psychologist, 51*, 986.

Biklen, D. (1996). Learning from the experiences of people with disabilities. *American Psychologist, 51*, 985-986.

Fernald, D. (1996). Tapping too softly. *American Psychologist, 51*, 988.

Jacobson, J. W., Mulick, J. A., & Schwartz, A. A. (1995). A history of facilitated Communication: Science, pseudoscience, and antiscience. *American Psychologist, 50*, 750-765.

Jacobson, J. W., Mulick, J. A., & Schwartz, A. A. (1996). If a tree falls in the woods... *American Psychologist, 51*, 988-989.

Knox, L. A. (1996). The facilitated communication witch-hunt. *American Psychologist, 51*, 986-987.

3. More information on the life of Charles Sanders Peirce as well as hypertext versions of his writings are available at a website dedicated to this American philosopher (<http://www.peirce.org>).

4. Before discussing Peirce’s methods of “fixing belief,” have students write down five things they believe to be true. Once they have completed their lists, have each student share his or her list with another student. As one student reads each “truth” from his or her list, the student’s partner should simply ask, “Why do you believe that this is true?” to each item, recording the student’s response. As a class, discuss the nature of the arguments that were used to fend off the challenges to the veracity of the student’s beliefs. This exercise easily leads into a discussion of Peirce’s methods of “fixing belief.” You may want to categorize the types of arguments the students used to justify the veracity of their beliefs using Peirce’s four methods of fixing belief.

5. To help students to critically consider the underlying foundation of claims of veracity, you might incorporate the following writing assignment into discussion of Peirce’s methods of “fixing belief.” The assignment involves the analysis of the famous 1897 editorial entitled, “Yes, Virginia, There Is a Santa Claus.” This editorial is actually a reply to a letter from an eight-year-old girl named Virginia O’Hanlon who was asking the editor of the now defunct newspaper, the *New York Sun*, the truth about the existence of Santa Claus. The editor, Francis Church, utilizes three of Peirce’s methods to establish that Santa Claus does exist while at the same time rejecting the scientific method as a means for answering this question. Have students

write a two- to three-page paper evaluating this exchange between Virginia and Church in terms of Peirce's four methods.

Virginia's letter and Church's subsequent reply is widely available in the public domain on the Internet. Here is the exchange between the two individuals:

Dear Editor: I am 8 years old. Some of my little friends say there is no Santa Claus. Papa says, 'If you see it in *The Sun* it's so.' Please tell me the truth, is there a Santa Claus?"  
Virginia O'Hanlon  
115 WEST 95TH ST.

Virginia, your little friends are wrong. They have been affected by the skepticism of a skeptical age. They do not believe except they see. They think that nothing can be which is not comprehensible by their little minds. All minds, Virginia, whether they be men's or children's, are little. In this great universe of ours man is a mere insect, an ant, in his intellect, as compared with the boundless world about him, as measured by the intelligence capable of grasping the whole of truth and knowledge.

Yes, Virginia, there is a Santa Claus. He exists as certainly as love and generosity and devotion exist, and you know that they abound and give to your life its highest beauty and joy. Alas! how dreary would be the world if there were no Santa Claus! It would be as dreary as if there were no Virginias. There would be no childlike faith then, no poetry, no romance to make tolerable this existence. We should have not enjoyment, except in sense and sight, The eternal light with which childhood fills the world would lie extinguished.

Not believe in Santa Claus! You might as well not believe in fairies! You might get your papa to hire men to watch in all the chimneys on Christmas Eve to catch Santa Claus, but even if they did not see Santa Claus coming down, what would that prove? Nobody sees Santa Claus, but that is no sign that there is no Santa Claus. The most real things in the world are those that neither children nor men can see. Did you ever see fairies dancing on the lawn? Of course not, but that's no proof that they are not there. Nobody can conceive or imagine all the wonders there are unseen and unseeable in the world.

You tear apart the baby's rattle and see what makes the noise inside, but there is a veil covering the unseen world which not the strongest man, nor even the united strength of all the strongest men that ever lived, could tear apart. Only faith, fancy, poetry, love, romance can push aside that curtain and view and picture the supernal beauty and glory beyond. Is it all real? Ah, Virginia, in all this world there is nothing else real and abiding. No Santa Claus! Thank God! he lives, and he lives forever. A thousand years from now, Virginia, nay, ten times ten thousand years from now, he will continue to make glad the heart of childhood.

Strohmetz, D. B. (2003, March). *Ways of Knowing There Is A Santa Claus*. Poster session presented at the 17<sup>th</sup> annual conference on Undergraduate Teaching of Psychology: Ideas and Innovations, March, 2003, Ellenville, NY.

