

Chapter 1

Research in the Behavioral Sciences

Chapter Outline

The Beginnings of Behavioral Research

Goals of Behavioral Research

Behavioral Science and Common Sense

The Value of Research to the Student

The Scientific Approach

The Scientist's Two Jobs: Detecting and Explaining Phenomena

Research Hypotheses

Conceptual and Operational Definitions

Proof, Disproof, and Scientific Progress

Strategies of Behavioral Research

Domains of Behavioral Science

Behavioral Research on Human and Nonhuman Animals

A Preview

Key Terms

applied research

a priori prediction

basic research

conceptual definition

correlational research

deduction
descriptive research
empirical generalization
empiricism
evaluation research
experimental research
falsifiability
file drawer problem
hypothesis
induction
methodological pluralism
model
null findings
operational definition
post hoc explanation
pseudoscience
public verification
quasi-experimental research
strategy of strong inference
theory

Course Enhancement Ideas

Establishing Rapport

The instructor of a research methods course must be aware that most students in the

class are not taking the course by choice but rather because they need research methods to fulfill a requirement. Most students would not only prefer to be taking some other course in psychology but are also initially intimidated by methods and statistics. I find that it helps to break the ice on the first day of class by acknowledging that I know how the students feel. I start the first day of class by asking for a show of hands of those students who would have taken research methods over all other courses in psychology if they had a choice. Rarely, if ever, are any hands raised, which then allows me to admit (after feigning hurt at their response) that, as a student, I wasn't thrilled about taking research methods either. I then explain why I and the department believe that research methods is an important course for all majors and minors. I acknowledge that the class might not be as intrinsically appealing as abnormal psychology, social psychology, or human sexuality, but promise to make it as interesting and accessible as possible if the students will do their part in coming to class and keeping up with the assignments. Students seem to appreciate my efforts to address their feelings from the outset.

Behavioral Research in the Media

On the first or second day of class, I bring to class a newspaper or magazine article that reports the results of a behavioral research study. After reading the article aloud, I use it as an opportunity to raise questions about research methodology. How can we tell whether to trust these results? Was the study designed and conducted properly? Were the measures reliable and valid? Were the data analyzed properly, and did the researchers draw appropriate conclusions from their data?

Of course, newspaper and magazine articles do not provide enough detail to answer these questions with any confidence, but students begin to learn (a) which questions to ask about research and (b) that they must be skeptical of research reported in the popular media. I

stress that the research reported in the media spans the entire range from studies that are nearly worthless to studies that are published in the best journals, and that we simply cannot tell from most articles whether the research is valid or not.

Over the course of the semester, I bring other articles to class as I see them in newspapers and magazines, and we spend a few minutes dissecting them. Often, I can find the original journal article on which the popular article was based, which offers the opportunity to critique the study more carefully and to show students that the article in the popular press does not always accurately report what the original study found.

Seeing the Breadth of Behavioral Science

Most students take their first research methods course as sophomores or juniors. Typically, they have had only a few courses in psychology and other behavioral sciences by the time they take methods (and, sometimes, no more than an introductory psychology course). As a result, they usually have a rather narrow view of behavioral science. For this reason, I have included a description of major areas of behavioral science in the book (pages 23-24).

However, I also devote a portion of a lecture during the first week of class to show students the full expanse of behavioral science. In addition to describing each area and giving examples of what each area studies, I talk briefly about the areas of expertise of the faculty members in my department (which includes some areas not shown in Table 1.1 in the book.). Thus, the lecture doubles as an introduction to behavioral research and to our department.

Generating Research Ideas

I want my students to realize early-on that the individuals who conduct behavioral

research are ordinary people much like themselves, and that they (the students) are, in fact, quite capable of doing research. To begin to demystify the research process, I ask students during the first week of class to generate their own research ideas.

I give them Handout #1, which asks them to come up with their own ideas for research. At this point, they are not supposed to design a study but only to develop two research ideas. (I have my students write a research proposal toward the end of the course, but I don't make that assignment until halfway through the course.) Of course, many of the ideas that students generate at first are naive, simplistic, or unimportant, so I also have them evaluate their own ideas according to certain criteria. Most students come away from this exercise seeing that they can come up with interesting ideas.

Getting Ideas for Research

For experienced researchers who have worked on a particular topic for many years, new research questions usually emerge naturally and easily. Many veteran researchers find that they have far more ideas than they will ever have time to investigate. For novice researchers, however, one of the most difficult parts of the research process involves developing a good idea.

Research ideas can come from nearly anywhere. Although ideas must be *tested in* a scientific manner, there is no one “scientific” way to *generate* ideas or to develop hypotheses. Pages 15-16 in your text offer several ways to stimulate ideas for research.

