# Mass Media Research

AN INTRODUCTION

Roger D. Wimmer
Joseph R. Dominick

Sixth Edition

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# Mass Media Research

## An Introduction

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Roger D. Wimmer

*Wimmer-Hudson*
*Research & Development*

Joseph R. Dominick

*University of Georgia*

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*To Shad, Jeremy, and Meaghan*
*—they continue to keep us in debt.*

# Preface

In the preface to each edition of our book, we have stated that the mass media are constantly changing. This continues to be true today. Keeping up with the changes in the media is a daily task. For example, *consolidation* has changed radio because companies can now own several radio stations in one market. Satellite delivery has changed television because viewers now have more programming choices. The accessibility to the print media on the Internet has changed the reading habits for millions of people. And the Internet has changed how mass media researchers conduct their work. These changes and more have created an exciting time in mass media research.

As in our previous editions, our goal is to introduce you to mass media research. In this edition, we have made changes based on comments from teachers, students, and media professionals who have used our book. All of the chapters have been updated, the chapters are now arranged in a more logical order, and there is a new chapter on Internet research. In addition, although the Internet is still in its infancy, we wanted to take advantage of it and we have made our book "Internet ready."

Throughout the book, we include web sites, search engine suggestions, and InfoTrac® references for you to examine for further information. These suggestions were current as of early 1999. However, since the World Wide Web changes daily, some of the suggestions and sites may be relocated or even abandoned. If that is the case, take time to search for related sites—the Internet is an information gold mine.

We would like to thank the following colleagues for their feedback on this edition: David H. Goff, University of Southern Mississippi; Charles "Rick" Houlberg, San Francisco State University; Michael Ryan, University of Houston; and James D. Whitfield, Northeast Louisiana University. In addition, we would like to thank our editor at Wadsworth, Karen Austin, for her support and encouragement.

As we have stated in the previous five editions: If you find a serious problem in the text, please contact one of us. Each of us will steadfastly blame the other for the problem and will be happy to give you his home telephone number (or forward any e-mail).

Have fun with the book. The mass media research field is *still* a great place to be!

*Roger Wimmer*
*Denver, Colorado*
*rogerwimmer@home.com*
*www.wimmer-hudson.com*

*Joseph Dominick*
*Athens, Georgia*
*joedom@arches.uga.edu*

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# Part One

# The Research Process


1 *Science and Research*

2 *Research Procedures*

3 *Elements of Research*

4 *Research Ethics*

5 *Sampling*

Chapter 1

# Science and Research

- *Why Should We Learn About Research?*
- *Getting Started*
- *The Development of Mass Media Research*
- *Media Research and the Scientific Method*
- *Characteristics of the Scientific Method*
- *Research Procedures*
- *Two Sectors of Research: Academic and Private*
- *The Internet*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

At some point in our lives most of us have heard someone say, "Some things never change." This statement is particularly appropriate to the average person's perception of mass media research. Based on our experience, we think that the perception of research is the same today as it was in 1979, when the first edition of this book was published. What is the perception of mass media research?

In the introduction to their book, *No Way: The Nature of the Impossible,* Davis and Park (1987) state:

- It is impossible to translate a poem.
- It is impossible for the president of the United States to be less than 35 years old.
- It is impossible to send a message into the past.
- It is impossible for a door to be open and closed simultaneously.

In reference to research, some people would add:

- It is impossible to learn how to conduct mass media research.

Davis and Park address the nature of the impossible in several areas. Their book is a collection of essays by authors who explain how some seemingly impossible statements and situations are not what they appear to be. For example, Davis and Park say that the last item in their list (the open/closed door) sounds like pure logic, but it isn't. A revolving door is evidence that the "pure logic" is incorrect. We contend that "it is impossible to learn how to conduct mass media research" may sound like pure logic, but it isn't. What is required is an understanding of the basics of research.

## Why Should We Learn About Research?

Regardless of how the word *research* is used, it essentially means the same thing: *an attempt to discover something.* We all do this every day. This book discusses many of the different *attempts* used to *discover something* in the mass media. It's that simple.

Research can be very informal with few, if any, specific plans or steps, or it can be formal with the researcher following highly defined and exacting procedures. Keep in mind, however, that the lack of exacting procedures in informal research does not mean that the approach is *incorrect.* Also note that the use of exacting procedures does not automatically make formal research *correct.* Both procedures can be both good and bad. The important thing for any researcher (formal or informal) to understand is the *correct approach* to follow to ensure the best results.

Most people who conduct research are not paid for their efforts. Although the research industry is an excellent field to enter, our approach in this book is to assume that most of you who read this material will not become (or are not now) paid professional researchers. We assume that most of you will work (or are already working) for companies and businesses that use research, or you are merely interested in finding out more about the field. With these ideas in mind, our approach is to explain what research is all about, to show you how to use it to discover something, and to make your life just a bit easier when a research report is put on your desk for you to read or when you face a question that needs to be answered.

Now, back to the idea that all of us are researchers and conduct research every day. Remember that we define research as *an attempt to discover something*. Every day each of us conducts hundreds or thousands of "research projects." We're not being facetious here. Just consider the number of things you must analyze, test, or evaluate in order to perform daily tasks:

1. Set the water temperature in the shower so you do not freeze or burn.
2. Decide which clothes to put on that are appropriate for the day's activities.
3. Select something to eat for breakfast that will stay with you until lunchtime.
4. Decide what time to leave the house to reach your destination on time.
5. Figure out the most direct route to your destination.
6. Decide whether you should pull over to the side of the road if you hear a siren.
7. Judge how loud to talk to someone.
8. Estimate how fast you need to walk to get across the street and beat the traffic.
9. Evaluate the best way to tell a friend about a problem you have.
10. Figure out when it is time to go home.

The list may seem mundane and boring, but the fact is that when we make any of these decisions, we have to conduct a countless number of tests. We all make numerous *attempts to discover something* in order to reach a decision about these events.

In essence, all of us are researchers already. This begs the question: Then why read this book? The reason is that there are good ways to attempt to discover something and there are not-so-good ways to attempt to discover something. This book discusses both the good and the bad so you will be able to distinguish between the two. Even if you do not plan to become a paid professional researcher, it is important to learn the best way to collect information and analyze it. Why? Quite simply, because we have already tested the idea and know it to be true.

Do not take only our word that understanding research is valuable. Consider what some people in the media say about research. Larry Barnes, President of Media Resources, Ltd., a Canton, Ohio, supplier of print-based promotions and advertising services, says:

> Research arms us with the best sales tool in the world—instant credibility. The customers we visit are busy with their own responsibilities, and oftentimes our sales call is perceived as an intrusion. When these customers see the basic research we have conducted for them and how it will help them make money, we are immediately considered to be experts in our field and are no longer considered to be an intrusion.

In the radio field, Bob Neil, President/CEO of Cox Radio, Inc., in Atlanta, Georgia, says:

> When I first started in radio, the notion of research was a new idea. In the late 70s and early 80s, very few stations took the time or spent the money to find out what the audience really wanted. I quickly became fascinated with research because, as a Program Director, there were so many questions I wanted to ask.
>
> Radio is simply a product, not unlike any other product, and if you are going to succeed, you need to understand who your target is. The only way to do that is through research.

David Hall, Program Director for KFI-AM in Los Angeles, California, takes a somewhat more basic approach:

> I work in a business in which I am responsible for knowing what 2 million people like and don't like when they listen to the radio, a product they can neither see nor touch. In fact, it's a product they don't even know they think about. Research is invaluable to me because I'm such a geek that if I put on my radio station what I like, our station would have an audience of about 10 people in a city of 10 million.

The underlying theme presented by these three professionals highlights the business philosophy followed by the senior author for the past 16+ years as a paid professional researcher. That is, there are three basic steps to success in business (and for that matter, every facet of life):

1. Find out what the people want (customers, audience, readers, family).
2. Give it to them.
3. Tell them that you gave it to them.

Failure is virtually impossible if the three-step philosophy is followed. How can you fail when you give people what they ask for? The way to find out what people want is through research, and that is what this book is all about.

## ▪ Getting Started

Keep in mind that the focus of this book is to discuss *attempts to discover something* in the mass media. Although it would be valuable to address other fields of endeavor, this chapter contains discussions of the development of *mass media* research during the past several decades and the methods used to collect and analyze information. It also includes a discussion of the scientific method of research. The purpose of this chapter is to provide a foundation for the topics discussed in greater detail in later chapters.

Two basic questions a beginning researcher must learn to answer are (1) *how* to use research methods and statistical procedures and (2) *when* to use research methods and statistical procedures. Although developing methods and procedures is a valuable task, the focus for most researchers should be on applications. This book supports the tasks and responsibilities of the *applied data analyst* (researcher), not the statistician; it does not concentrate on the role of the statistician because the "real world" of mass media research does not require specific knowledge of statistics. Instead, the "real world" requires an understanding of what the statistics produce and how to use the results in decision making. After conducting thousands of mass media research studies for more than 25 years, we have concluded that those who wish to become mass media researchers should spend time learning *what to do with the research methods, not how they work*. (There are more than 69,000 entries in an Internet search for "research methods.")

Although both statisticians and researchers are involved in producing research results, their functions are quite different. (Keep in mind that one person sometimes serves in both capacities.) What do statisticians do? Among other complex activities, they generate statistical procedures, or formulas, called **algorithms**; then researchers use algorithms to investigate research questions and hypotheses. The results of this cooperative effort are used to advance our understanding of the mass media.

For example, users of radio and television ratings (mainly produced by The Arbitron Company and A. C. Nielsen) continually complain about the instability of ratings information. The ratings and shares for radio and television stations in a given market often vary dramatically from one survey period to the next without any logical explanation (see Chapter 15). Users of ratings periodically ask statisticians and the ratings companies to help determine why this problem occurs and to offer suggestions for making syndicated media audience information more reliable. As recently as the spring of 1996, media statisticians recommended larger samples and more refined methods of selecting respondents to correct the instability. Although the problems have not been solved, it is clear that statisticians and researchers can work together. (Search the Internet for "statisticians" to find out the variety of tasks these people perform.)

Since the early part of the 20th century, when there was no interest in the size of an audience or in the types of people who make up the audience, mass media leaders have come to rely on research results for nearly every major decision they make. As stated in the first edition of this book, the increased demand for information has created a need for more researchers, both public and private. And within the research field are many specializations. Research directors plan and supervise studies and act as liaisons to management, methodological specialists provide statistical support, research analysts design and interpret studies, and computer specialists provide hardware and software support in data analysis.

Research in mass media can be used to verify or nullify gut feelings or intuition for decision makers. Although common sense is often accurate, media decision makers need additional objective information to evaluate problems, especially when they make significant decisions (which usually involve large sums of money). The past 50 years have witnessed the evolution of a decision-making approach that combines research and intuition to produce a higher probability of success.

Research, however, is not limited to only decision-making situations. It is also widely used in theoretical areas to attempt to describe the media, to analyze media effects on consumers, to understand audience behavior, and so on. No day goes by without some reference in the media to audience surveys, public opinion polls, growth projections or status reports of one medium or another, or advertising or public relations campaigns. As philosopher Suzanne Langer (1967) says, "Most new discoveries are suddenly-seen things that were always there." As stated in previous editions of this book, mass media researchers still have a great deal to "see."

There is no question that media research and the need for qualified researchers will continue to grow. Yet it is difficult to find qualified researchers who can work in the public and private sectors.

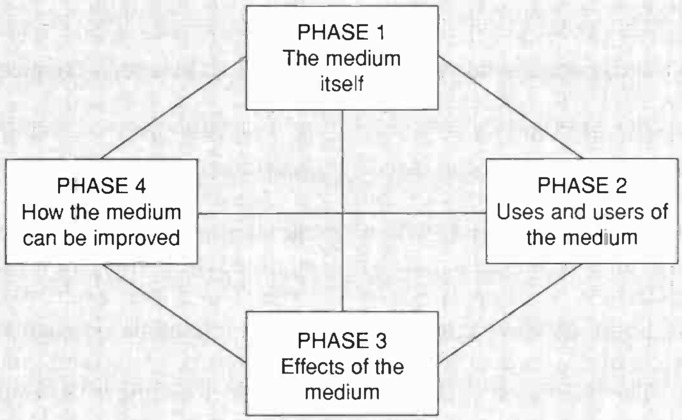
We strongly urge you to search the Internet for additional information on every topic discussed in this book. We have identified some areas for further investigation, but do not limit your searching to only our suggestions.