6. Keith Stanovich (2001) tells the story of how Francesco Szizi, an astronomer, tried to refute Galileo's claim that there were moons orbiting Jupiter. Rather than looking through Galileo's telescope, Szizi rejected the possibility of Galileo's observation being true through the use of reasoning based on "common sense" (p. 9). Students will be amused by the absurdity of Szizi's argument as being considered a perfectly acceptable alternative to the use of systematic observation in the formation of beliefs and explanations concerning the world. However, point out to them that many of their own beliefs about the world may also be the product of reasoning similar to Szizi's. To demonstrate this point, have students complete Vaughn's (1977) Test of Common Beliefs. Students may find that many of the beliefs they have about human behavior have been shown by scientists to be inaccurate. Discuss how students may have originally formulated these misconceptions about behavior and what the possible implications would be to society if these types of beliefs were never challenged.

Stanovich, K. E. (2001). *How to think straight about psychology* (6<sup>th</sup> ed.). Boston, MA: Allyn and Bacon.

Vaughn, E. D. (1977). Misconceptions about psychology among introductory psychology students. *Teaching of Psychology*, 4, 138-141.

7. Art Kohn (1999) employs a variation of the "Monty Hall" problem to demonstrate the superiority of empirical reasoning over intuition (i.e., the method of tenacity). Kohn places a \$1 bill in one of three envelopes, seals all three envelopes, and then shuffles the envelopes such that one no longer knows which envelope contains the dollar bill. Kohn asks for a volunteer to select one of the envelopes, stating that the person can keep the dollar if it is in the envelope selected. Kohn privately opens the other two envelopes, showing the class an envelope that does not contain the dollar bill. Before the volunteer opens his or her envelope, Kohn offers to switch envelopes with the volunteer. The question posed to the class is, should the volunteer switch the envelopes? Most will say that the volunteer should stay with her original selection, but will only be able to explain their reasoning through a "gut sense" or intuition rather than through empirical reasoning.

Kohn then has the class empirically evaluate their intuitive belief by conducting an experiment. Students form pairs in which one student is the experimenter and the other the research subject. Each experimenter is given a data sheet with four columns and twenty rows. The four columns are labeled "Correct Answer," "Subject's Choice," "Stay/Switch," and "Win/Lose." The experimenter fills in the rows in the "Correct Answer" column with a random assortment of the letters "A," "B," and "C." The experimenter is instructed to ask the subject to guess "A," "B," or "C." The subject is told which letter was not the correct one and then given the opportunity to either stay with the original guess or switch to the nonchosen letter. The experimenter records the subject's decision as well as whether or not the subject ultimately made the right choice. After all the pairs of students have completed the experiment, Kohn compiles the class's results, determining the proportion of the time that the subject won (i.e., correctly selected the letter) by staying with the original selection as compared to the proportion of the time the subject won by switching.

Kohn has found that most students prefer the “staying strategy” but when looking at the overall results, they were more likely to win if they chose the “switching strategy.” Kohn gives the mathematical rationale for why switching is better (because the odds are 2/3 that the experimenter chose the envelope containing the dollar and that these odds do not change even when the experimenter reveals an empty envelope).

This activity is useful for not only demonstrating the advantage of the scientific method over the method of tenacity in knowing our world, but also how truly “tenacious” the method of tenacity can really be. After having the class empirically demonstrate the superiority of the switching strategy over the staying strategy, offer the original volunteer again the opportunity to either keep his or her unopened envelope or switch envelopes. Despite the class’s findings as well as the explanation for why switching is the best decision, volunteers frequently wish to stay with their original choice based on their “gut instinct.” Needless to say, in these situations you will usually not lose a dollar to the student. Point out the potential cost that choosing to rely solely on intuition rather than empirical reasoning can have for the individuals (in this case, the cost is a dollar).

Kohn, A. (1999). Defying intuition: Demonstrating the importance of the empirical technique. In M. E. Ware and C. L. Brewer (Eds.), *Handbook for teaching statistics and research methods (2<sup>nd</sup> ed.)* (pp. 179-181). Mahwah, NJ: Lawrence Erlbaum.

8. The importance of rhetoric in science is illustrated in an article by Robert Madigan, Susan Johnson, and Patricia Linton (1995). These authors argue that “APA style” is not merely a set of writing rules. Rather, it reflects the rhetoric or language by which psychologists formulate their “ways of knowing.” Madigan et al. assert that it is important for newcomers to the discipline of psychology to learn to communicate using this style as it reflects the accepted discourse as well as the history of psychology as a science. For example, among the important characteristics inherent in the “APA style” is the use of a story schema to describe one’s use of systematic observations to address research questions, the use of hedged wording when drawing conclusions from these observations, and the emphasis on the empirical process rather than the individual through the passive voice and depersonalized styles of disagreement. While the implications of their arguments have been criticized (see Brand, 1996; Josselson & Lieblich, 1996; Vipond, 1996), Madigan et al. (1996) argue that one must learn the rhetoric of psychology (via the “APA style”) to have the ability to make an impact upon or contribution to the field of psychology.