Your assignment is to develop two ideas for research, using any of the tips for generating ideas described on pages 15-16. Try to develop ideas for studies that involve more than simply describing patterns of attitudes, emotions, or behavior. Surveys and other descriptive studies have their uses, but because they don’t examine how variables are related to one another, they seldom enhance our *understanding* of behavioral processes. Your ideas should involve efforts to understand how and why certain variables relate to behavior.

In addition to describing your idea, state one or more hypotheses regarding what you would expect to find. Note that your goal is simply to develop researchable ideas, not to design studies that will test them.

After a researcher comes up with an idea, he or she must evaluate its quality. How do we know whether an idea is a good one to pursue? Although there is no definite answer to this question, you should consider several criteria as you evaluate research ideas:

Does the idea have the potential to advance our understanding of behavior?

Assuming that the study is conducted and the expected patterns of results are obtained, will we have learned something new about behavior?

Is the knowledge that may be gained potentially important? Importance is, of course, in the eye of the beholder. A study can be important in many ways. It can (a) test hypotheses derived from a theory (thereby providing evidence for or against the theory), (b) identify a qualification to a previously-demonstrated finding, (c) demonstrate a weakness in a previously-used research method or technique, (d) document the effectiveness of procedures for modifying a behavioral problem (such as in counseling, education, or industry, for example), or (e) demonstrate the existence of a phenomenon or effect that had not been previously recognized. Rarely does a single study provide earthshaking information that revolutionizes the field, so don't expect too much. Just ask yourself whether this idea is likely to provide information that other psychologists would find interesting or useful.

Do I find the idea interesting? No matter how important an idea might be, it is difficult to do research that one finds boring. If you really don't care about the area and aren't interested in the answer to the research question, consider getting a different topic.

Is the idea researchable? Many research ideas are not viable because they are ethically questionable, because they require resources that the researcher cannot possibly obtain, or because the researcher can not think of any way to design a relevant study.

Complete the following form for each of the research ideas you create.

Research Idea #1

Brief title of idea (e.g., Effects of noise on concentration):

How did you get this idea?

Full description of idea - describe your idea in a few sentences:

Hypotheses - what do predict your results will show?

Evaluation of idea - for each criterion, give your assessment of the idea:

Advances knowledge?

Important?

Interesting?

Researchable?

Research Idea #2

Brief title of idea (e.g., Effects of noise on concentration):

How did you get this idea?

Full description of idea - describe your idea in a few sentences:

Hypotheses - what do predict your results will show?

Evaluation of idea - for each criterion, give your assessment of the idea:

Advances knowledge?

Important?

Interesting?

Researchable?

Test Questions

Multiple Choice Questions

1. Wilhelm Wundt
 - a. was the first clinical psychologist
 - b. began the scientific study of children
 - c. was the father of modern statistics
 - * d. founded one of the first psychological laboratories
 - e. developed the first psychological theory

2. The first psychological laboratory in the United States was established by
 - a. Wilhelm Wundt
 - b. James McKeen Cattell
 - c. G. Stanley Hall
 - d. John Watson
 - * e. William James

3. The individual who is usually credited with starting the scientific study of behavior and mental processes was
 - a. Sigmund Freud
 - b. William James
 - c. John Watson
 - * d. Wilhelm Wundt
 - e. B. F. Skinner

4. Research that is conducted to enhance our understanding of behavior without regard for the immediate application of this knowledge is

- a. descriptive research
- b. applied research
- * c. basic research
- d. empirical research
- e. conceptual research

5. An industrial-organizational psychologist who has been hired to study the causes of low morale at a particular manufacturing plant is probably conducting

- * a. applied research
- b. developmental research
- c. post hoc research
- d. basic research
- e. action research

6. Research that uses behavioral research methods to investigate the effects of social and educational programs is called

- * a. evaluation research
- b. prediction research
- c. basic research
- d. pseudoscientific research
- e. intervention research

7. Whether a particular area of study is considered scientific depends on

- * a. the methods it uses
- b. the topics it studies

- c. the accuracy of its findings
 - d. its use of statistics
 - e. all of the above
8. Which of the following is *not* a criterion of scientific investigations?
- a. problems must be solvable
 - b. observations must be conducted systematically
 - * c. researchers must agree regarding how data should be interpreted
 - d. research findings must be publicly verifiable
 - e. conclusions must be based on empirical observation
9. How does the scientific observation of events differ from everyday observation?
- a. scientific observations are always correct
 - * b. scientific observations are structured in a systematic fashion
 - c. scientific observations use highly specialized equipment
 - d. scientific observations are made by people who have a Ph.D.
 - e. scientific observations may be interpreted in only one way
10. Empiricism refers to the practice of relying on _____ to draw conclusions.
- a. statistics
 - b. experts
 - * c. observation
 - d. basic research
 - e. deduction
11. How does pseudoscience differ from true science?
- a. pseudoscientific ideas are wrong

- b. pseudoscience is conducted by people without scientific degrees
- * c. pseudoscience violates the central criteria of true science
- d. pseudoscience is not empirical
- e. all of the above

12. Concluding that aliens have visited Earth on the basis of one person's report fails to support which criterion of science?