## ▪ *The Development of Mass Media Research*

Mass media research has evolved in definable steps, and similar patterns have been followed in each medium's needs for research (see Figure 1.1). (As you read the following paragraphs about the development of mass media research, consider the Internet as an example. It is now the newest mass medium.) In Phase 1 of the research, there is an interest in the medium itself. What is it? How does it work? What technology does it involve? How is it similar to or different from what we already have? What functions or services does it provide? Who will have access to the new medium? How much will it cost?

Phase 2 research begins once the medium is developed. In this phase, specific information is accumulated about the uses and the users of the medium. How do people use the medium in real life? Do they use it for information only, to save time, for entertainment, or for some other reason? Do children use it?

Figure 1.1 *Research Phases In Mass Media*




Do adults use it? Why? What gratifications does the new medium provide? What other types of information and entertainment does the new medium replace? Were original projections about the use of the medium correct? What uses are evident other than those that were predicted from initial research?

Phase 3 includes investigations of the social, psychological, and physical effects of the medium. How much time do people spend with the medium? Does it change people's perspectives about anything? What do the users of the medium want and expect to hear or see? Are there any harmful effects related to using the medium? Does the technology cause any harm? How does the medium help in people's lives? Can the medium be combined with other media or technology to make it even more useful?

In Phase 4 research is conducted to determine how the medium can be improved, either in its use or through technological developments. Can the medium provide information or entertainment to more types of people? How can new technology be used to perfect or enhance the sight or sound of the medium? Is there a way to change the content (programming) to be more valuable or entertaining?

The design of Figure 1.1 is not intended to suggest that the research phases are linear—that when one phase is over, it is never considered again. In reality, once a medium is developed and established, research may be conducted simultaneously in all four phases. For example, although television has been around for more than 50 years, researchers are still investigating the medium itself (satellite-delivered digital audio and video), the uses of TV (pay-per-view programming), effects (violent programming), and improvements (flat-screen TV).

Research is a never-ending process. In most instances a research project designed to answer one series of questions produces a new set of questions no one thought of before. This failure to reach closure may be troublesome to some people, yet it is the essential nature of research.

Figure 1.1 depicts four phases of research. However, in some instances, as in private sector research, an additional element permeates every phase: How can the medium make money? The largest percentage of research conducted in the private sector relates in some way to money—how to save it, make more of it, or take it away from others. This may not "sit well" with people who view the media as products of artistic endeavor, but this is how the "real world" operates.

At least four major events or social forces have encouraged the growth of mass media research. The first was World War I, which prompted a need to understand the nature of propaganda. Researchers working from a stimulus–response point of view attempted to uncover the effects of the media on people (Lasswell, 1927). The media at that time were thought to exert a very powerful influence over their audiences, and several assumptions were made about what the media could and could not do. One theory of mass media, later named the "hypodermic needle" model of communication, basically suggested that mass communicators need only "shoot" messages at an audience and that those messages would produce preplanned and almost universal effects. The belief then was that all people behave in very similar ways when they encounter media messages. We know now that individual differences among people rule out this rather simplistic view. As DeFleur and Ball-Rokeach (1989) note:

> These assumptions may not have been explicitly formulated at the time, but they were drawn from fairly elaborate theories of human nature, as well as the nature of the social order. . . . It was these theories that guided the thinking of those who saw the media as powerful.

Search the Internet for more information about the "hypodermic needle theory" of communication.

A second contributor to the development of mass media research was the realization by advertisers in the 1950s and 1960s that research data are useful in devising ways to persuade potential customers to buy products and services. Consequently, advertisers encouraged studies of message effectiveness, audience demographics and size, placement of advertising to achieve the highest level of exposure (efficiency), frequency of advertising necessary to persuade potential customers, and selection of the medium that offered the best chance of reaching the target audience.

A third contributing social force was the increasing interest of citizens in the effects of the media on the public, especially on children. The direct result was an interest in research related to violence and sexual content in television programs and in commercials aired during children's programs. Researchers have expanded their focus to include the positive (prosocial) as well as the negative (antisocial) effects of television (see Chapter 17). Investigating violence on television is still an important endeavor as evidenced by such studies as "The UCLA Television Violence Report" published in January 1998.

Increased competition among the media for advertising dollars has been a fourth contributor to the growth of research. Most media managers are now very sophisticated and use long-range plans, management by objectives, and an increasing dependency on data to support the decision-making process. Even program producers seek relevant research data, a task usually assigned to the creative side of program development. In addition, the mass media are geared toward audience fragmentation, which means that the masses of people are divided into small groups, or niches (technically referred to as the "demassification" of the mass media).

The competition among the media for audiences and advertising dollars continues to reach new levels of complexity. The media "survival kit" today includes information about consumers' changing values and tastes, shifts in demographic patterns, and developing trends in lifestyles. Audience fragmentation increases the need for trend studies (fads, new behavior patterns), image studies (people's perceptions of the media and their environment), and segmentation studies (explanations of types or groups of people). Major research organizations, consultants, and media owners and operators conduct research that was previously considered the sole property of the marketing, psychology, and sociology disciplines. With the advent of increased competition and audience fragmentation, media managers are more frequently using marketing strategies in an attempt to discover their position in the marketplace. When this position is identified, the medium is packaged as an "image" rather than a product. (Similarly, the producers of consumer goods such as soap and toothpaste try to sell the "image" of these products because the products themselves are very similar, if not the same, from company to company.)

This packaging strategy involves determining what the members of the audience think, how they use language, how they spend their spare time, and so on. Information on these ideas and behaviors is then woven into the merchandising effort to make the medium seem to be part of the audience. Positioning thus involves taking information from the audience and interpreting the data to use in marketing the medium. (For more information about positioning companies and products in the business and consumer worlds, see Ries & Trout, 1986, 1997.)

Much of the media research before the early 1960s originated in psychology and sociology departments at colleges and universities. Researchers with backgrounds in the media were rare because the media themselves were young. But this situation has changed. Media departments in colleges and universities grew rapidly in the 1960s, and media researchers entered the scene. Today mass media researchers dominate the field, and now the trend is to encourage cross-disciplinary studies in which media researchers invite participation from sociologists, psychologists, and political scientists. Because of the pervasiveness of the media, researchers from all areas of science are now actively involved in attempting to answer media-related questions.

Modern mass media research includes a variety of psychological and sociological investigations such as physiological and emotional responses to television programs, commercials, or music played by radio stations. In addition, computer modeling and other sophisticated computer analyses are now commonplace in media research to determine such things as the potential success of television programs (network or syndicated). Once considered eccentric by some, mass media research is now a legitimate and esteemed field.

## ▪ *Media Research and the Scientific Method*

Kerlinger (1986) defines scientific research as a *systematic, controlled, empirical, and critical investigation of hypothetical propositions about the presumed relations among observed phenomena*. The basic terms that define the scientific research method describe a procedure that has been accepted for centuries. In the 16th century, for example, Tycho Brahe (pronounced TEE-koh BRAH-hee) conducted years of systematic and controlled observation to refute many of Aristotle's theories of the universe. (Search the Internet for "Brahe" to discover more about this fascinating astronomer. Pay particular attention to the role of scientific research in solving Brahe's mysterious death.)

As mentioned earlier in this chapter, we all conduct research in our day-by-day lives. We do this whenever we start with an idea and then test it. Children conduct "studies" to determine which items are hot and which are cold, how to ride a bicycle or a snowboard, and which persuasive methods work best with parents. Teenagers "test" ideas about driving, dating, and working; and adults "test" ideas about family, finance, and survival.

All research, whether formal or informal, begins with a basic question or proposition about a specific phenomenon. For example, why do viewers select one television program over another? Which sections of the newspaper do people read most often? Which types of magazine covers attract the most readers? Which types of advertising are most effective in selling products and services? These questions can be answered to some degree with well-designed research studies. Sometimes the difficulty is to determine which data collection method can most appropriately provide answers to specific questions.

There are several possible approaches in answering research questions. Kerlinger (1986), using definitions provided nearly a century ago by C. S. Peirce, discusses four approaches to finding answers, or "methods of knowing": tenacity, intuition, authority, and science.

A user of the **method of tenacity** follows the logic that something is true because it has always been true. An example is the storeowner who says, "I don't advertise because my parents did not believe in advertising." The idea is that nothing changes—what was good, bad, or successful before will continue to be so in the future.

In the **method of intuition**, or the a priori approach, a person assumes that something is true because it is "self-evident" or "stands to reason." Some creative people in advertising agencies resist efforts to test their advertising methods because they believe they know what will attract customers. To these people, scientific research is a waste of time.

The **method of authority** promotes a belief in something because a trusted source, such as a parent, a news correspondent, or a teacher, says it is true. The emphasis is on the source, not on the methods the source may have used to gain the information. For example, the claim that "consumers will pay hundreds of dollars for a new satellite dish to receive hundreds of television channels because producers of satellite dish companies say so" is based on the method of authority. (During 1994 and 1995, this was shown not to be true. Consumers did not flock to the stores to buy the new delivery system, and research had to be conducted to find out what failed. When changes were made in both product and marketing, sales quickly took off.)

The **scientific method** approaches learning as a series of small steps. That is, one study or one source provides only an indication of what may or may not be true; the "truth" is found through a series of objective analyses. This means that the scientific method is self-correcting in that changes in thought or theory are appropriate when errors in previous research are uncovered. For example, in 1984 Barry Marshall, a medical resident in Perth, Australia, identified a bacterium (*Helicobacter pylori* or *H. pylori*) as the cause of stomach ulcers (not an increase in stomach acid due to stress or anxiety). After several years, hundreds of independent studies proved that Marshall was correct, and in 1996 the Food and Drug Administration (FDA) approved a combination of drugs to fight ulcers—an antacid and an antibiotic. In space exploration, NASA disclosed in early 1998 that water had been found on Earth's moon, changing the centuries-old idea that water could not exist there.

In communications, researchers discovered that the early perceptions of the power of the media (the "hypodermic needle" theory) were incorrect and, after numerous studies, concluded that behavior and ideas are changed by a combination of communication sources and different people's reactions to the same message. Isaac Asimov (1990, p. 42) states, "One of the glories of scientific endeavor is that any scientific belief, however firmly established, is constantly being tested to see if it is truly universally valid." The scientific method may be inappropriate in many areas of life—for instance, in evaluating works of art, choosing a religion, or forming friendships—but it has been valuable in producing accurate and useful data in mass media research. The next section provides a more detailed look at this method of knowing. See R. K. Tucker (1996) for a discussion of how a person's personality, temperament, or approach to life can affect the way he or she learns things. In addition, for a different perspective of the methods of knowing, go to *http://mrrc.bio.uci.edu/se10/philosophy.html/.*

## ▪ Characteristics of the Scientific Method

Five basic characteristics, or tenets, distinguish the scientific method from other methods of knowing. A research approach that does not follow these tenets cannot be considered a scientific approach.

1. *Scientific research is public.* Scientific advancement depends on freely available information. Researchers (especially in the academic sector) cannot plead private knowledge, methods, or data in arguing for the accuracy of their findings; scientific research information must be freely communicated from one researcher to another. As Nunnally and Bernstein (1994) note:

> Science is a highly public enterprise in which efficient communication among scientists is essential. Each scientist builds on what has been learned in the past; day by day his or her findings must be compared with those of other scientists working on the same types of problems. . . . The rate of scientific progress in a particular area is limited by the efficiency and fidelity with which scientists can communicate their results to one another.

Researchers therefore must take great care in their published reports to include information on sampling methods, measurements, and data-gathering procedures. Such information allows other researchers to independently verify a given study and support or refute the initial research findings. This process of replication (discussed in Chapter 2) allows for correction and verification of previous research findings. Though not related to media research, the importance of replication in scientific research was underscored in 1992, when physicists were unable to duplicate the fantastic claim made by two University of Utah chemists who said they had produced fusion at room temperature.

Researchers also need to save their descriptions of observations (data) and their research materials so that information not included in a formal report can be made available to other researchers on request. Nunnally and Bernstein (1994) say: "A key principle of science is that any statement of fact made by one scientist should be independently verifiable by other scientists." Researchers can verify results only if they have access to the original data. It is common practice to keep all raw research materials for at least 5 years. This material is usually provided free as a courtesy to other researchers, or for a nominal fee if photocopying or additional materials are required.