Brand, J. L. (1996). Can we decide between logical positivism and social construction views of reality? *American Psychologist*, 51, 652-653.

Josselson, R., & Lieblich, A. (1996). Fettering the mind in the nature of “science.” *American Psychologist*, 51, 651-652.

Madigan, R., Johnson, S., & Linton, P. (1995). The language of psychology: APA style as epistemology. *American Psychologist*, 50, 429-436.

Madigan, R., Johnson, S., & Linton, P. (1996). APA style: Quo vadis? *American Psychologist*, 51, 653-655.

Vipond, D. (1996). Problems with the monolithic APA style. *American Psychologist*, 51, 653.

9. To encourage students to think carefully about the importance of nine traits Rosnow and Rosenthal note as characteristic of good researchers, have your students discuss in groups which three traits they believe to be most essential in order to be a good researcher and why. Interesting discussions should ensue as each group will most likely have selected different traits and for different reasons. You may also want to discuss how one can acquire or develop these traits.

## MULTIPLE-CHOICE QUESTIONS

1. Which of Peirce's methods refers to the use of common sense or the obvious to justify claims of belief?
  - \* a. the method of tenacity
  - b. the method of authority
  - c. the a priori method
  - d. the scientific method(4)
  
2. According to Peirce, the most primitive strategy for forming a belief is the
  - a. a priori method.
  - b. method of authority.
  - \* c. method of tenacity.
  - d. scientific method.(4)
  
3. John refuses to alter his opinion because it seems so obvious it must be correct. According to Peirce, John is basing his belief on the
  - a. a priori method.
  - b. method of authority.
  - \* c. method of tenacity.
  - d. scientific method.(4)
  
4. When an explanation is accepted as true because it is advocated by an expert, this belief is based on the
  - a. method of tenacity.
  - \* b. method of authority.
  - c. a priori method.
  - d. scientific method.(5)
  
5. While having the oil changed in his car, Zach accepts his mechanic's recommendation to have his fuel-injection system cleaned. Which of Peirce's methods is Zach relying on to know what maintenance his car requires?
  - a. the scientific method
  - b. the method of tenacity
  - c. the a priori method
  - \* d. the method of authority(5)



6. Which method of fixing belief is based on the use of pure reason and logic?  
a. the method of authority  
\* b. the a priori method  
c. the scientific method  
d. the method of tenacity (6)
7. Susan rejects the claim of a salesperson about the benefits of a particular product because it simply does not make logical sense to her. Which of Peirce's methods is Susan using to evaluate the salesperson's claim?  
a. the method of authority  
\* b. the a priori method  
c. the method of tenacity  
d. the scientific method (6)
8. The inherent limitation of pure reason is a problem associated with which of Peirce's methods of fixing belief?  
a. the scientific method  
b. the method of tenacity  
c. the method of authority  
\* d. the a priori method (6)
9. The use of empirical reasoning is essential to which of Peirce's methods of fixing belief?  
a. the method of authority  
b. the a priori method  
c. the method of tenacity  
\* d. the scientific method (6)
10. By systematically testing the different electrical systems in his car, Joshua is using which of Peirce's methods to confirm his belief that he may need a new car battery?  
a. the a priori method  
\* b. the scientific method  
c. the method of authority  
d. the method of tenacity (6)
11. Kristen exclaims, "I want to see the evidence for myself before I'll accept your explanation!" Kristen's claim reflects the basic idea behind the  
\* a. scientific method.  
b. method of authority.  
c. a priori method.  
d. method of tenacity. (6)

12. Which of the following represents how Peirce ordered his strategies for formulating beliefs, from most flawed to least flawed?  
 \* a. method of tenacity, method of authority, a priori method, scientific method  
 b. method of authority, method of tenacity, a priori method, scientific method  
 c. a priori method, method of tenacity, method of authority, scientific method  
 d. method of tenacity, a priori method, scientific method, method of authority (4-6)
13. The use of observation and experience in inquiry characterizes  
 a. armchair reasoning.  
 \* b. empirical reasoning.  
 c. a priori reasoning.  
 d. authoritative reasoning. (7)
14. Which of the following terms refers to the use of techniques based on observation or experience?  
 a. a priori  
 b. pseudoscience  
 \* c. empirical  
 d. analogical rhetoric (7)
15. Which of the following refers to visualizing one thing in terms of another?  
 a. theoretical ecumenism  
 b. ad hoc hypothesis  
 \* c. perceptibility  
 d. methodological pluralism (10)
16. Technical terms such as “hypotheses,” “participant observation study,” and “intercoder reliability” are examples of  
 a. methodology pluralism.  
 b. theoretical ecumenism.  
 \* c. the rhetoric of justification.  
 d. pseudoscience. (11)
17. Kim is interested in what physical qualities people most desire in their prospective partners. She begins by interviewing married individuals, asking them what physical qualities most attracted them to their current partner. She then visits a bar and observes the physical qualities of those who leave with each other. Finally, she examines the personal ads in a local newspaper, noting the physical qualities that are most often mentioned in these ads. In her investigation of interpersonal attraction, Kim is employing  
 a. experimental methodology.  
 \* b. methodological pluralism.  
 c. theoretical ecumenism.  
 d. an interdisciplinary approach. (13)