- a. empiricism
- * b. public verifiability
- c. solvability
- d. statistical analysis
- e. none of the above

13. A set of propositions that attempts to specify the interrelationships among constructs is a (an)

- * a. theory
- b. pseudoscientific proposition
- c. deduction
- d. operational definition
- e. post hoc explanation

14. Reasoning from general propositions to specific implications of those propositions involves the process of

- a. operationism
- b. induction
- c. conduction
- d. post hoc analysis

* e. deduction

15. When researchers derive research hypotheses from a theory, they use

a. induction

b. operational definitions

c. empiricism

* d. deduction

e. verification

16. A model differs from a theory in that it

a. explains why a particular effect occurs

b. is constructed from physical objects

c. can not be tested by research

d. is less strongly supported by empirical evidence

* e. explains how but not why concepts are related

17. A specific proposition that logically follows from a theory is a (an)

a. induction

* b. hypothesis

c. empirical generalization

d. post hoc explanation

e. model

18. Deriving a general explanation from specific facts involves

* a. induction

b. operationism

c. a priori reasoning

- d. post hoc analysis
- e. deduction

19. Empirical generalizations are

- a. facts
- b. models
- * c. hypotheses
- d. definitions
- e. theories

20. Empirical generalizations are

- * a. induced from observed results
- b. deduced from theories
- c. inferred from models
- d. generalized from assumptions
- e. created from nothing

21. Hypotheses must be stated in such a way that they are

- a. induced
- b. proven
- c. post hoc
- * d. falsifiable
- e. definable

22. Some philosophers of science have suggested that the defining characteristic of science is its emphasis on

- a. statistics

* b. falsifiability

c. deduction

d. philosophy

e. experimentation

23. An explanation that is developed after obtaining a particular result is called

a. inductive

b. deductive

* c. post hoc

d. a priori

e. operational

24. An *a priori* hypothesis is

a. scientifically valid

b. logically valid

c. pseudoscientific

* d. made before collecting data

e. not falsifiable

25. Operational definitions differ from conceptual definitions in that operational definitions are

a. more general

* b. specific to a particular research context

c. more similar to dictionary definitions

d. not used in scientific research

e. more vague

26. Which of the following would be an operational definition of “anxiety”?

- a. a participant's score on an anxiety scale
 - b. a researcher's rating of how anxious a participant appears
 - c. a physiological measure of anxious arousal
 - d. the frequency of "nervous" behaviors, such as fidgeting
 - * e. all of the above are operational definitions of anxiety
27. Although theories can never be _____, they can be _____ by the results of a particular research study.
- a. proved; disproved
 - b. disproved; proved
 - * c. proved; supported
 - d. tested; falsified
 - e. falsified; proved
28. Scientific proof is impossible for _____ reasons.
- * a. logical
 - b. practical
 - c. statistical
 - d. operational
 - e. experimental
29. Given that theories can not be proved nor disproved by the results of a research study, how does scientific knowledge advance?
- a. it doesn't
 - b. on the basis of null findings
 - * c. on the basis of accumulated evidence over many studies
 - d. through logic

e. through experimentation

30. A researcher who was applying the strategy of strong inference would design studies that

a. proved a theory

b. generated null findings

c. used many different research methods

d. evaluated social or educational programs

* e. tested hypotheses of two or more competing theories

31. The practice of using many different methods and designs to test theories is called

a. strong inference

* b. methodological pluralism

c. operationism

d. deductive research

e. evaluation research

32. Null findings are results of a study that

a. disconfirm the researcher's hypothesis

b. confirm a common sense hypothesis

* c. reveal no relationships among the variables being studied

d. are dismissed as invalid by the scientific community

e. are pseudoscientific

33. Null findings are often uninformative regarding the hypothesis being tested because they

a. indicate that the study is flawed

b. are not based on empirical observation

* c. may be the result of a poor research design

- d. prove rather than falsify the hypothesis
- e. are not verifiable

34. A researcher measured the public's attitudes toward nuclear power after a nuclear accident. This is an example of _____ research.

- a. correlational
- b. post hoc
- c. experimental
- * d. descriptive
- e. none of the above

35. A researcher was interested in the effects of caffeine on memory. After administering various doses of caffeine to participants, she gave participants a test of memory. This is an example of _____ research.