2. *Science is objective.* Science tries to rule out eccentricities of judgment by researchers. When a study is undertaken, explicit rules and procedures are constructed and the researcher is bound to follow them, letting the chips fall where they may. Rules for classifying behavior are used so that two or more independent observers can classify particular behavior patterns in the same manner. For example, to measure the appeal of a television commercial, researchers might count the number of times a viewer switches channels while the commercial is shown. This is considered to be an objective measure because any competent observer would report a change in channel. Conversely, to measure appeal by observing how many

viewers make negative facial expressions while the ad is shown would be a subjective approach, since different observers may have different ideas of what constitutes a negative expression. However, an explicit definition of "negative facial expression" might eliminate the coding error.

Objectivity also requires that scientific research deal with facts rather than interpretations of facts. Science rejects its own authorities if their statements conflict with direct observation. As the noted psychologist B. F. Skinner (1953) wrote: "Research projects do not always come out as one expects, but the facts must stand and the expectations fall. The subject matter, not the scientist, knows best." Mass media researchers have often encountered situations in which media decision makers reject the results of a research project because the study did not produce the anticipated results. (In such a case, one might wonder why the research was conducted at all.)

3. *Science is empirical.* Researchers are concerned with a world that is knowable and potentially measurable. (*Empiricism* derives from the Greek word for "experience.") They must be able to perceive and classify what they study and to reject metaphysical and nonsensical explanations of events. For example, a newspaper publisher's claim that declining subscription rates are "God's will" would be rejected by scientists; such a statement cannot be perceived, classified, or measured. (Scientists whose areas of research rely on superstition and other nonscientific methods of knowing are said to practice "bad science." For a fascinating discussion on astrology, UFOs, and pseudoscience, see Seeds, 1992, and search the Internet for "empiricism.")

This does not mean that scientists evade abstract ideas and notions; they encounter them every day. But they recognize that concepts must be strictly defined to allow for observation and measurement. Scientists must link abstract concepts to the empirical world through observations, which may be made either directly or indirectly via various measurement instruments. Typically, this linkage is accomplished by framing an operational definition.

Operational definitions are important in science, and a brief introduction necessitates some backtracking. There are basically two kinds of definitions. A **constitutive definition** *defines a word by substituting other words or concepts for it.* For example, here is a constitutive definition of the concept "artichoke": An artichoke is a green leafy vegetable, a tall composite herb of the *Cynara scolymus* family. In contrast, an **operational definition** *specifies procedures that will allow one to experience or measure a concept*—for example: Go to the grocery store and find the produce aisle; look for a sign that says "Artichokes"; what's underneath the sign is an artichoke. Although an operational definition assures precision, it does not guarantee validity; a stock clerk may mistakenly stack lettuce under the artichoke sign. This possibility for error underscores the importance of considering both the constitutive definition and the operational definition of a concept to evaluate the trustworthiness of any measurement. Carefully examining the constitutive definition of artichoke indicates that the operational definition might be faulty. (For more information about definitions in general, see Langer, 1967.)

Operational definitions can help dispel some of the strange questions raised in philosophical discussions. For instance, if you have taken a philosophy course, you may have encountered the question "How many angels can stand on the head of a pin?" The debate ends quickly when the retort is "Give me an operational definition of an angel, and I'll give you the answer." Any question can be answered as long as there are operational definitions for the independent or dependent variables. For further discussion of operational definitions, see *Psychometric Theory*

(Nunnally & Bernstein, 1994) and *The Practice of Social Research* (Babbie, 1998).

4. *Science is systematic and cumulative.* No single research study stands alone, nor does it rise or fall by itself. Astute researchers always use previous studies as building blocks for their own work. One of the first steps in conducting research is to review the available scientific literature on the topic so that the current study will draw on the heritage of past research (see Chapter 2). This review is valuable for identifying problem areas and important factors that might be relevant to the current study. (Please read Timothy Ferris's preface in *The Whole Shebang*, 1998. In addition, listen to a fascinating interview with Ferris at *www.annonline.com/interviews/970901/index.html.back.*)

In addition, scientists attempt to search for order and consistency among their findings. In its ideal form, scientific research begins with a single, carefully observed event and progresses ultimately to the formulation of theories and laws. A theory is a *set of related propositions that presents a systematic view of phenomena by specifying relationships among concepts.* Researchers develop theories by searching for patterns of uniformity to explain the data that have been collected. When relationships among variables are invariant (always the same) under given conditions, researchers may formulate a law. Both theories and laws help researchers search for and explain consistency in behavior, situations, and phenomena.

5. *Science is predictive.* Science is concerned with relating the present to the future. In fact, scientists strive to develop theories because, among other reasons, they are useful in predicting behavior. A theory's adequacy lies in its ability to predict a phenomenon or event successfully. A theory that suggests predictions that are not borne out by data analysis must be carefully reexamined and perhaps discarded. Conversely, a theory that generates predictions that are supported by the data can be used to make predictions in other situations.

## ▪ Research Procedures

The purpose of the scientific method of research is to provide an objective, unbiased evaluation of data. To investigate research questions and hypotheses systematically, both academic and private sector researchers follow a basic eight-step procedure. However, merely following the eight research steps does not guarantee that the research is good, valid, reliable, or useful. An almost countless number of intervening variables (influences) can destroy even the best-planned research project. The situation is analogous to someone assuming he or she can bake a cake by just following the recipe. The cake may be ruined by an oven that doesn't work properly, spoiled ingredients, altitude, or numerous other problems. The typical research process consists of these eight steps:

1. Select a problem.
2. Review existing research and theory (when relevant).
3. Develop hypotheses or research questions.
4. Determine an appropriate methodology/research design.
5. Collect relevant data.
6. Analyze and interpret the results.
7. Present the results in an appropriate form.
8. Replicate the study (when necessary).

Step 4 includes deciding whether to use **qualitative research** (such as focus groups or one-on-one interviews) with small samples or **quantitative research** (such as telephone interviews), in which large samples are used to allow results to be generalized to the population under study (see Chapter 6 for a discussion of qualitative research).

Steps 2 and 8 are optional in the private sector where some research is conducted to answer a specific and unique question related to a future decision, such as whether to invest a large sum of money in a developing medium. In this type of project there generally is no previous research to consult, and there seldom is a reason to replicate the study because a decision is made on the basis of the first analysis. However, if the research produces inconclusive results, the study is revised and replicated.

Each step in the eight-step process depends on all the others to produce a maximally efficient research study. For example, before a literature search is possible, the researcher must have a clearly stated research problem; to design the most efficient method of investigating a problem, the researcher must know what types of studies have been conducted; and so on. Moreover, all the steps are interactive: A literature search may refine and even alter the initial research problem, or a study conducted previously by another company or business in the private sector might expedite (or complicate) the current research effort.

## ▪ Two Sectors of Research: Academic and Private

The practice of research is divided into two major sectors, academic and private, which are sometimes called "basic" and "applied," respectively. We do not use these terms in this text because research in both sectors can be basic or applied. The two sectors are equally important and in many cases work together to solve mass media problems.

*Academic sector research* is conducted by scholars from colleges and universities. Generally this research has a theoretical or scholarly approach; that is, the results are intended to help explain the mass media and their effects on individuals. Some popular research topics in the theoretical area are the use of media and various media-related items, such as video games and multiple-channel cable systems; differences in consumer lifestyles; effects of media "overload" on consumers; and effects of various types of programming on children.

*Private sector research* is conducted by nongovernmental companies or their research consultants. It is generally applied research; that is, the results are intended to be used for decision making. Typical research topics in the private sector include media content and consumer preferences, acquisitions of additional businesses or facilities, analysis of on-air talent, advertising and promotional campaigns, public relations approaches to solving specific informational problems, sales forecasting, and image studies of the properties owned by the company.

There are other differences between academic research and private sector research. For instance, academic research is public. Any other researcher or research organization that wishes to use the information gathered by academic researchers should be able to do so merely by asking the original researcher for the raw data. Most private sector research, on the other hand, generates proprietary data that are considered to be the sole property of the sponsoring agency and generally cannot be obtained by other researchers. Some private sector research, however, is released to the public soon after it has been conducted (for example, public opinion polls and projections concerning the future of the media). Other studies may be released only after several years, although this practice is the exception rather than the rule.

Another difference between academic research and private sector research involves the amount of time allowed to conduct the work. Academic researchers generally do not have specific deadlines for their research projects (except when they receive research grants). Academicians usually conduct their research at a pace that accommodates their teaching schedules. Private sector researchers, however, nearly always operate under some type of deadline. The time frame may be imposed by management or by an outside agency or client that requires a decision from the company or business.

Academic research is generally less expensive to conduct than research in the private sector. This is not to say that academic research is "cheap"; in many cases it is not. But academicians do not need to have enormous sums of money to cover overhead costs for office rent, equipment, facilities, computer analysis, subcontractors, and personnel. Private sector research must take such expenses into account, regardless of whether the research is conducted within the company or contracted out to a research supplier. The lower cost of academic researchers sometimes motivates large media companies and groups to use them rather than professional research firms.

Despite these differences, it is important for beginning researchers to understand that academic research and private sector research are not completely independent of each other. Academicians perform many studies for industry, and private sector groups conduct research that can be classified as theoretical. (For example, the television networks have departments that conduct social research.) Similarly, many college and university professors act as consultants to (and often conduct private sector research for) the media industry.

It is important for all researchers to refrain from attaching to academic or private sector research stereotypical labels such as "unrealistic," "pedantic," and "limited in scope." Research in both sectors, though occasionally differing in cost and scope, uses similar methodologies and statistical analyses. In addition, the two sectors have common research goals: to understand problems and to predict the future. In conducting a study according to the scientific method, researchers must have a clear understanding of what they are investigating, how the phenomenon can be measured or observed, and what procedures are required to test the observations or measurements. Answering a research question or hypothesis requires a conceptualization of the research problem and a logical development of the procedural steps. Chapter 2 discusses research procedures in more detail.

## ▪ The Internet

Some areas of research change dramatically. The most significant change in the past few years involves the Internet. Only a few editions ago, we recommended that all students learn how to use the computer. Using a computer is now commonplace. Knowing how to use the Internet, particularly search engines like *Yahoo!*, *Lycos*, and *HotBot*, is now essential. The Internet makes mass media research easier because information is available immediately and there are almost no limits on what can be found.

We include Internet research procedures and hints throughout this edition. But because of the rapid changes with the Internet, we recommend that every new researcher keep up to date with current procedures, uses, and changes. For example, to see the power of search engines on the Internet, sign on to *www.askjeeves.com*.

## ▪ ▪ ▪ Summary

Media research evolved from the fields of psychology and sociology and is now a well-established field in its own right. It is not necessary to be a statistician to be a successful researcher; it is more important to know how to conduct research and what research procedures can do.

In an effort to understand any phenomenon, researchers can follow one of several methods of inquiry. Of the procedures discussed in this chapter, the scientific approach is most applicable to the mass media because it involves a systematic, objective evaluation of information. Researchers first identify a problem and then investigate it using a prescribed set of procedures known as the scientific method. The scientific method is the only learning approach that allows for self-correction of research findings; one study does not stand alone but must be supported or refuted by others.

The proliferation of mass media research is mainly attributable to the rapidly developing technology of the media industry. Because of this growth in research, both applied and theoretical approaches have taken on more significance in the decision-making process of the mass media and in our understanding of the media. At the same time, there continues to be a severe shortage of good researchers in both the academic and private sectors.

## Questions and Problems for Further Investigation

1. Obtain a recent issue of the *Journal of Broadcasting and Electronic Media, Journalism and Mass Communication Quarterly,* or *Public Opinion Quarterly.* How many articles fit into the research phases depicted in Figure 1.1?
2. To see a wide range of questions that can be investigated, go to one of the Internet search engines and conduct a search on "why does" or "why do". You should find about a million entries.
3. How might researchers abuse the scientific research approach?
4. Theories are used as springboards to develop solid bodies of information, yet there are only a few universally recognized theories in mass media research. Why do you think this is true?
5. Some citizens groups have claimed that television has a significant effect on viewers, especially the violence and sexual content of some programs. How might these groups collect data to support their claims? Which method of knowing can such groups use to support their claims?
6. Investigate how research is used to support or refute an argument outside the field of mass media. For example, how do various groups use research to support or refute the idea that motorcycle riders should be required to wear protective helmets? (Refer to publications such as *Motorcycle Consumer News.*)
7. Search the Internet for "hypodermic needle theory," "Isaac Asimov," and "scientific research steps."
8. If you are using *InfoTrac College Edition,* try using "scientific method" as a key word search term. Note the variety of disciplines that rely on this method.