18. To develop a richer, more complete understanding of human behavior, researchers embrace \_\_\_\_\_ because they recognize that there is often more than one “right way” to view the causes of behavior.
- a. methodological pluralism
  - \* b. theoretical ecumenism
  - c. analogical thinking
  - d. empirical reasoning
- (13)
19. The objective of descriptive research is to determine
- \* a. what’s happening.
  - b. what’s related.
  - c. what caused it.
  - d. what does it affect.
- (14)
20. Interested in how teenagers interact when unsupervised, Cheryl decides to spend several Saturdays observing adolescents at a local mall. Cheryl’s work can be BEST described as
- a. experimental research.
  - b. relational research.
  - c. quasi-research.
  - \* d. descriptive research.
- (14)
21. Amala spends several hours at a local playground observing how often the children engage in cooperative as well as competitive activities. Amala’s investigation can best be described as
- \* a. descriptive research.
  - b. quasi-experimental research.
  - c. experimental research.
  - d. relational research.
- (14)
22. Dave is interested in whether one’s support for prayer in schools is associated with one’s religiosity. This type of question is most characteristic of
- a. descriptive research.
  - b. laboratory research.
  - \* c. relational research.
  - d. experimental research.
- (15)
23. Interested in the effect of outside employment on academic performance, a professor asks his students how many hours a week they work and compares this to current grade point averages. The professor’s inquiry is an example of which broad research approach?
- a. experimental
  - b. pseudoscientific
  - \* c. relational
  - d. descriptive
- (15)

24. Which of the following questions is beyond the scope of relational research?
- Are  $X$  and  $Y$  significantly related?
  - What is the form of the relationship between  $X$  and  $Y$ ?
  - \* Will changes in  $X$  cause changes in  $Y$ ?
  - d. How strong is the relationship between  $X$  and  $Y$ ? (15)
25. Mary suspects that a new violent afternoon TV show is the reason for her son's sudden increase in aggressive behavior towards his sister. Which research approach would best help Mary evaluate this suspicion?
- correlational
  - descriptive
  - relational
  - \* d. experimental (15)
26. To evaluate questions of causality, scientists must conduct
- relational research.
  - \* b. experimental research.
  - laboratory research.
  - d. descriptive research. (15)
27. Brian suspects that his new late-night cappuccino habit is the cause of his recent insomnia problems. Which research approach would best help Brian evaluate his suspicion?
- anecdotal
  - relational
  - descriptive
  - \* d. experimental (15)
28. Which of the following is NOT one of the orienting attitudes of scientists described in the text?
- open-mindedness
  - confidence in one's own judgment
  - ability to communicate
  - \* d. ability to be correct (18-19)

### SHORT ESSAY QUESTIONS

- Discuss three reasons why it is beneficial for one to learn and know about the scientific method.
- What are Peirce's four strategies for formulating explanations? Which of these strategies is the least desirable? Why? Which is the most desirable? Why?
- Why is an accepted rhetoric one of the features of the scientific method? Describe some aspects of this rhetoric.

4. What is the difference between methodological pluralism and theoretical ecumenism? Why have they both been adopted by behavioral scientists?
5. What are the three broad research approaches described in the text? Give an example of the type of question each approach addresses.
6. Describe five characteristics that good researchers possess.

## CHAPTER 2: CREATIVE IDEAS AND WORKING HYPOTHESES

### CHAPTER OUTLINE

#### I. Discovery and Justification

- A. The philosopher Hans Reichenbach (1938) identified two phases of scientific inquiry:
  1. The **discovery phase** conceptualizes the initial development of research ideas.
  2. In the **justification phase** researchers test their **working hypotheses** and logically defend their conclusions.
- B. Suitable leads for research can be found everywhere.
  1. McGuire used the term “hypothesis-generating heuristics” to refer to the circumstances or the strategies that were the basis of hypotheses for empirical research. Examples of hypothesis-generating heuristics are:
    - a. The use of an intensive case study approach.
    - b. The effort to make sense of a paradoxical incident.
    - c. The use of analogical thinking.
    - d. The resolution of conflicting results.
    - e. The effort to improve on older ideas.
    - f. The exploitation of unexpected observations (serendipity).
  2. **Meta-analysis** can be used to develop an overall picture of empirical findings concerning a specific research question as well as an exploratory tool for identifying **moderating variables**.

