

Chapter 2. The Research Process: Coming to Terms

CHAPTER OVERVIEW

The purpose of this chapter is to engage students in formulating research questions that seek to find solutions. Students will learn some of the basic terms and concepts associated with the research process, such as research methods, types of variables, hypotheses, the sample versus the population, and the concept of significance.

OBJECTIVES

At the conclusion of this chapter, students should be able to:

- Describe the research process from formulating questions to seeking and finding solutions.
- Describe the difference between dependent and independent variables.
- Identify other types of variables that may interfere with the research process.
- Define a hypothesis and describe how it works.
- Discuss the value of the null hypothesis.
- Describe the difference between a null hypothesis and a research hypothesis.
- List the characteristics of a good hypothesis.
- Explain the difference between a sample and the population.
- Define statistical significance and explain its importance.

CHAPTER OUTLINE

- I. From Problem to Solution
- II. The Language of Research
 - A. All About Variables

- 1) Dependent Variables
 - 2) Independent Variables
- B. The Relationship between Independent and Dependent Variables
- C. Other Important Types of Variables
 - 1) Control Variables
 - 2) Extraneous Variables
 - 3) Moderator Variables
- III. Hypotheses
 - A. The Null Hypothesis
 - B. The Research Hypothesis
 - 1) The Nondirectional Research Hypothesis
 - 2) The Directional Research Hypothesis
- IV. Differences Between the Null Hypothesis and the Research Hypothesis
- V. What Makes a “Good” Hypothesis?
 - A. Declarative in form
 - B. Posits an expected relationship
 - C. Based on theory
 - D. Brief and to the point
 - E. Testable!
- VI. Samples and Populations
- VII. The Concept of Significance

IMPORTANT TERMS

1. Variable
2. Measurement
3. Dependent Variable
4. Independent Variable
5. Control Variable
6. Extraneous Variable
7. Moderator Variable
8. Treatment Variable
9. Factorial Design
10. Confounding
11. Null Hypothesis
12. Chance
13. Research Hypothesis
14. Directional Research Hypothesis
15. Nondirectional Research Hypothesis
16. Population
17. Sample
18. Statistical Significance
19. Significance Level

LECTURE & DISCUSSION QUESTIONS

1. According to the text, independent variables should be independent of one another. Why is this an important part of examining the relationship between independent and dependent variables? Provide an example of how independent variables that are related may confound research findings.
2. Discuss the characteristics of a good research hypothesis. What distinguishes a null hypothesis from a research hypothesis? How would you explain the difference between nondirectional research and directional research hypotheses?
3. Why is it impossible for researchers to be 100 percent confident that the differences found between groups in a study were due to the hypothesized reason? How might a good scientist go about reducing the risk that some other competing reason (other than the variables of interest) is influencing the variables in a study? An example might be the

polling results vs. the election results comparing two groups (McCain voters and Obama voters) for the 2008 Presidential election.

CLASS ACTIVITIES

1. When introducing the different types of variables, you may choose to reference Table 2.1 in the text, which will provide students with definitions of dependent, independent, control, extraneous, and moderator variables. In addition, this table will introduce students to other terms often associated with these types of variables.
2. The crossword puzzle that ends chapter 2 of this manual may be used to initiate class discussion and/or review key vocabulary terms that relate to the various aspects of the research process (see Appendix A for answer key).
3. In order to introduce types of research designs, refer to Figure 2.1, a single factor design. Ask students to identify the number of independent variables and the number of levels associated with the independent variables. What is the dependent variable of interest?
4. To illustrate the concept of factorial designs, refer to Figure 2.2 and discuss the differences between factors and levels of each factor. Have students generate their own factorial designs by drawing an experimental design that has at least three independent variables (i.e., factors) with 2 to 3 levels each. Be sure to have them also indicate the dependent variable of interest. This makes for a great quiz item!

ADDITIONAL RESOURCES

Nickerson, R.S. (2000). Null hypothesis significance testing: a review of an old and continuing controversy. *Psychological Methods*, 5(2), 241-301.

Raktoe, B.L., Hedyat, A., & Federer, W.T. (1981). *Factorial Designs*, New York, NY: John Wiley & Sons, 2001.

- Vitaro, F., Brendgen, M., & Tremblay, R.E. (2000). Influence of deviant friends on delinquency: Searching for moderator variables. *Journal of Abnormal Child Psychology* 28(4), 313-325.
- Corina, J.M & Dunlap, W.P. (1997). On the logic and purpose of significance testing. *Psychological Methods* 2(2), 161-172.
- Daniel, L.G. (1998). Statistical significance testing: A historical overview of misuse and misinterpretation with implications for the editorial policies and educational journals. *Research in the School* 5(2), 23-32.