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Chapter 2

# Research Procedures

- *Selecting a Research Topic*
- *Determining Topic Relevance*
- *Reviewing the Literature*
- *Stating a Hypothesis or Research Question*
- *Research Suppliers and Field Services*
- *Data Analysis and Interpretation*
- *Presenting Results*
- *Replication*
- *Supplement on Incidence Rates and CPI*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

The scientific evaluation of any problem must follow a sequence of steps to increase the probability that it will produce relevant data. Researchers who do not follow a prescribed set of steps do not subscribe to the scientific method of inquiry and simply increase the amount of error present in a study. This chapter describes the process of scientific research—from identifying and developing a topic for investigation to replicating the results. The first section briefly introduces the steps in the development of a research topic.

Objective, rigorous observation and analysis characterize the scientific method. To meet this goal, researchers must follow the prescribed steps shown in Figure 2.1. This research model is appropriate to all areas of scientific research.

## Selecting a Research Topic

Not all researchers are concerned with selecting a topic to study; some are able to choose and concentrate on a research area that is interesting to them. Many researchers come to be identified with studies of specific types, such as those concerning children and media violence, newspaper readership, advertising, or communications law. These researchers investigate small pieces of a puzzle to obtain a broad picture of their research area. In addition, some researchers become identified with specific *approaches* to research, such as focus groups or historical analysis. In the private sector, researchers generally do not have the flexibility of selecting topics or questions to investigate. Instead, they conduct studies to answer questions raised by management, or they address the problems and questions for which they are hired, as is the case with full-service research companies.

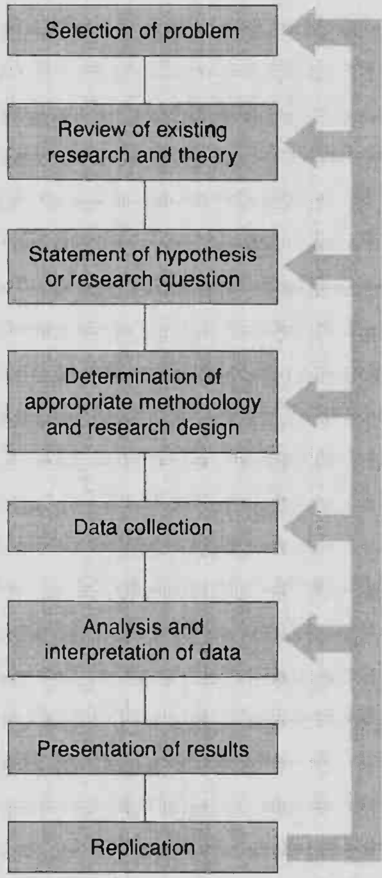
Although some private sector researchers are limited in the amount of input they have in selecting a topic, they are usually given total control over *how* the question should be answered (that is, what methodology should be used). The goal of private sector researchers is to develop a method that is fast, inexpensive, reliable, and valid. If all these criteria are met, the researcher has performed a valuable task.

Selecting a topic is a concern for many beginning researchers, however, especially those writing term papers, theses, and dissertations. The problem is knowing where to start. Fortunately, many sources are available for research topics; academic journals, periodicals, newsweeklies, and everyday encounters provide a wealth of ideas. This section highlights some primary sources.

### Professional Journals

Academic communication journals, such as the *Journal of Broadcasting and Electronic Media*, *Journalism and Mass Communication Quarterly*, and others listed in this section, are excellent sources of information. Although academic journals tend to publish research that is 12 to 24 months old (due to review procedures and the backlog of articles), the articles may provide ideas for research topics. Most authors conclude their research by discussing

Figure 2.1 *Steps in the Development of a Research Project*




problems they encountered during the study and suggesting topics that need further investigation. In addition, some journal editors build issues around individual research themes, which often can help in formulating research plans. Many high-quality journals cover various aspects of research; some specialize in mass media, and others include media research occasionally. The journals listed on page 21 provide a starting point in using academic journals for research ideas.

In addition to academic journals, professional trade publications offer a wealth of information relevant to mass media research. These include *Broadcasting & Cable, Radio & Records, Advertising Age, Electronic Media, Television/Radio Age, Media Decisions, Editor & Publisher, CableVision*, and *Media and Marketing Management*. Other excellent sources for identifying current topics in mass media are the weekly newsletters such as *Media Industry Newsletter, Cable Digest*, and

Journals That Specialize in Mass Media Research

- *Critical Studies in Mass Communication*
- *Journalism and Mass Communication Quarterly*
- *Journal of Advertising*
- *Journal of Advertising Research*
- *Journal of Broadcasting and Electronic Media*
- *Journal of Consumer Research*
- *Journal of Radio Studies*
- *Newspaper Research Journal*
- *Public Relations Review*

Journals That Occasionally Publish Mass Media Research

- *American Psychologist*
- *Communication Education*
- *Communication Monographs*
- *Communication Research*
- *Feedback* (from the Broadcast Education Association)
- *Human Communication Research*
- *Journalism Educator*
- *Journal of Communication*
- *Journal of Marketing*
- *Journal of Marketing Research*
- *Multivariate Behavioral Research*
- *Public Opinion Quarterly*
- *Public Relations Quarterly*
- *Quarterly Journal of Speech*

several publications from Paul Kagan and Associates (see *www.gii.co.ip*).

Research abstracts, located in most college and university libraries, are also valuable sources for research topics. These volumes contain summaries of research articles published in nearly every academic journal. Of particular interest to media researchers are *Communication Abstracts, Psychological Abstracts, Sociological Abstracts,* and *Dissertation Abstracts.*

### Magazines and Periodicals

Although some educators feel that publications other than professional journals contain only "watered down" articles written for the general public, these articles tend to eliminate tedious technical jargon and are often good sources for problems and hypotheses. In addition, more and more articles written by highly trained communications professionals appear in weekly and monthly publications such as *TV Guide, Time,* and *Newsweek*. These sources often provide interesting perspectives on complex problems in communication and many times raise interesting questions that media researchers can pursue.

### Research Summaries

Professional research organizations periodically publish summaries that provide a close look at the major research areas in various fields. These summaries are often useful for obtaining information about research topics because they survey a wide variety of studies. Good examples of summary research (also known as "meta-research") in communication are *Television and Human Behavior* by George Comstock and others (1978), *The Effects of Mass Communication on Political Behavior* by Sydney Kraus and Dennis Davis (1967), and *Milestones in Mass Communication Research* by Shearon Lowery (1994).

### The Internet

The Internet brings the world to a researcher's fingertips and must be considered whenever the goal is to find a topic to investigate. Search engines such as *AltaVista, Infoseek,* and *Ask Jeeves!* can immediately provide a vast number of possible research topics. For example, assume we have an interest in satellite television. Let's go to the net. A search (as of early 1999) of "satellite television" on *AltaVista* produces more than 16,000 matches. That's a lot of material to consider, but suppose we wonder about satellite television and remote controls. That search produces an interesting article by David Winston (1998) entitled "Digital Democracy and the New Age of Reason" that contains a whole host of potential topics that could be investigated.

A great exercise on the Internet is to search for broad categories. For example, to see the variety of questions that can be answered, search for "How is," "How does," "Why is," or "Why does." The lists are incredibly fascinating.

### Everyday Situations

Each day we are confronted with various types of communication via radio, television, newspapers, magazines, movies, personal discussions, and so forth. These can be excellent sources of topics for researchers who take an active role in analyzing them. With this in mind, consider the following questions:

- Why do advertisers use specific types of messages in broadcasting or print?
- Why are "Entertainment Tonight," "Jeopardy," and "Wheel of Fortune" so popular?
- Why do so many TV commercials use only video to deliver a message, when we know that many people don't always watch TV—they just listen?
- How effective are billboards in advertising products?
- What types of people listen to the Dr. Laura and Rush Limbaugh radio programs?
- How many commercials in a row can people watch on television or hear on the radio before the commercials are no longer effective?
- Why do some people faithfully watch soap operas while others find them absurd?
- Why do commercials on radio and television always sound louder than the regular programming?
- What are the perceptions of the Taco Bell chihuahua?
- What types of people buy items from the television shopping channels?
- Does anyone really watch the Weather Channel?

These and other questions may become a research idea. Significant studies based on questions arising from everyday encounters with the media and other forms of mass communication have covered investigations of television violence, the layout of newspaper advertisements, advisory warnings on television programs, and approaches to public relations campaigns. Pay attention to things around you and to conversations with others; these contacts can produce a wealth of questions to investigate.

Just for the sake of experimentation, do a search on the Internet using "everyday situations" and see how many articles and mentions appear; you may be surprised.

### Archive Data

Data archives, such as the Inter-University Consortium for Political Research (ICPR) at the University of Michigan, the Simmons Target Group Index (TGI), the Gallup and Roper organizations, and the collections of Arbitron and Nielsen ratings data (see Chapter 15), are valuable sources of ideas for researchers. Historical data may be used to investigate questions different from those that the data were originally intended to address.

For example, ratings books provide information about audience size and composition for a particular period in time, but other researchers may use the data for historical tracking, prediction of audiences in the future, changes in the popularity of types of stations and programs, and the relationship between audience ratings and advertising revenue generated by individual stations or an entire market. This process, known as secondary analysis, is a marvelous research approach because it saves time and resources.

Secondary analysis provides an opportunity for researchers to evaluate otherwise unavailable data. Becker (1981, p. 240) defines secondary analysis as

> [the] reuse of social science data after they have been put aside by the researcher who gathered them. The reuse of the data can be by the original researcher or someone uninvolved in any way in the initial research project. The research questions examined in the secondary analysis can be related to the original research endeavor or quite distinct from it.

***Advantages of Secondary Analysis.*** Ideally, every researcher should conduct a research project of some magnitude to learn about design, data collection, and analysis. Unfortunately, this ideal situation does not exist. Modern research is simply too expensive. In addition, because survey methodology has become so complex, it is rare to find one researcher or even a small group of researchers who are experts in all phases of large studies.

Secondary analysis is one research alternative that overcomes some of these problems. Using available data is very inexpensive. There are no questionnaires or measurement instruments to construct and validate; interviewers and other personnel do not need to be paid; and there are no costs for subjects and special equipment. The only expenses entailed in secondary analysis are those for duplicating materials (some organizations provide their data free of charge) and computer time. Data archives are valuable sources for empirical data. In many cases, archive data provide researchers with information that can be used to address significant media problems and questions.

Although novice researchers (usually students) can derive some benefits from developing questionnaires and conducting a research project using a small and often unrepresentative sample of subjects, this type of analysis rarely produces results that are externally valid (discussed later in this chapter). Instead of conducting a small study that has limited (if any) value to other situations, these people can benefit from using data that have been previously collected. Researchers then have more time to understand and analyze the data (Tukey, 1969). All too often researchers collect data that are quickly analyzed for publication or reported to management and never touched again. It is difficult to completely analyze all data from any research study in just one analysis; yet researchers in both the academic and private sectors are guilty of this practice.

Tukey (1969, p. 89) argues for data reanalysis, especially for graduate students, but his statement applies to all researchers:

> There is merit in having a Ph.D. thesis encompass all the admitted steps of the research process. Once we recognize that research is a continuing, more or less cyclic process, however, we see that we can segment it in many places. Why should not at least a fair proportion of theses start with a careful analysis of previously collected and presumably already lightly analyzed data, a process usefully spread out over considerable time? Instant data analysis is—and will remain—an illusion.

Arguments for secondary analysis come from a variety of researchers (Glenn, 1972; Hyman, 1972; Tukey, 1969). It is clear that the research method provides excellent opportunities to produce valuable knowledge.

The procedure, however, is not universally accepted—an unfortunate perspective that limits the advancement of knowledge.

***Disadvantages of Secondary Analysis.*** Researchers who use secondary analysis are limited to the types of hypotheses or research questions that can be investigated. The data already exist, and since there is no way to go back for more information, researchers must keep their analyses within the boundaries of the data originally collected.

Researchers conducting secondary analysis may be confronted with data that were poorly collected, inaccurate, fabricated, or flawed. Many studies do not include information about research design, sampling procedures, weighting of subjects' responses, or other peculiarities. Although individual researchers in mass media have made their data more readily available (Reid, Soley & Wimmer, 1981; Wimmer & Reid, 1982), not all follow adequate scientific procedures. This may seriously affect a secondary analysis.