#### II. The Research Proposal

- A. A proposal might be thought of as a mutual understanding between the student and the instructor.
- B. By searching the literature and having discussions with one’s instructor, one will be able to develop a rationale for one’s hypothesis.
- C. A research proposal conveys what one would like to study and how one will go about it.

#### III. Retrieving and Using Reference Materials

- A. **PsycINFO** is an extensive computerized reference database maintained by the American Psychological Association. This database dates back to 1872 and contains abstracts as well as full text materials.
- B. The Social Sciences Citation Index (SSCI) and the Science Citation Index (SCI) are useful when conducting an ancestry search.
- C. “Fugitive literature” is a term referring to the most hard-to-find material such as technical reports, dissertations, and master’s theses.
- D. It is important to read the actual work, not just the abstract of the work.

#### IV. Defining Terms and Variables

- A. One should begin to think about naming and defining the things one wants to study.
- B. **Operational definitions** identify terms on the basis of the empirical conditions used to measure or manipulate them.

- C. **Theoretical** (or **conceptual**) **definitions** assign the meaning of terms more abstractly or generally.
- D. There are reference sources available that can aid in the development of good operational and theoretical definitions of variables one wishes to study.

#### V. Hypotheses and Theories

- A. The research idea is molded into a testable supposition, or **working hypothesis** (also called an **experimental hypothesis** in experimental research) based on theory.
- B. There is a distinction usually made between hypotheses and theories.
  - 1. A hypothesis is a conjectural statement or supposition.
    - a. Hypotheses can be derived from a theory.
    - b. Hypotheses give direction to the researcher's systematic observations.
  - 2. A theory is a larger set of conjectural statements in the context of certain assumptions or presuppositions.
    - a. A theory postulates a kind of conceptual pattern, which can then serve as a logical framework for the interpretation or the larger meaning of one's observations.
    - b. Seminal theories shape or stimulate other work.
    - c. Good scientific theories are **generative**.

#### VI. Molding Ideas Into Acceptable Hypotheses

- A. A working hypothesis must be plausible, that is, it must have **correspondence with reality** in that it agrees with accepted truths (e.g., other respected theories and reliable empirical data).
- B. **Falsifiability** is the most essential criterion for an acceptable hypothesis according to the philosopher Karl Popper. Hypotheses that do not meet this criterion are considered to be outside the realm of science.
- C. A hypothesis must be succinct, which is a combination of **coherence** and **parsimony**.
  - 1. **Coherence** refers to whether the hypothesis "sticks together" in a logically compelling way.
  - 2. **Parsimony** refers to how "sparing" or "frugal" the hypothesis is. **Occam's razor** refers to the ruminative and winnowing process of eliminating the superfluous.

#### VII. Variables

- A. A **variable** is an event or condition that the researcher observes or measures or plans to investigate and that is likely to vary or change.
  - 1. The **dependent variable** is the "effect" (or outcome) in which the researcher is interested.
  - 2. The **independent variable** is the presumed "cause." Changes in this variable lead to changes in the dependent variable.
- B. How a variable is labeled always depends on its context.

#### VIII. Examples of Independent Variables

## LECTURE IDEAS AND ACTIVITIES

1. One misconception that students may have concerning the research process is that it is a “boring” endeavor that is relatively straightforward, culminating in a published research report. However, as many researchers know, this is far from the truth. To help students come to appreciate the “exciting” side of the research process, discuss how you became interested in your area of research. Relate the personal process you go through as you formulate and eventually test your research ideas. You may also want to discuss the origin of these research ideas, relating to the various sources of research ideas outlined in the text. Along these lines, there are several books available in which researchers focus on the origins of their ideas and the experiences they had along the way as their research endeavors led them down unexpected and interesting paths.

Brannigan, G. G., & Merrens, M. R. (Eds.). (1992). *The undaunted psychologist: Adventures in research*. New York: McGraw-Hill.

Brannigan, G. G., & Merrens, M. R. (Eds.). (1995). *The social psychologist: Research adventures*. New York: McGraw-Hill.

Merrens, M. R., & Brannigan, G. G. (Eds.). (1996). *The developmental psychologists: Research adventures across the lifespan*. New York: McGraw-Hill.

2. To illustrate the point that research ideas can be found almost anywhere, begin a discussion of current events. You may want to read the headlines from that day’s newspaper to stimulate this discussion. Have students propose explanations for why these events occurred. After discussing several alternative explanations for the same event, have students shape each of these explanations into plausible research ideas suitable for investigation.