- a. correlational
- b. post hoc
- * c. experimental
- d. descriptive
- e. none of the above

36. A researcher was interested in whether extraversion is related to drug use. He administered a measure of extraversion, along with a questionnaire regarding drug use, to 200 respondents, then looked at the relationship between the scores on the two measures. This is an example of _____ research.

- * a. correlational
- b. post hoc
- c. experimental

- d. descriptive
- e. none of the above

36. In an experiment, the variable that is manipulated by the researcher is the _____ variable.

- * a. independent
- b. control
- c. empirical
- d. dependent
- e. operational

37. In an experiment, the variable that is measured is the _____ variable.

- a. independent
- b. control
- c. empirical
- * d. dependent
- e. operational

38. When researchers are interested in studying the effects of a variable that they can not control, they use _____ designs.

- a. experimental
- b. pseudoscientific
- * c. quasi-experimental
- d. descriptive
- e. operational

39. Research that involves the description, measurement, and explanation of psychological

differences among people is most likely to be conducted within

- * a. personality psychology
- b. developmental psychology
- c. social psychology
- d. clinical psychology
- e. cognitive psychology

40. A researcher who studies the relationship between processes occurring in the nervous system and behavior is most likely to be a (an)

- a. cognitive psychologist
- b. personality psychologist
- c. clinical psychologist
- * d. physiological psychologist
- e. educational psychologist

Matching

Match each domain of behavioral science on the left to its description on the right.

- | | |
|-------------------------------|--|
| _____ 1. Social psychology | a. Processes involved in learning, and the development of methods and materials for educating people |
| _____ 2. Clinical psychology | b. Description, measurement, and explanation of psychological differences among individuals |
| _____ 3. Cognitive psychology | c. Description, measurement, and explanation of age-related changes in |

behavior, thought, and emotion

- | | |
|---|---|
| _____ 4. Educational psychology | d. Basic psychological processes, including learning and memory, sensation, perception, motivation, language, and physiological processes |
| _____ 5. School psychology | e. Relationship between bodily structures and processes and behavior |
| _____ 6. Family studies | f. Thinking, learning, and memory |
| _____ 7. Developmental psychology | g. Behavior in work settings |
| _____ 8. Industrial-organizational psychology | h. The influence of social environments (particularly other people) on behavior, thought, and emotion |
| _____ 9. Personality psychology | i. Causes and treatment of emotional and behavioral problems |
| _____ 10. Psychophysiology | j. Intellectual, social, and emotional development of children, particularly as it affects performance and behavior in school |
| _____ 11. Experimental psychology | k. Relationships among family members; family influences on child development |

Answers to matching: 1-H, 2-I, 3-F, 4-A, 5-J, 6-K, 7-C, 8-G, 9-B, 10-E, 11-D

Short Answer Questions

1. In what sense is psychology both a science and a profession?
2. What was Wilhelm Wundt's contribution to scientific psychology?
3. Who established the first psychological laboratory in the United States?
4. What are the four primary functions of behavioral research?
5. Distinguish between basic and applied research. Why is the distinction between basic and applied research a somewhat misleading one?
6. What three characteristics must be met in order for an investigation to be considered scientific?
7. Why is empiricism the central criterion of scientific investigation?
8. How can one tell whether a particular claim is pseudoscientific?
9. What are the two primary activities of all scientists?
10. What is a theory? Give an example.
11. Why can theories not be tested directly?
12. Where do researchers get hypotheses for research?
13. Distinguish between induction and deduction.
14. What is an empirical generalization?
15. Why must hypotheses be stated in such a way that they are falsifiable?
16. Why are a priori predictions more convincing than post hoc explanations?

17. What is an operational definition?
18. Propose three operational definitions of shyness.
19. Why is it impossible to prove a theory?
20. Why is it impossible to disprove a theory?
21. Given that theories cannot be proved or disproved by a single study, how does science advance?
22. What is the strategy of strong inference?
23. Using the idea of the scientific filter, discuss how science separates valid from invalid ideas about the nature of the world.
24. Why are scientific journals reluctant to publish null findings?
25. How does quasi-experimental research differ from experimental research
26. For each research question below, tell whether the most appropriate research strategy involves descriptive, correlational, experimental, or quasi-experimental research.
 - a. Do children who have high self-esteem perform better in sports than children with low self-esteem?
 - b. In what percentage of American families do husbands take more responsibility for the children than wives?
 - c. Which of two drugs is more effective in reducing schizophrenics' hallucinations?
 - d. Did Hurricane Katrina cause an increase in stress-related disorders among residents of the Gulf Coast after it struck in 2005?
 - e. Does a partial reinforcement schedule result in slower extinction of behavior than a schedule that reinforces every response?

25. Tell what researchers in each of these domains of behavioral science study.

- a. neuroscience
- b. school psychology
- c. social psychology
- d. cognitive psychology
- e. community psychology