Despite the criticisms of using secondary analysis, it has rightfully become an acceptable research method, and detailed justifications for using it are no longer required. As the Nike ad campaign says, "Just do it." (Search the Internet for "data archives.")

## ▪ *Determining Topic Relevance*

Once a basic research idea has been chosen or assigned, the next step is to ensure that the topic has merit. This is accomplished by answering eight basic questions.

### *Question 1: Is The Topic Too Broad?*

Most research studies concentrate on one small area of a field; few researchers attempt to analyze an entire field in one study. However, researchers frequently choose topics that are too broad to cover in one study—for example, "the effects of television violence on children" or "the effects of mass media information on voters in a presidential election." To avoid this problem, researchers usually write down their proposed title as a visual starting point and attempt to dissect the topic into a series of questions.

For example, a University of Colorado master's degree student was interested in why viewers like the television shows they watch and how viewers' analyses of programs are similar to or different from the analyses of TV critics. This is a broad topic. First of all, what types of programs will be analyzed? After a great deal of thought about the questions involved, the student settled on the topic of "program element importance" in television soap operas. She asked viewers to identify what is important to them when they watch a soap opera, and she developed a "model" for a successful program.

### *Question 2: Can the Problem Really Be Investigated?*

Aside from considerations of broadness, a topic might prove unsuitable for investigation simply because the question being asked has no answer or at least cannot be answered with the facilities and information available. For example, a researcher who wants to know how people who have no television receiver react to everyday interpersonal communication situations must consider the problem of finding subjects without at least one television set in the home. A few such subjects may exist in remote parts of the country, but the question is basically unanswerable due to the current market saturation of television. Thus the researcher must attempt to reanalyze the original idea in conformity with practical considerations. A. S. Tan (1977) solved this particular dilemma by choosing to investigate what people do when their television sets are turned off for a period of time. He persuaded subjects not to watch television for one week and to record their use of other media, their interactions with their family and friends, and so on. (We have observed that subjects involved in these types of media-deprivation studies usually cheat and use the medium before the end of the project.)

Another point to consider is whether all the terms of the proposed study are definable. Remember that all measured variables must have operational definitions (see Chapter 3). A researcher who is interested in examining youngsters' use of the media must develop a working definition of the word *youngsters* to avoid confusion. Problems can be eliminated if an operational definition is stated: "Youngsters are children between the ages of 3 and 7 years."

One final consideration is to review available literature to determine whether the topic has been investigated. Were there any problems in previous studies? What methods were used to answer the research questions? What conclusions were drawn?

### Question 3: Can the Data Be Analyzed?

A topic does not lend itself to productive research if it requires collecting data that cannot be measured in a reliable and valid fashion (see Chapter 3). In other words, a researcher who wants to measure the effects of *not* watching television should consider whether the information about the subjects' behavior will be adequate and reliable, whether the subjects will answer truthfully, what value the data will have once gathered, and so forth. Researchers also need to have enough data to make the study worthwhile. It would be unsatisfactory to analyze only 10 subjects in the "television turn-off" example because then the results could not be generalized to the entire population.

Another consideration is the researcher's previous experience with the statistical method selected to analyze the data; that is, does the researcher really understand the proposed statistical analysis? Researchers need to know how the statistics work and how to interpret the results. All too often researchers design studies involving advanced statistical procedures that they have never used. This tactic invariably creates errors in computation and interpretation. Research methods and statistics should not be selected because they happen to be popular or because a research director suggests a given method, but because they are appropriate for a given study and are understood by the person conducting the analysis. A common error made by beginning researchers—selecting a statistical method without understanding what the method produces—is called the Law of the Instrument.

It is much wiser to use simple frequencies and percentages and understand the results than to try to use a high-level statistic and end up totally confused.

### Question 4: Is the Problem Significant?

Before a study is conducted, the researcher must determine its merit—that is, whether the results will have practical or theoretical value. The first question to ask is: Will the results add knowledge to information already available in the field? The goal of research is to help further the understanding of the problems and questions in the field of study; if a study does not do this, it has little value beyond the experience the researcher acquires from conducting it. This does not mean that all research has to be earth shattering. Many researchers waste valuable time trying to develop monumental projects when in fact the smaller problems are of more concern.

A second question is: What is the real purpose of the study? This question is important because it helps focus ideas. Is the study intended for a class paper, a thesis, a journal article, or a management decision?

Each of these projects requires different amounts of background information, levels of explanation, and details about the results generated. For example, applied researchers need to consider whether any useful action based on the data will prove to be feasible, as well as whether the study will answer the question(s) posed by management.

### Question 5: Can the Results of the Study Be Generalized?

If a research project is to have practical value beyond the immediate analysis, it must have external validity; that is, one must be able to generalize from it to other situations. For example, a study of the effects of a small-town public relations campaign might be appropriate if plans are made to analyze such effects in several small towns, or if it is a case study not intended for generalization; however, such an analysis has little external validity and cannot be related to other situations.

### Question 6: What Costs and Time Are Involved in the Analysis?

In many cases the cost of a research study is the sole determinant of its feasibility. A researcher may have an excellent idea, but if costs would be prohibitive, the project is abandoned. A cost analysis must be completed very early on. It does not make sense to develop the specific designs and the data-gathering instrument for a project that will be canceled because of lack of funds. Sophisticated research is particularly expensive; the cost of one project can easily exceed $50,000.

A carefully itemized list of all materials, equipment, and other facilities required is necessary before beginning a research project. If the costs seem prohibitive, the researcher must determine whether the same goal can be achieved if costs are shaved in some areas. Another possibility to consider is financial aid from graduate schools, funding agencies, local governments, or other groups that subsidize research projects. In general, private sector researchers are not severely constrained by expenses; however, they must adhere to budget specifications set by management.

Time is also an important consideration in research planning. Research studies must be designed so that they can be completed in the amount of time available. Many studies fail because the researchers do not allot enough time for each research step, and in many cases the pressure of deadlines creates problems in producing reliable and valid results (for example, failure to provide alternatives if the correct sample of people cannot be located).

### Question 7: Is the Planned Approach Appropriate to the Project?

The best research idea may be greatly, and often needlessly, hindered by a poorly planned method of approach. For example, a researcher might wish to measure any change in television viewing habits that may accompany an increase in time spent on the Internet. This researcher could mail questionnaires to a large number of people to determine how their television habits have changed during the past several months. However, the costs of printing and mailing questionnaires, plus follow-up letters and possibly phone calls to increase the response rate, might prove prohibitive.

Could the study be planned differently to eliminate some of the expense? Possibly, depending on its purpose and the types of questions planned. For example, the researcher could collect the data by telephone interviews to eliminate printing and postage costs. Although some questions might need reworking to fit the telephone procedure, the essential information could be collected. A close look at every study is required to plan the best approach. Every procedure in a research study should be considered from the standpoint of the parsimony principle, or Occam's razor. The principle, attributed to 14th-century philosopher William of Occam (also spelled Ockham), states that a person should not increase, beyond what is necessary, the number of entities required to explain anything, or make more assumptions than the minimum needed. Applying this to media research suggests that *the simplest research approach is always the most efficient.* (Search the Internet for "occam" for several interesting articles about the philosopher.)

### Question 8: Is There Any Potential Harm to the Subjects?

Researchers must carefully analyze whether their project may cause physical or psychological harm to the subjects under evaluation. Will respondents be frightened in any way? Will they be required to answer embarrassing questions or perform embarrassing acts that may create adverse reactions? Is there a chance that exposure to the research conditions will have lasting effects? Prior to the start of most public sector research projects involving humans, subjects are given detailed statements explaining the exact procedures involved in the research to ensure that they will not be injured in any way. These statements are intended to protect unsuspecting subjects from exposure to harmful research methods.

Underlying all eight steps in the research topic selection process is the necessity for validity (see Chapter 3). In other words, are all the steps (from the initial idea to data analysis and interpretation) the correct ones to follow in trying to answer the question(s)?

Suppose that, after you carefully select a research project and convince yourself that it is something you want to do, someone confronts you with this reaction: It's a good idea, but it can't be done; the topic is too broad, the problem cannot really be investigated, the data cannot be analyzed, the problem is not significant, the results cannot be generalized, it will cost too much, and the approach is wrong—two thumbs down! How should you respond? First, consider the criticisms carefully to make sure that you have not overlooked anything. If you are convinced you're on the right track and no harm will come to any subject or respondent, go ahead with the project. It is better to do the study and find nothing than to back off because of someone's criticism. (Almost every major inventor in the past 100 years has been the target of jokes and ridicule.)

## ▪ Reviewing the Literature

Researchers who conduct studies under the guidelines of scientific research never begin a research project without first consulting available literature to learn what has been done, how it was done, and what results were generated. Experienced researchers consider the literature review to be one of the most important steps in the research process. It not only allows them to learn from (and eventually add to) previous research but also saves time, effort, and money. Failing to conduct a literature review is as detrimental to a project as failing to address any of the other steps in the research process.

Before they attempt any project, researchers should ask these questions:

- What type of research has been done in the area?
- What has been found in previous studies?
- What suggestions do other researchers make for further study?
- What has not been investigated?
- How can the proposed study add to our knowledge of the area?
- What research methods were used in previous studies?

Answers to these questions will usually help define a specific hypothesis or research question.

## Stating a Hypothesis or Research Question

After a general research area has been identified and the existing literature reviewed, the researcher must state the problem as a workable hypothesis or research question. A **hypothesis** is a formal statement regarding the relationship between variables and is tested directly. The predicted relationship between the variables is either true or false. On the other hand, a **research question** is a formally stated question intended to provide indications about something; it is not limited to investigating relationships between variables. Research questions are generally used when a researcher is unsure about the nature of the problem under investigation. Although the intent is merely to gather preliminary data, testable hypotheses are often developed from information gathered during the research question phase of a study.

Singer and Singer (1981) provide an example of how a topic is narrowed, developed, and stated in simple terms. Interested in whether television material enhances or inhibits a child's capacity for symbolic behavior, Singer and Singer reviewed available literature and then narrowed their study to three basic research questions:

1. Does television content enrich a child's imaginative capacities by offering materials and ideas for make-believe play?
2. Does television lead to distortions of reality for children?
3. Can intervention and mediation by an adult while a child views a program, or immediately afterward, evoke changes in make-believe play or stimulate make-believe play?

The information collected from this type of study could provide data to create testable hypotheses. For example, Singer and Singer might have collected enough valuable information from their preliminary study to test these hypotheses:

1. The amount of time a child spends in make-believe play is directly related to the amount of time spent viewing make-believe play on television.
2. A child's level of distortion of reality is directly related to the amount and types of television programs the child views.
3. Parental discussions with children about make-believe play before, during, and after a child watches television programs involving make-believe play increase the child's time involved in make-believe play.

The difference between the two sets of statements is that the research questions pose only general areas of investigation, whereas the hypotheses are testable statements about the relationship(s) between the variables. The only intent in the research question phase is to gather information to help the researchers define and test hypotheses in later projects.

## Research Suppliers and Field Services

Most media researchers do not conduct every phase of every project they supervise. Although they usually design research projects, determine the sample to be studied, and prepare the measurement instruments, researchers generally do not actually make telephone calls or interview respondents in on-site locations. Instead, the researchers contract with a research supplier or a field service to perform these tasks.

Research **suppliers** provide a variety of services. A full-service supplier participates in the design of a study, supervises data collection, tabulates the data, and analyzes the results. The company may work in any field (such as mass media, medical and hospital, or banking) or specialize in only one type of research work. In addition, some companies can execute any type of research method—telephone surveys, one-on-one interviews, shopping center interviews (intercepts), or focus groups—whereas others concentrate on only one method.

Field services usually specialize in conducting telephone interviews, mall intercepts, and one-on-one interviews and in recruiting respondents for group administration (central location testing, or CLT) projects (see Chapter 6) and focus groups. The latter projects are called **prerecruits** (the company prerecruits respondents to attend a research session). Although some field services offer help in questionnaire design and data tabulation, most concentrate on telephone interviews, mall interviews, and prerecruiting.

Field services usually have focus group rooms available (with one-way mirrors to allow clients to view the session) and test kitchens for projects involving food and cooking. Although some field service facilities are gorgeous and elaborate, others look as though the company just filed for bankruptcy protection. Many field services lease space, or lease the right to conduct research, in shopping malls to conduct intercepts. Some field services are actually based in shopping malls.