3. The text discusses the role of the literature search in the development of a research proposal. As this may be a student’s first exposure to the psychological literature, the student may be unfamiliar with how to critically read a research article. You may want to take this opportunity to discuss the format of the typical journal article, pointing out the purpose of the different sections (i.e., introduction, method, results, and discussion). Appendix A of the text (“Communicating Your Research Findings”) can serve as a guide for this discussion.

One aspect of reading an empirical article that can be particularly frustrating for students is the statistical analyses the author employed to test the hypothesis. This lack of understanding may lead the student’s eyes to “glaze over” when reading the results section, thus missing the major findings of the study. You may want to specifically guide students through a results section of a typical research report explaining how students do not necessarily have to have a sophisticated knowledge of statistics to understand and evaluate the author’s major findings and conclusions.

4. Searching the literature can be a daunting task for the beginning researcher, especially for students unfamiliar with the wealth of resources available to behavioral scientists. You may want to discuss how to effectively use library resources to conduct a literature search. Parr (1988) has



argued that a general instruction on library usage is a necessary first step in teaching students how to do literature searches. Merriam, LaBaugh, and Butterfield (1999) describe the basic, practical library skills that all psychology students should learn in order to be able to conduct effective literature searches. In addition to the brief discussion of how to find and use reference materials in this chapter, Rosnow and Rosnow (2005) have devoted an entire chapter to this topic in their *Writing Papers in Psychology* manual. Rosnow and Rosnow familiarize students not only with general library operation (e.g., how material is catalogued) but also the types of resources that are often available to students in their literature search.

- Merriam, J., LaBaugh, R. T., & Butterfield, N. E. (1999). Library instruction for psychology majors: Minimum training guidelines. In M. E. Ware and C. L. Brewer (Eds.), *Handbook for teaching statistics and research methods (2<sup>nd</sup> ed.)* (pp. 154-157). Mahwah, NJ: Lawrence Erlbaum.
- Parr, V. H. (1996). Course related library instruction for psychology students. In M. E. Ware and D. E. Johnson (Eds.), *Handbook of demonstrations and activities in the teaching of psychology, Vol. 1: Introductory, statistics, research methods, and history* (pp. 132-133). Mahwah, NJ: Lawrence Erlbaum.
- Rosnow, R. L., & Rosnow, M. (2005). *Writing papers in psychology (7<sup>th</sup> ed.)*. Belmont, CA: Wadsworth.

5. As discussed in this chapter, computerized reference databases represent an easy way to search the literature for relevant references. Feinberg, Drews, and Eynman (1996) have suggested that learning to use these databases may have positive effects on students' attitudes towards the library as well as the literature review process itself (see also Cameron & Hart, 1996). However, using computerized reference databases does have disadvantages which should be discussed with your students (Lewis, 1996). For example, the scope of the database may be limited to articles published only during the past 20-30 years. In addition, the success of one's literature search is influenced by the effectiveness of the search strategy one uses. Parr (1996) describes a general search strategy she uses when working with students who are learning to conduct searches using computerized databases.

- Cameron, L., & Hart, J. (1996). Assessment of PsycLIT competence, attitudes, and instructional methods. In M. E. Ware and C. L. Brewer (Eds.), *Handbook for teaching statistics and research methods (2<sup>nd</sup> ed.)* (pp. 157-161). Mahwah, NJ: Lawrence Erlbaum.
- Feinberg, R. A., Drews, D., & Eynman, D. (1996). Positive side effects of online information retrieval. In M. E. Ware and D. E. Johnson (Eds.), *Handbook of demonstrations and activities in the teaching of psychology, Vol.1: Introductory, statistics, research methods, and history* (pp. 136-137). Mahwah, NJ: Lawrence Erlbaum.
- Lewis, L. K. (1996). Bibliographic computerized searching in psychology. In M. E. Ware and D. E. Johnson (Eds.), *Handbook of demonstrations and activities in the teaching of psychology, Vol.1: Introductory, statistics, research methods, and history* (pp.138-140). Mahwah, NJ: Lawrence Erlbaum.

6. One way to motivate your students to learn how to effectively conduct library searches is to use “treasure” or “scavenger” hunts. For example, LeUnes (1988) and Mathews (1988) found that students became more comfortable and efficient with doing literature searches after they learned to use the library to answer specific questions as part of a treasure hunt “game.” For example, who was the author of the chapter on Personality in the 1971 edition of the *Annual Review of Psychology*? What is the library call number of the *Journal of Psychology*? (Mathews, p. 115) Name eight educational/psychological journals that deal with studies on the development of children. What book did John Watson write in 1928 pertaining to child development? (LeUnes, p. 114)

Gardner (1996) describes another strategy for introducing students to the psychological literature. He provides students with a list of clichés and old sayings (e.g., “opposites attract” or “you can’t teach an old dog new tricks”) that they are to treat as research hypotheses. The students are then told to find empirical evidence in the psychological literature that either supports or refutes their cliché or saying. Students are required to submit the abstracts from the articles they locate as well as defend why those particular articles would be useful in either supporting or negating the validity of the cliché or saying. This last component of Gardner’s exercise is a particularly important aspect of this exercise. While students may become adept at locating articles, they are not necessarily able to evaluate the utility of those articles. By being able to locate the relevant literature and understand how that literature either supports or refutes a research hypothesis, students will gain a better understanding of how to write a clear and focused literature review.

