

## **Chapter 1. Overview of Behavioral Research**

### **The Excitement of Behavioral Research**

#### **Purpose**

*Skills as a Researcher*

*Skills as a Consumer of Research*

#### **Science**

#### **Research**

*Types of Questions*

*Ways of Answering Questions*

*Ways of Reporting Answers*

#### **Summary**

## **The Excitement of Behavioral Research**

It happened in a stairwell closet on a summer's day in 1984. The closet was located in the main building of Hubb's Sea World Research Institute in San Diego, California, and it was the only available location for conducting research that was relatively free from distracting light and sound. As the hungry Blue-fronted Amazon parrot turned in the modified Skinner box toward the front wall, I instantly pressed a button that I held in my nervous hand. A food tray immediately became available, and the hungry parrot quickly grabbed a small nut in his beak before the tray swung away. I continued to reward the parrot first for facing and then for moving closer to a small circular disk on the front wall of the box. On this occasion the desired outcome was to get the parrot to press the disk with his beak in order to close an electric microswitch that would automatically raise the food tray. I experienced momentary setbacks (at one point the parrot began turning circles!), and I knew that motivation (hunger level) of the parrot was diminishing. But the magical moment did arrive. The parrot touched the disk with his beak, and I immediately pressed the button in my now sweaty hand. A few trials later, the parrot was pressing the disk to receive food. Yes!!! I had done it!

That day in the closet was one of the most influential moments for an undergraduate student who is now one of the authors of your textbook (Lammers). Both a parrot and a career as a behavioral researcher were shaped that day. The story illustrates both the excitement and the challenge of conducting behavioral research. The challenge can only be met by understanding the concepts of research methodology and how best to use research design strategies to answer questions about behavior. We hope that our textbook provides you with both the spark of enthusiasm and the tools necessary for the systematic exploration of behavior.

## **Purpose**

Knowledge of research design is a universal requirement for students studying in the behavioral sciences. We have written a book that focuses on fundamental research methods and procedures that we believe are common to most courses in research design. Basic principles of research methodology are the core of the book. The particular topic areas within psychology that are used to illustrate these principles vary across different disciplines within psychology. At times, our examples represent basic research in learning, cognition, social behavior, development, and physiology; at other times, they represent applied research in clinical, counseling, industrial/organizational, and human factors psychology. (A more detailed discussion of basic versus applied research is presented in Chapter 3). Our purpose is to walk the learner through the research process, including the development of a research question, collection of data,

analysis of data, and report writing. The intention is to provide students with the necessary knowledge to evaluate research, to do research, and to appreciate its importance.

### ***Skills as a Researcher***

One purpose of the book is to introduce you to the basic skills necessary for you to conduct quality research. If you pursue a career in an area of research, these basic skills will provide the foundation upon which your future training will be built. You will have the tools needed to explore the mysteries of human behavior and thought. It is likely that most students reading this book are unsure of their future and have given little consideration to the possibility of being a researcher. That's fine. Part of the purpose of this book is to introduce you to this possible career choice. But even if your career choice is not that of a researcher, there are often opportunities to do research. For example, let's assume you get a job as a manager of a department store. You have an idea for a new approach to advertising, an approach that you believe will be more effective than the one that has been used in the past. Rather than making a subjective assessment or simply having faith that your approach will be better, you have a perfect opportunity to make systematic comparisons between the two approaches, collect data (such as sales), and analyze the results. These types of opportunities to answer real-world questions in an empirical way are used far too infrequently.

### ***Skills as a Consumer of Information***

Although there are many opportunities to conduct research, it is entirely possible that you will never do so. However, we are all consumers of information. We are bombarded with information from radio, television, magazines, and the Internet that inform us of this or that new finding. Should we believe it? Should we change our lifestyle because of something we hear? These are decisions that we make every day. One purpose of this book is to help you become a critical consumer of information. For example, while waiting in the doctor's office, you pick up a copy of *Better Homes and Gardens*. This particular issue reports the results of a survey that the magazine conducted to assess attitudes toward the role of women in the workplace. Should you believe the findings? Here's where you need to be critical and ask yourself questions. Who was surveyed—readers of *Better Homes and Gardens*? How were they surveyed? How many were surveyed? How many of those who read the survey completed it and returned it? Could the answers to these questions influence the results?

## **Science**

Part of the previous example relates to our ability to recognize science when we see it. What makes a discipline scientific? What makes a particular study scientific? Why do we call certain fields *sciences*?

Even in the traditional sciences like biology, physics, and chemistry, these questions are often not addressed. There are certain assumptions and methodologies that characterize science, and it is these characteristics that separate scientific knowledge from other forms of knowledge. It is important that we understand these distinctions, whether we want to do research or want to be an intelligent consumer of information.

## **Research**

### *Types of Questions*

The types of questions that we ask are at the heart of how we gain new knowledge in the behavioral sciences. First and foremost, our questions must be empirical questions. We must be able to answer them by making observations. If you begin to contemplate the various empirical questions that you could ask about human behavior and thought, you begin to realize that the possibilities are nearly infinite. Although our knowledge about behavior has grown enormously over the years, there are many things that we do not yet know.