Hiring a research supplier or field service is a simple process. The researcher calls the company, explains the project, and is given a price quote. A contract or project confirmation letter is usually signed. In some cases, the price quote is a flat fee for the total project, or a fee plus or minus about 10% depending on the eventual difficulty of the project. Sometimes costs are based on the **cost per interview (CPI)**, which is discussed shortly.

Another term that plays an important role in the research process is **incidence**, which describes how easily qualified respondents or subjects can be found for a research project. Incidence is expressed as a percentage of 100: The lower the incidence, the more difficult it is to find a qualified respondent or group of respondents. **Gross incidence** is the percentage of qualified respondents reached of all contacts made (such as telephone calls), and **net incidence** is the number of respondents or subjects who actually participate in a project.

For example, assume that a telephone research study requires 100 female respondents between the ages of 18 and 49 who listen to the radio at least 1 hour per day. The estimated gross incidence is 10%. (Radio and television incidence figures can be estimated by using Arbitron and A. C. Nielsen ratings books; in many cases, however, an incidence is merely a guess on the part of the researcher.) A total of about 1,818 calls will have to be made to recruit the 100 females, not 1,000 calls as some people may think. The number of calls required is not computed as the target sample size (100 in this example) divided by the incidence (.10), or 1,000. The number of calls computed for gross incidence (1,000) must then be divided by the acceptance rate, or the percentage of the target sample that agrees to participate in the study.

The total calls required is 1,000 divided by .55 (a generally used acceptance rate), or 1,818. Of the 1,818 telephone calls made, 10% (182) will qualify for the interview, but only 55% of those (100) will actually agree to complete the interview (net incidence).

Field services and research suppliers base their charges on net incidence, not gross incidence. Many novice researchers fail to take this into account when they plan the financial budget for a project.

There is no "average" incidence rate in research. The actual rate depends on the complexity of the sample desired, the length of the research project, the time of year the study is conducted, and a variety of other factors. The lower the incidence, the higher the cost of a research project. In addition, prices quoted by field services and research suppliers are based on an estimated incidence rate. Costs are adjusted after the project is completed and the actual incidence rate is known. As mentioned earlier, a quote from a field service is usually given with a plus or minus 10% "warning." Some people may think that understanding how a CPI is computed is unnecessary, but the concept is vitally important to any researcher who subcontracts work to a field service or research supplier.

Returning to the CPI discussion, let's assume that a researcher wants to conduct a 400-person telephone study with adults who are between the ages of 18 and 49. A representative of the company first asks for the researcher's estimated incidence and the length of the interview (in minutes). The two figures determine the CPI. Most field services and research suppliers use a chart to compute the CPI, such as the one shown in Table 2.1.

The table is easy to use. To find a CPI, first read across the top of the table for the length of the interview and then scan down the left-hand side for the incidence. For example, the CPI for a 20-minute interview with an incidence of 10% is $30. A researcher conducting a 400-person telephone study with these "specs" will owe the field service or research supplier $12,000 (400 × $30) plus any costs for photocopying the questionnaire, mailing, and tabulating the data (if requested). If the company analyzes the data and writes a final report, the total cost will be between $20,000 and $30,000.

Research projects involving prerecruits, such as focus groups and group administration, involve an additional cost—respondent co-op fees, or incentives. A telephone study respondent generally receives no payment for answering questions. However, when respondents are asked to leave their home to participate in a project, they are usually paid a co-op fee—normally between $25 and $100.

Costs escalate quickly in a prerecruit project. For example, assume that a researcher wants to conduct a group session with 400 respondents instead of using a telephone approach. Rather than paying a field service or a research supplier a CPI to conduct a telephone interview, the payment is for recruiting respondents to attend a session conducted at a specific location. Although most companies have separate rate cards for prerecruiting (they are usually a bit higher than the card used for telephone interviewing), we will assume that the costs are the same. Recruiting costs, then, are $12,000 (400 × $30 CPI), with another $10,000 (minimum) for respondent co-op (400 × $25). Total costs so far are $22,000, about twice as much as those for a telephone study. Moreover, other costs must be added to this figure: a rental fee for the room where the study will be conducted, refreshments for respondents, fees for assistants to check in respondents, and travel expenses (another $1,000–$4,000).

In addition, to ensure that 400 people show up (four sessions of 100 each), it is necessary to overrecruit since not every respondent will "show." In prerecruit projects, field services and research suppliers overrecruit 25% to 100%. In other words, for a 400 "show rate," a company must prerecruit between 500 and 800 people. However, rarely does a prerecruit session hit the target sample size exactly. In many cases, the show rate falls short and a "make-good" session is required (the project is repeated at a later date with another group of respondents to meet the target sample size). In some cases, more respondents than required show for the study, which means that projected research costs may skyrocket over the planned budget.

In most prerecruit projects, field services and research suppliers are paid on a "show basis" only; that is, they receive payment only for respondents who show, not for the number who are recruited. If the companies were paid on a recruiting basis, they could recruit thousands of respondents for each proj-

Table 2.1 *CPI Chart*

| | Minutes | | | | | |
|---|---|---|---|---|---|---|
| **Incidence** | 5 | 10 | 15 | 20 | 25 | 30 |
| 5 | 44.25 | 45.50 | 46.50 | 47.75 | 49.00 | 50.00 |
| 6 | 38.00 | 39.25 | 40.50 | 41.75 | 42.75 | 44.00 |
| 7 | 34.00 | 35.00 | 36.25 | 37.50 | 38.50 | 39.75 |
| 8 | 30.75 | 32.00 | 33.00 | 34.25 | 35.50 | 36.50 |
| 9 | 28.50 | 29.50 | 30.75 | 32.00 | 33.00 | 34.25 |
| 10 | 26.50 | 27.75 | 29.00 | 30.00 | 31.25 | 32.50 |
| 20 | 14.25 | 15.50 | 16.75 | 17.75 | 19.00 | 20.25 |
| 30 | 10.25 | 11.50 | 12.50 | 13.75 | 15.00 | 16.25 |
| 40 | 8.25 | 9.50 | 10.50 | 11.75 | 13.00 | 14.25 |
| 50 | 7.00 | 8.25 | 9.50 | 10.50 | 11.75 | 13.00 |
| 60 | 6.50 | 7.75 | 9.00 | 10.00 | 11.25 | 12.50 |
| 70 | 6.00 | 7.25 | 8.50 | 9.50 | 10.75 | 11.75 |
| 80 | 5.75 | 7.00 | 8.00 | 9.25 | 10.50 | 11.50 |
| 90 | 5.50 | 6.75 | 8.00 | 9.00 | 10.25 | 11.00 |
| 100 | 5.00 | 6.50 | 7.75 | 9.00 | 10.00 | 10.50 |

ect. The show-basis payment procedure also adds incentive for the companies to ensure that those who are recruited actually show up for the research session.

Although various problems with hiring and working with research suppliers and field services are discussed in Chapter 6, we present two important points here to help novice researchers when they begin to use these support companies. (See the Internet at *www.greenbook.org* for a list of some research suppliers.)

1. *All suppliers and field services are not equal.* Regardless of qualifications, any person or group can form a research supply company or field service. There are no formal requirements, no tests to take, and no national, state, or regional licenses to acquire. All that's required are a "shingle on the door," advertising in marketing and research trade publications, and (optional) membership in one or more of the voluntary research organizations. Thus it is the sole responsibility of researchers to determine which of the hundreds of suppliers available are capable of conducting a professional, scientifically based research project. Over time, experienced researchers develop a list of qualified companies that are professional and trustworthy. This list comes

from experience with a company or from the recommendations of other researchers. In any event, it is important to check the credentials of a research supplier or field service. The senior author has encountered several instances of research supplier and field service fraud during the past 20+ years in the industry.

2. *The researcher must maintain close supervision over the project.* This is true even with the very good companies, not because their professionalism cannot be trusted but rather to be sure that the project is answering the questions that were posed. Because of security considerations, a research supplier may never completely understand why a particular project is being conducted, and the researcher needs to be sure that the project will provide the exact information required.

## Data Analysis and Interpretation

The time and effort required for data analysis and interpretation depend on the study's purpose and the methodology used. Analysis and interpretation may take from several days to several months. In many private sector research studies involving only a single question, data analysis and interpretation may be completed in a few minutes. For example, a radio station may be interested in finding out its listeners' perceptions of the morning show team. After a survey is conducted, that question may be answered by summarizing only one or two items on the questionnaire. The summary then may determine whether the morning show team "stays" or "goes."

Every analysis should be carefully planned and performed according to specific guidelines. Once the computations have been completed, the researcher must step back and consider what has been discovered. The results must be analyzed with reference to their external validity and the likelihood of their accuracy. Here, for example, is an excerpt from the conclusion drawn by Singer and Singer (1981, p. 385):

> Television by its very nature is a medium that emphasizes those very elements that are generally found in imagination: visual fluidity, time and space flexibility and make-believe. . . . Very little effort has emerged from producers or educators to develop age-specific programming. . . . It is evident that more research for the development of programming and adult mediation is urgently needed.

Researchers must determine through analysis whether their work is both internally and externally valid. This chapter has touched briefly on the concept of external validity: An externally valid study is one whose results can be generalized to the population. To assess **internal validity**, on the other hand, one asks: Does the study really investigate the proposed research question?

### Internal Validity

Control over research conditions is necessary to enable researchers to rule out plausible but incorrect explanations of results. If, for example, a researcher is interested in verifying that "$y$ is a function of $x$," or $y = f(x)$, control over the research conditions is necessary to eliminate the possibility of finding that $y = f(b)$, where $b$ is an extraneous variable. Any such variable that creates a plausible but incorrect explanation of results is called an artifact (also referred to as an extraneous, or confounding, variable). The presence of an artifact indicates a lack of internal validity; that is, the study has failed to investigate its hypothesis.

Suppose, for example, that researchers discover through a study that children who view television for extended periods of time have lower grade point averages in school than children who watch only a limited amount of television. Could an artifact have created this finding? It may be that children who view fewer hours of television also receive parental help with their school work; parental help (the artifact), not hours of television viewed, may be the reason for the difference in grade point averages between the two groups.

Artifacts in research may arise from several sources. Those most frequently encountered are described next. Researchers should be familiar with these sources to achieve internal validity in the experiments they conduct (Campbell & Stanley, 1963; Cook & Campbell, 1979).

1. *History.* Various events that occur during a study may affect the subjects' attitudes, opinions, and behavior. For example, to analyze an oil company's public relations campaign for a new product, researchers first pretest subjects' attitudes toward the company. The subjects are next exposed to an experimental promotional campaign (the *experimental treatment*); then a posttest is administered to determine whether changes in attitude occur as a result of the campaign. Suppose the results indicate that the public relations campaign was a complete failure, that the subjects display a very poor perception of the oil company in the posttest. Before the results are reported, the researchers must determine whether an intervening variable could have caused the poor perception. An investigation discloses that during the period between tests, subjects learned from a television news story that a tanker owned by the oil company spilled millions of gallons of crude oil into the North Atlantic. News of the oil spill—not the public relations campaign—may have acted as an artifact to create the poor perception. The potential to confound a study is compounded as the time increases between a pretest and a posttest.

The effects of history in a study can be devastating, as was shown during the late 1970s and early 1980s, when several broadcast companies and other private businesses perceived a need to develop Subscription Television (STV) in various markets throughout the country where cable television penetration was thought to be very low. An STV service allows a household, using a special antenna, to receive pay television services similar to *Home Box Office* or *Showtime*. Several cities became prime targets for STV because both Arbitron and A. C. Nielsen reported very low cable penetration. Research conducted in these cities supported the Arbitron and Nielsen data. In addition, the research found that people who did not have access to cable television were very receptive to the idea of STV. However, it was discovered later that even as some studies were being conducted, cable companies in the target areas were expanding very rapidly and had wired many previously nonwired neighborhoods. What were once prime targets for STV soon became accessible to cable television. The major problem was that researchers attempting to determine the feasibility of STV failed to consider the historical changes (wiring of the cities) that could affect the results of their research. The result was that many companies lost millions of dollars and STV soon faded away.

2. *Maturation.* Subjects' biological and psychological characteristics change during the course of a study. Growing hungry or tired or becoming older may influence how subjects respond in a research study. An example of how maturation can affect a research project was seen in the early 1980s, when radio stations around the country began to test their music playlist in auditorium sessions (see Chapter 15). Some unskilled research companies tested as many as 600

songs in one session and wondered why the songs after about 400 tested differently from the others. Without a great deal of investigation, researchers discovered that the respondents were physically and emotionally drained once they reached 400 songs (about 70 minutes of testing time), and they merely wrote down any number just to complete the project.