Gardner, L. E. (1996). A relatively painless method of introduction to the psychological literature search. In M. E. Ware and D. E. Johnson (Eds.), *Handbook of demonstrations and activities in the teaching of psychology, Vol.1: Introductory, statistics, research methods, and history* (pp. 129-130). Mahwah, NJ: Lawrence Erlbaum.

LeUnes, A. D. (1988). The developmental psychology library search: Can a nonsense assignment make sense? In M. E. Ware and C. L. Brewer (Eds.), *Handbook for teaching statistics and research methods* (pp. 113-114). Hillsdale, NJ: Lawrence Erlbaum.

Mathews, J. B. (1996). “Hunting” for psychological literature: A methodology for the introductory research course. In M. E. Ware and D. E. Johnson (Eds.), *Handbook of demonstrations and activities in the teaching of psychology, Vol. 1: Introductory, statistics, research methods, and history* (pp. 131-132). Mahwah, NJ: Lawrence Erlbaum.

7. To help students learn to identify the independent and dependent variables associated with a research question, have them identify the relevant independent and dependent variables in each question below. Then have them provide an operational definition for each.

1. Do blondes have more fun?
2. Does taking vitamins increase brain power?
3. Does age affect how well you can exercise?
4. Does interacting with relatives cause anxiety?
5. Does living in close quarters increase the desire to hurt others?
6. Does exposure to repeated disappointment result in sadness?
7. Is physical attractiveness related to arrogance?

8. Do children have more behavioral problems when both parents have careers?
9. Do patient people take longer to get to the center of a tootsie roll pop?

### MULTIPLE-CHOICE QUESTIONS

1. According to the philosopher Hans Reichenbach, it is during the \_\_\_\_\_ phase of research that scientists formulate the ideas they pursue using the scientific method.
  - a. empirical
  - b. justification
  - \* c. discovery
  - d. final(24)
  
2. One has entered the \_\_\_\_\_ phase of research when scientists actually begin to test their working hypotheses and logically defend their conclusions.
  - a. discovery
  - b. plausibility
  - c. initial
  - \* d. justification(24)
  
3. In-depth examinations of an individual or group of people with a common identity are examples of
  - \* a. intensive case studies.
  - b. serendipity.
  - c. analogical thinking.
  - d. paradoxical incidents.(26)
  
4. Irving Janis was fascinated by how a group of intelligent men such as President John F. Kennedy and his advisors could make such a disastrous decision when they authorized the ill-fated Bay of Pigs invasion. To find out, Janis began his study of decision-making in groups that eventually led to the phenomenon of “groupthink.” Janis’s hypothesis-generating heuristic could best be described as
  - a. an attempt to resolve conflicting results.
  - \* b. an effort to understand a paradoxical incident.
  - c. an effort to improve on older ideas.
  - d. the use of metaphors.(26-27)
  
5. The inspiration for Robert Zajonc’s research that ultimately led to his theory of social facilitation was
  - a. his desire to improve on older ideas and theories.
  - b. his use of analogical thinking.
  - c. his trying to make sense of a paradoxical incident.
  - \* d. his attempt to resolve conflicting results.(28)

6. While studying possible factors related to heart disease, two cardiologists, Meyer Friedman and Ray Rosenman, noticed that there were discernable differences in behavioral patterns between men who were and were not prone to coronary problems. This observation led to the identification of Type A and Type B personality types. The source of Friedman and Rosenman's initial research idea can best be described as
- a. the use of metaphors.
  - \* b. serendipity.
  - c. resolution of conflicting ideas.
  - d. improvement on old ideas. (30)
7. Material that is difficult to find when conducting a literature review is referred to as
- a. the ancestry literature.
  - b. the PsycINFO literature.
  - c. the "lost" literature.
  - \* d. the fugitive literature. (36)
8. Definitions based on how something will be measured or manipulated are referred to as
- a. theoretical definitions.
  - b. conceptual definitions.
  - c. precise definitions.
  - \* d. operational definitions. (38)
9. A researcher defines frustration as the number of teeth marks a student makes on a pencil while trying to solve a difficult problem. This is an example of a(n)
- \* a. operational definition.
  - b. conceptual definition.
  - c. working definition.
  - d. theoretical definition. (38)
10. Definitions that use abstract or general terms are considered to be
- a. useful definitions.
  - b. working definitions.
  - \* c. theoretical definitions.
  - d. operational definitions. (38)
11. A researcher defines frustration as the negative affect one experiences when trying to solve a difficult problem. This is an example of a(n)
- a. operational definition.
  - b. working definition.
  - \* c. theoretical definition.
  - d. plausible definition. (38)