Some of the questions that we might contemplate relate to the possible effect of one variable on another. For example, we might ask whether sleep deprivation causes memory impairment, whether the drug secretin causes an improvement in autistic children, whether the color of the walls affects worker productivity, or whether violence on television causes more aggressive behavior in children. In other cases, our questions may simply ask whether there is a relationship between two variables. For example, we might ask whether children's intelligence is related to parents' intelligence, whether time spent studying per week is related to a college student's grade point average, whether the attractiveness of an individual is related to the likelihood that someone will help her, or whether a person's personality is related to his likelihood of experiencing cardiovascular disease.

### *Ways of Answering Questions*

Experimental methods are used to answer cause-effect questions, whereas nonexperimental methods are used to answer the relational questions. Experimental methods enable the researcher to control the environment and manipulate the variable of interest. To assess whether sleep deprivation causes memory impairment, the researcher would decide who gets deprived of sleep, when they get deprived of sleep, for how long they are deprived of sleep, and where they get deprived of sleep. The researcher would decide what type of memory test to use, when they receive the memory test, how they receive the memory test, and where they receive the memory test. This extensive level of control is the hallmark of the experimental method and allows the researcher to draw powerful cause-effect conclusions.

Nonexperimental methods are often necessary when the research question does not permit such extensive control or when ethical issues are involved. To understand how personality relates to cardiovascular health, the researcher cannot control or manipulate the personality of an individual (except, perhaps, with the short-term effects of drugs). The researcher can measure both the personality of people and the cardiovascular health of people and determine whether there is a relationship. Assuming there is a relationship, does this imply that personality caused cardiovascular disease? As we will emphasize later in the book, one limitation of nonexperimental methods is that the researcher can conclude that there is a relationship between variables but cannot conclude that one variable caused a change in the other variable.

### ***Ways of Reporting Answers***

We have not truly completed the scientific process until we have analyzed, interpreted, and presented our data to the scientific community. How do we know whether our observations support our research hypothesis? We can certainly look at the raw data that have been collected. But there is usually some level of ambiguity. Perhaps some participants clearly show the expected pattern of results, others show no changes, and still others show a pattern opposite of what was expected. How does the researcher arrive at a conclusion that is not inherently subjective? How can the researcher be objective so that other researchers agree with the conclusion?

The field of mathematics provides objectivity. There is no subjectivity in deciding that  $2 + 2 = 4$ . Therefore, we can apply mathematical principles to the data we have collected to help us arrive at a conclusion with which other scientists would agree. Statistics involve the application of mathematical principles to research data. Descriptive statistics provide ways of describing and summarizing data (often in graphical form) so that the data can talk to us and reveal answers to our research questions. Inferential statistics are then often used to determine whether the patterns we may see are reliable and not simply due to chance.

After we have arrived at our conclusions, we must share the results with the scientific community. There are numerous levels at which this can occur. The researcher can give a talk or present a poster at a scientific conference. The researcher can publish the report in a journal or book. This process is not limited to university professors with PhDs. In fact, no degree is required to do any of the activities just described. Students have the same opportunities to present or publish their research. In fact, there are opportunities specifically designated for students. Most scientific conferences have sessions designated for student research. Some have awards for the best student presentations. There are even conferences just for student research. One example is the Arkansas Symposium for Psychology Students. In this setting, students can present their research findings to a group of fellow students. Finally, several journals restrict

their submissions to individuals who have conducted research as undergraduates. Examples of these include the *Psi Chi Journal of Undergraduate Research* and the *Journal of Psychological Inquiry*. All of these provide wonderful opportunities for students to contribute to the field of psychology.

## Summary

This chapter provided an overview of the fundamentals of research in the behavioral sciences. The book is organized to provide a logical development of the tools you will need to conduct research. Table 1.1 summarizes the steps in the research process. These steps are elaborated in the chapters that follow. Science provides the framework of methods and assumptions necessary to be confident about the knowledge gained. The methods begin with knowing how to ask effective research questions. After the questions are developed, variables must be defined, observed, and measured in valid and reliable ways. The researcher must be aware of the many unmeasured variables that can influence participant behavior and confuse interpretation of the observations. Awareness of these extraneous variables leads to a decision to use specific research methods to reduce their influence. In some studies, the researcher can conduct true experiments and exert high levels of control, whereas in other studies the researcher must resort to nonexperimental methods. All of the methods involve making observations and interpreting data. Statistics provide a tool to objectively analyze the data and arrive at conclusions. Conclusions are then made public through presentations and publications.

**Table 1.1** Steps in the Research Process

1. Consider what area of psychology fascinates you.
2. Read the literature in this area.
3. Develop a specific and testable research question.
4. Decide who will be the participants.
5. Decide on the most appropriate method to answer the question.
6. Consider ways to reduce the influence of extraneous variables.
7. Consider the ethical issues involved.
8. Obtain ethics approval from a review board.
9. Finalize the specific procedures that will be used.
10. Obtain informed consent from participants.
11. Collect data by making observations.
12. Use descriptive statistics to describe the data.
13. Use inferential statistics to arrive at a conclusion.
14. Consider the implications of your findings.
15. Present your findings to the scientific community.

Learning these fundamentals is analogous to taking a hike. Before you set out down the path, it is important to look at a topographical map, to get your bearings, and to see the forest before the trees. It will be much work. There will be peaks and valleys. But in the end there will be a sense of accomplishment. Let's put on our hiking boots and get started.