Technology has changed the approach in music testing. In several studies during 1997 and 1998, Wimmer-Hudson Research & Development found that if a professional production company is used to produce consistent hooks (song segments), it is possible to test as many as 600 songs in one session without compromising the data.

3. *Testing.* Testing itself may be an artifact, particularly when subjects are given similar pretests and posttests. A pretest may sensitize subjects to the material and improve their posttest scores regardless of the type of experimental treatment given to them. This is especially true when the same test is used for both situations. Subjects learn how to answer questions and to anticipate researchers' demands. To guard against the effects of testing, different pretests and posttests are required. Or, instead of being given a pretest, subjects can be tested for similarity (homogeneity) by means of a variable or set of variables that differs from the experimental variable. The pretest is not the only way to establish a *point of prior equivalency* (the point at which the groups were equal before the experiment) between groups; this also can be done through sampling (randomization and matching). For further discussion on controlling confounding variables within the context of an experiment, see Chapter 10.

4. *Instrumentation.* Also known as instrument decay, this term refers to the deterioration of research instruments or methods over the course of a study. Equipment may wear out, observers may become more casual in recording their observations, and interviewers who memorize frequently asked questions may fail to present them in the proper order. Some college entrance tests, such as the SAT and ACT, are targets of debate by many researchers and statisticians. The complaints mainly address the concern that the current tests do not adequately measure knowledge of today, but rather what was once considered necessary and important.

5. *Statistical regression.* Subjects who achieve either very high or very low scores on a test tend to regress to the sample or population mean during subsequent testing sessions. Often outliers (subjects whose pretest scores are far from the mean) are selected for further testing or evaluation. Suppose, for example, that researchers develop a series of television programs designed to teach simple mathematical concepts, and they select only subjects who score very low on a mathematical aptitude pretest. An experimental treatment is designed to expose these subjects to the new television series, and a posttest is given to determine whether the programs increased the subjects' knowledge of simple math concepts. The experimental study may show that indeed, after only one or two exposures to the new programs, math scores increased. But the higher scores on the posttest may not be due to the television programs; they may be a function of statistical regression. That is, regardless of whether the subjects viewed the programs, the scores in the sample may have increased merely because of statistical regression to the mean. The programs should be tested with a variety of subjects, not just those who score low on a pretest. (The significance of regression toward the mean is relevant to a variety of areas such as stock market prices and the standings of professional sports teams.)

6. *Experimental mortality.* All research studies face the possibility that subjects will drop out for one reason or another. Especially in long-term studies, subjects may refuse to continue with the project, become ill, move away, drop out of school, or quit work. This

mortality, or loss of subjects, is sure to have an effect on the results of a study because most research methods and statistical analyses make assumptions about the number of subjects used. It is always better, as mentioned in Chapter 5, to select more subjects than are actually required—within the budget limits of the study. It is not uncommon to lose 50% or more of the subjects from one testing period to another (Wimmer, 1995).

7. *Sample selection.* Most research designs compare two or more groups of subjects to determine whether differences exist on the dependent measurement. These groups must be selected randomly and tested for homogeneity to ensure that results are not due to the type of sample used (see Chapter 5).

8. *Demand characteristics.* The term **demand characteristics** is used to describe subjects' reactions to experimental conditions. Orne (1969) suggests that, under some circumstances, subjects' awareness of the experimental purpose may be the sole determinant of how they behave; that is, subjects who recognize the purpose of a study may produce only "good" data for researchers.

Novice researchers quickly learn about the many variations of demand characteristics. For example, research studies seeking to find out about respondents' listening and viewing habits always find subjects who report high levels of NPR and PBS listening and viewing. However, when the same subjects are asked to name their favorite NPR or PBS programs, many cannot recall a single one. (In other words, the respondents are not telling the truth.)

Cross-validating questions are often necessary to verify subjects' responses; by giving subjects the opportunity to answer the same question phrased in different ways, the researcher can spot discrepant, potentially error-producing responses. In addition, researchers can help control demand characteristics by disguising the real purpose of the study; however, researchers should use caution when employing this technique (see Chapter 4).

In addition, most respondents who participate in research projects are eager to provide the information the researcher requests. They are flattered to be asked for their opinions. Unfortunately, this means that they will answer any type of question, even if the question is totally ambiguous, misleading, vague, or absolutely uninterpretable. For example, this book's senior author conducted a telephone study in the early 1990s with respondents in area code 717 of Pennsylvania. An interviewer mistakenly called area code 714 (Orange County, California). For nearly 20 minutes, the respondent in California answered questions about radio stations with W call letters—stations impossible for her to pick up on any radio. The problem was discovered during questionnaire validation.

9. *Experimenter bias.* Rosenthal (1969) discusses a variety of ways in which a researcher may influence the results of a study. Bias can enter through mistakes made in observation, data recording, mathematical computations, and interpretation. Whether experimenter errors are intentional or unintentional, they usually support the researcher's hypothesis and are considered to be biased (Walizer & Wienir, 1978).

Experimenter bias can also enter into any phase of a research project if the researcher becomes swayed by a client's wishes for a project's end results. Such a situation can cause significant problems for researchers if they do not remain totally objective throughout the entire project, especially when they are hired by individuals or companies to "prove a point" or to provide "supporting information" for a decision (this is usually unknown to the researcher). For example, the news director at a local television station may dislike a particular news anchor and want information to justify the dislike (in order to fire the anchor). A researcher is hired under the guise of finding out whether the audience likes or dislikes the anchor. In this case, it is easy for the news director to intentionally or unintentionally sway the results through conversations with the researcher in the planning stages of the study. It is possible for a researcher, either intentionally or unintentionally, to interpret the results in a way that supports the program director's desire to eliminate the anchor. The researcher may, for instance, have like/dislike numbers that are very close, but may give the "edge" to dislike because of the news director's influence.

Experimenter bias is a potential problem in all phases of research, and those conducting a study must be aware of problems caused by outside influences. Several procedures can help to reduce experimenter bias. For example, individuals who provide instructions to subjects and make observations should not be informed of the purpose of the study; experimenters and others involved in the research should not know whether subjects belong to the experimental group or the control group (called a **double-blind experiment**); and automated devices such as tape recorders should be used whenever possible to provide uniform instructions to subjects. (See Chapter 10 for more information about control groups.)

Researchers can also ask clients not to discuss the intent of a research project beyond what type of information is desired. In the news anchor example, the program director should say only that information is desired about the like/dislike of the program and should not discuss what decisions will be made following the research. In cases where researchers must be told about the purpose of the project, or where the researcher is conducting the study independently, experimenter bias must be repressed at every phase.

10. *Evaluation apprehension.* Rosenberg's (1965) concept of **evaluation apprehension** is similar to demand characteristics, but it emphasizes that subjects are essentially *afraid* of being measured or tested. They are interested in receiving only positive evaluations from the researcher and from the other subjects involved in the study. Most people are hesitant to exhibit behavior that differs from the norm and tend to follow the group even though they may totally disagree with the others. The researcher's task is to try to eliminate this passiveness by letting subjects know that their individual responses are important.

11. *Causal time order.* The organization of an experiment may create problems with data collection and interpretation. It may be that an experiment's results are not due to the stimulus (independent) variable, but rather to the effect of the dependent variable. For example, respondents in an experiment that is attempting to determine how magazine advertising layouts influence their purchasing behavior may change their opinions when they read or complete a questionnaire after viewing several ads.

12. *Diffusion or imitation of treatments.* In situations where respondents participate at different times during one day or over several days, or where groups of respondents are studied one after another, respondents may have the opportunity to discuss the project with someone else and contaminate the research project. This is a special problem with focus groups when one group leaves the focus room at the same time a new group enters.

13. *Compensation.* Sometimes individuals who work with a control group (the one that receives no experimental treatment) may unknowingly treat the group differently because the group is "deprived" of something. In this case, the control group is no longer legitimate.

14. *Compensatory rivalry.* In some situations, subjects who know they are in a control group may work harder or perform differently to outperform the experimental group.

15. *Demoralization.* Control group subjects may literally lose interest in a project because they are not experimental subjects. These people may give up or fail to perform normally

because they may feel demoralized or angry that they are not in the experimental group.

The sources of internal invalidity are complex and may arise in all phases of research. For this reason, it is easy to see why the results from a single study cannot be used to refute or support a theory or hypothesis. In attempting to control these artifacts, researchers use a variety of experimental designs and try to keep strict control over the research process so that subjects and researchers do not intentionally or unintentionally influence the results. As Hyman (1954) recognizes:

> All scientific inquiry is subject to error, and it is far better to be aware of this, to study the sources in an attempt to reduce it, and to estimate the magnitude of such errors in our findings, than to be ignorant of the errors concealed in our data.

Search the Internet for "internal validity" for hundreds of articles and interesting examples.

### External Validity

External validity refers to how well the results of a study can be generalized across populations, settings, and time (Cook & Campbell, 1979). The external validity of a study can be severely affected by the interaction in an analysis of variables such as subject selection, instrumentation, and experimental conditions (Campbell & Stanley, 1963). A study that lacks external validity cannot be projected to other situations; it is valid only for the sample tested.

Most procedures used to guard against external invalidity relate to sample selection. Cook and Campbell (1979) make three suggestions:

1. Use random samples.
2. Use heterogeneous samples and replicate the study several times.
3. Select a sample that is representative of the group to which the results will be generalized.

Using random samples rather than convenience or available samples allows researchers to gather information from a variety of subjects rather than from those who may share similar attitudes, opinions, and lifestyles. As discussed in Chapter 5, a random sample means that everyone (within the guidelines of the project) has an equal chance of being selected for the research study.

Several replicated research projects using samples with a variety of characteristics (heterogeneous) allow researchers to test hypotheses and research questions and not worry that the results will apply to only one type of subject.

Selecting a sample that is representative of the group to which the results will be generalized is basic common sense. For example, the results from a study of a group of high school students cannot be generalized to a group of college students.

A fourth way to increase external validity is to conduct research over a long period of time. Mass media research is often designed as short-term projects that expose subjects to an experimental treatment and then immediately test or measure them. In many cases, however, the immediate effects of a treatment are negligible. In advertising, for example, research studies designed to measure brand awareness are generally based on only one exposure to a commercial or advertisement. It is well known that persuasion and attitude change rarely take place after only one exposure; they require multiple exposures over time. Logically, then, such measurements should be made over weeks or months to take into account the "sleeper" effect—that attitude change may be minimal or nonexistent in the short run and still prove significant in the long run.

An Internet search of "external validity" provides hundreds of references for additional information and examples.

## Presenting Results

The format used to present results depends on the purpose of the study. Research intended for publication in academic journals follows a format prescribed by each journal; research conducted for management in the private sector tends to be reported in simpler terms, often excluding detailed explanations of sampling, methodology, and review of literature. However, all results must be presented in a clear and concise manner appropriate to both the research question and the individuals who will read the report. (See Appendix 5.)

## Replication

One important point mentioned throughout this book is that the results of any single study are, by themselves, only indications of what might exist. A study provides information that says, in effect, "This is what may be the case." For others to be relatively certain of the results of any study, the research must be replicated. Too often researchers conduct one study and report the results as if they are providing the basis for a theory or a law. The information presented in this chapter, and in other chapters that deal with internal and external validity, argues that this cannot be true.

A research question or hypothesis must be investigated from many different perspectives before any significance can be attributed to the results of one study. Research methods and designs must be altered to eliminate design-specific results—that is, results that are based on, and hence specific to, the design used. Similarly, subjects with a variety of characteristics should be studied from many angles to eliminate sample-specific results, and statistical analyses need to be varied to eliminate method-specific results. In other words, every effort must be made to ensure that the results of any single study are not created by or dependent on a methodological factor; studies must be replicated.

Researchers overwhelmingly advocate the use of **replication** to establish scientific fact. Lykken (1968) and Kelly, Chase, and Tucker (1979) identify four basic types of replication that can be used to help validate a scientific test:

1. **Literal replication** involves the exact duplication of a previous analysis, including the sampling procedures, experimental conditions, measuring techniques, and methods of data analysis.
2. **Operational replication** attempts to duplicate only the sampling and experimental procedures of a previous analysis, to test whether the procedures will produce similar results.
3. **Instrumental replication** attempts to duplicate the dependent measures used in a previous study and to vary the experimental conditions of the original study.
4. **Constructive replication** tests the validity of methods used previously by deliberately not imitating the earlier study; both the manipulations and the measures differ from those used in the first study. The researcher simply begins with a statement of empirical "fact" uncovered in a previous study and attempts to find the same "fact."