12. A testable supposition is also referred to as a  
a. theory.  
b. construct.  
\* c. hypothesis.  
d. variable. (40)
13. Linda conjectures that as research participants become more frustrated, they will commit more errors on a timed task. Her conjecture is an example of a  
a. theory.  
b. construct.  
c. research idea.  
\* d. hypothesis. (40)
14. Theories that result in further hypotheses and additional observations are known as \_\_\_\_\_ theories.  
a. coherent  
\* b. generative  
c. parsimonious  
d. working (41)
15. Steve hypothesizes that some behaviors are due to one's astrological sign. Steve's hypothesis most likely violates which criterion for acceptable hypotheses?  
\* a. correspondence with reality  
b. falsifiability  
c. coherence  
d. parsimony (41)
16. Michele hypothesizes that an individual who gets eight hours of sleep, takes a shower, eats a nutritious breakfast, and works under severe time constraints will do worse on a task than an individual who gets eight hours of sleep, takes a shower, eats a nutritious breakfast, but who does not work under the same severe time constraints. Michele's hypothesis violates which criterion for acceptable hypotheses?  
a. correspondence with reality  
b. inclusiveness  
\* c. coherence and parsimony  
d. falsifiability (41)
17. Occam's razor is used to address which criterion for acceptable hypotheses?  
a. falsifiability  
b. comprehensiveness  
c. correspondence with reality  
\* d. coherence and parsimony (41)

18. A researcher who attributes all successes to his treatment but then attributes all failures to another factor has violated which essential criterion for acceptable hypotheses?  
\* a. falsifiability  
b. testability  
c. coherence and parsimony  
d. correspondence with reality (41)
19. An event or condition that a researcher plans to measure or observe is called a  
a. theory.  
b. construct.  
\* c. variable.  
d. hypothesis. (42)
20. In an experiment, one manipulates the \_\_\_\_\_ variable in order to measure its effect on the \_\_\_\_\_ variable.  
a. dependent; independent  
\* b. independent; dependent  
c. theoretical; operational  
d. hypothesis; construct (42)
21. \_\_\_\_\_ is to cause as \_\_\_\_\_ is to effect.  
\* a. Independent variable; dependent variable  
b. Construct; dependent variable  
c. Dependent variable; independent variable  
d. Independent variable; construct (42)
22. Bill is interested in how people react to news of an impending snow storm. He informs subjects that it is going to snow 2, 6, or 12 inches and then assesses their anxiety levels. The different snow forecasts represent the \_\_\_\_\_ variable in this study.  
a. construct  
\* b. independent  
c. control  
d. dependent (42)
23. A waitress is interested in whether providing candy at the end of a meal to her customers can have a positive impact on the tips she receives. She either does or does not provide candy to her customers when she delivers the final check. The waitress then records the amount of the tip she receives from the dining party. What would the act of providing or not providing candy be in this study?  
a. a construct  
\* b. an independent variable  
c. a random variable  
d. a dependent variable (42)

24. Bill is interested in how people react to news of an impending snow storm. He informs subjects that it is going to snow 2, 6, or 12 inches and then assesses their anxiety levels. Anxiety levels represent the \_\_\_\_\_ variable in this study.

- \* a. dependent
- b. conceptual
- c. independent
- d. control

(42)

25. A waitress is interested in whether providing candy at the end of a meal to her customers can have a positive impact on the tips she receives. She either does or does not provide candy to her customers when she delivers the final check. The waitress then records the amount of the tip she receives from the dining party. What would tips be in this study?

- a. a construct
- b. an independent variable
- c. a random variable
- \* d. a dependent variable

(42)

### SHORT ESSAY QUESTIONS

1. What is meant by the “discovery” phase of the research process? How is this different from the “justification” phase?

2. Describe three hypothesis-generating heuristics that scientists may use as the basis of hypotheses for empirical research.

3. Describe the role of the research proposal in the research process.

4. Describe two strategies one may employ when trying to identify studies relevant to one’s research idea.

5. What is the difference between operational and theoretical definitions? Give an example of each.

6. How do hypotheses differ from theories?

7. Describe the three essential criteria for acceptable hypotheses.

8. Why is there no simple classification system for differentiating between variables that are exclusively independent variables and variables that are exclusively dependent variables? Give an example to support your argument.

9. Describe the two general categories of independent variables discussed in the text. Provide an example of each.