Despite the obvious need to replicate research, mass media researchers generally ignore this important step, probably because many feel that replications are not as glamorous or important as original research. The wise researcher recognizes that even though replications may lack glamour, they most certainly do not lack importance.

Table 2.2 *Determining a CPI*

| Step | | Explanation |
|---|---|---|
| 1. Gross incidence | 1,000 | 100 ÷ .10 |
| 2. Acceptance rate | 55% | Standard figure used. Use acceptance rate to determine how many calls are needed. |
| 3. Actual contacts necessary | 1,818 | 1,000 ÷ .55 |
| 4. Minutes per contact | 4 | Number of minutes to find correct respondent (bad numbers, busy lines, etc.) |
| 5. Total contact minutes | 7,272 | 4 × 1,818 |
| 6. Productive minutes per hour | 40 | Average number of minutes interviewers usually work in 1 hour (net of breaks, etc.) |
| 7. Total contact hours | 182 | 7,272 ÷ 40 |
| 8. Total interview hours | 33 | 100 × 20 minutes |
| 9. Total hours | 215 | Contact hours + interview hours |
| 10. Hourly rate | $15 | Industry standard |
| 11. Total cost | $3,225 | 215 × $15 |
| 12. CPI | $32.25 | $3,225 ÷ 100 interviews |

## ▪ Supplement on Incidence Rates and CPI

Incidence rate is an important concept in research because it determines both the difficulty and the cost of a research project. Table 2.1 (on page 31) illustrates a standard CPI rate chart. The specific rates shown on the chart are computed through a complicated series of steps. Without exact detail, this supplement explains the general procedure of how each CPI is computed.

As mentioned earlier, CPI is based on the incidence rate and interview length. In prerecruiting, only incidence is considered, but the CPIs are basically the same as those for telephone interviews. To determine a CPI, let us assume we wish to conduct a 100-person telephone study, with an incidence rate of 10% and an interview length of 20 minutes. The computation and an explanation of each step are shown in Table 2.2. As shown in the table, 1,818 contacts must be made. Of these, 10% will qualify for the interview (182) and 55% of these will accept (100). The total number of hours required to conduct the 100-person survey is 215, with a CPI of $32.25.

## ▪ ▪ ▪ Summary

This chapter described the processes involved in identifying and developing a topic for research investigation. It was suggested that researchers consider several sources for potential ideas, including a critical analysis of everyday situations. The steps in developing a topic for investigation naturally become easier with experience; the beginning researcher needs to pay particular attention to material already available. He or she should not attempt to tackle broad research questions but should try to isolate a smaller, more practical subtopic for study. The researcher should develop an appropriate method of analysis and then proceed, through data analysis and interpretation, to a clear and concise presentation of results.

The chapter stressed that the results of a single survey or other research approach provide only indications of what may or may not exist. Before the researcher can claim support for a research question or hypothesis, the study must be replicated a number of times to eliminate dependence on extraneous factors.

While conducting research studies, the investigator must be constantly aware of potential sources of error that may create spurious results. Phenomena that affect an experiment in this way are sources of breakdowns in internal validity. Only if differing and rival hypotheses are ruled out can researchers validly say that the treatment was influential in creating differences between the experimental group and the control group. A good explanation of research results rules out intervening variables; every plausible alternative explanation should be considered. However, even when this is accomplished, the results of one study can be considered only as an indication of what may or may not exist. Support for a theory or hypothesis is gained only after several other studies produce similar results.

In addition, if a study is to be helpful in understanding mass media, its results must be generalizable to subjects and groups other than those involved in the experiment. External validity can be best achieved through random sampling (see Chapter 5).

## Questions and Problems for Further Investigation

1. The focus of this chapter is on developing a research topic by defining a major problem area and then narrowing the topic to a manageable study. Develop two different research projects in an area of mass media research. Use either an outline format or a flowchart format.
2. Replication has long been a topic of debate in scientific research, but mass media researchers have not paid much attention to it. Why do you think this is true?
3. An analysis of the effects of television viewing revealed that the fewer hours of television students watched per week, the higher were their scores in school. What alternative explanations or artifacts might explain such differences? How could these variables be controlled?
4. The fact that some respondents will answer any type of question, whether it is a legitimate question or not, may surprise some novice researchers until they encounter it firsthand. Try posing the following question to a friend in another class or at a party: What effects do you think the sinking of Greenland into the Labrador Sea will have on the country's fishing industry?
5. To develop a research topic, try this experiment: Sit down with paper and pencil and write the word *why?* Under that word, prepare a list of questions that have always interested you. Then try to develop each topic into a potential research project. Don't get frustrated.
6. Spend a few hours on the Internet searching for information on topics that interest you. Go to a search engine and type in words such as "viewers," "listeners," or "readers."
7. If you are using *InfoTrac College Edition,* you can get a good sampling of recent research topics in media research by looking up "mass media research" in the subject guide. Note that popular publications as well as scholarly journals contain articles on this topic.

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Chapter 3

# Elements of Research

- *Concepts and Constructs*
- *Measurement*
- *Discrete and Continuous Variables*
- *Measurement Scales*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

Chapters 1 and 2 presented an overview of the research process. In this chapter we define and discuss four basic elements of this process: concepts and constructs, measurement, variables, and scales. A clear understanding of these elements is essential to conducting precise and meaningful research.

## Concepts and Constructs

A concept is a term that expresses an abstract idea formed by generalizing from particulars and summarizing related observations. For example, a researcher might observe that a public speaker becomes restless, starts to perspire, and continually fidgets with a pencil just before giving an address. The researcher might summarize these observed patterns of behavior and label them "speech anxiety." On a more prosaic level, the word *table* is a concept that represents a wide variety of observable objects, ranging from a plank supported by concrete blocks to a piece of furniture commonly found in dining rooms. Typical concepts in mass media research include terms such as *advertising effectiveness, message length, media usage,* and *readability.*

Concepts are important for at least two reasons. First, they simplify the research process by combining particular characteristics, objects, or people into more general categories. For example, a researcher may study families that own personal computers, modems, VCRs, CD players, cellular phones, and DVD machines. To make it easier to describe these families, the researcher calls them "Taffies" and categorizes them under the concept of "technologically advanced families." Now, instead of describing each of the characteristics that make these families unique, the researcher has a general term that is more inclusive and convenient to use.

Second, concepts simplify communication among those who have a shared understanding of them. Researchers use concepts to organize their observations into meaningful summaries and to transmit this information to their colleagues. Researchers who use the concept of "agenda setting" to describe a complicated set of audience and media activities find that their colleagues understand what is being discussed. Note that people must share an understanding of a concept in order for the concept to be useful. For example, when teenagers use the word *phat* to describe an activity, most of their peers understand perfectly what is meant by the concept, although many adults may not.

A construct is a concept that has three distinct characteristics. First, it is an abstract notion that is usually broken down into dimensions represented by lower-level concepts. In other words, a construct is a combination of concepts. Second, because of its abstraction, a construct usually cannot be observed directly. Third, a construct is usually designed for some particular research purpose so that its exact meaning relates only to the context in which it is found. For example, the construct "involvement" has been used in many advertising studies (Pokrywczynski, 1986). It is a construct that is difficult to see directly, and it includes the concepts of attention, interest, and arousal.

Researchers can observe only its likely or presumed manifestations. In some contexts involvement means product involvement; in others it refers to involvement with the message or even with the medium. Its precise meaning depends on the research context.

To take another example, in mass communication research, the term *authoritarianism* represents a construct defined to describe a certain type of personality; it comprises nine different concepts, including conventionalism, submission, superstition, and cynicism. Authoritarianism itself cannot be seen; some type of questionnaire or standardized test must determine its presence. The results of such tests indicate what authoritarianism might be and whether it is present under given conditions, but the tests do not provide exact definitions for the construct itself.

The empirical counterpart of a construct or concept is called a **variable**. Variables are important because they link the empirical world with the theoretical; they are the phenomena and events that can be measured or manipulated in research. Variables can have more than one value along a continuum. For example, the variable "satisfaction with pay-per-view TV programs" can take on different values—a person can be satisfied a lot, a little, or not at all—reflecting in the empirical world what the concept "satisfaction with pay-per-view TV programs" represents in the theoretical world.

Researchers try to test a number of associated variables to develop an underlying meaning or relationship among them. After suitable analysis, the most important variables are retained and the others are discarded. These important variables are labeled **marker variables** because they seem to define or highlight the construct under study. After further analysis, new marker variables may be added to increase understanding of the construct and to permit more reliable predictions.

Concepts and constructs are valuable tools in theoretical research, but, as noted in Chapter 1, researchers also function at the observational, or empirical, level. To understand how this is done, it is necessary to examine variables and to know how they are measured.

## Independent and Dependent Variables

Variables are classified in terms of their relationship with one another. It is customary to talk about independent and dependent variables: **Independent variables** are systematically varied by the researcher, and **dependent variables** are observed and their values presumed to depend on the effects of the independent variables. In other words, *the dependent variable is what the researcher wishes to explain.* For example, assume that an investigator is interested in determining how the angle of a camera shot affects an audience's perception of the credibility of a television newscaster. Three versions of a newscast are videotaped: one shot from a very low angle, another from a high angle, and a third from eye level. Groups of subjects are randomly assigned to view one of the three versions and to complete a questionnaire that measures the newscaster's credibility. In this experiment, the camera angle is the independent variable. The experimenter, who selects only three of the camera angles possible, systematically varies its values. The dependent variable to be measured is the perceived credibility of the newscaster. If the researcher's assumption is correct, the newscaster's credibility will vary according to the camera angle. (Note that the values of the dependent variable are not manipulated; they are simply observed or measured.)

Keep in mind that the distinction between types of variables depends on the purposes of the research. An independent variable in one study may be a dependent variable in another. Also, a research task may involve examining the relationship of more than one independent variable to a single dependent variable. For example, the researcher in the previous example could investigate the effects not only of camera angles but also of closing styles on the newscaster's credibility (as perceived by the viewers). Moreover, in many instances multiple dependent variables are measured in a single study. This type of study is called a *multivariate* analysis.

## *Other Types of Variables*

In nonexperimental research, where there is no active manipulation of variables, different terms are sometimes substituted for independent and dependent variables. The variable that is used for predictions or is assumed to be causal (analogous to the independent variable) is sometimes called the **predictor,** or **antecedent variable.** The variable that is predicted or assumed to be affected (analogous to the dependent variable) is sometimes called the **criterion variable.**

Researchers often wish to account for or control variables of certain types in order to eliminate unwanted influences. These **control variables** are used to ensure that the results of the study are due to the independent variables, not to another source. However, a control variable need not always be used to eliminate an unwanted influence. On occasion, researchers use a control variable such as age, gender, or socioeconomic status to divide subjects into specific, relevant categories. For example, in studying the relationship between newspaper readership and reading ability, researchers know that IQ will affect the relationship and must be controlled; thus, subjects may be selected based on IQ scores or placed in groups with similar scores.

One of the most difficult aspects of any type of research is identifying all the variables that may create spurious or misleading results. Some researchers refer to this problem as "noise." Noise can occur in even very simple research projects. For example, a researcher might design a telephone survey that asks respondents to name the local radio station they listened to most during the past week. The researcher uses an open-ended question—that is, provides no specific response choices—and the interviewer writes down each respondent's answer. When the completed surveys are tabulated, the researcher notices that several people mentioned radio station WAAA. But if the city has a WAAA-AM and a WAAA-FM, which station gets the credit? The researcher cannot arbitrarily assign credit to the AM station or to the FM station; nor can credit be split because such a practice may distort the description of the actual listening pattern.

Interviewers could attempt callbacks to everyone who said "WAAA," but this is not suggested for two reasons: (1) the likelihood of reaching all the people who gave that response is low, and (2) even if the first condition is met, some respondents may not recall which station they originally mentioned. The researcher is therefore unable to provide a reliable analysis of the data because not all possible intervening variables were considered. (The researcher should have foreseen this problem, and the interviewers should have been instructed to find out in each case whether WAAA meant the AM or the FM station.)

People who unknowingly provide false information create another type of research noise. For example, people who keep diaries for radio and television surveys may err in recording the station or channel they tune in; that is, they may listen to or watch station KAAA but incorrectly record "KBBB." (This problem is partially solved by the use of **people meters;** see Chapter 16.) In addition, people often answer a multiple-choice or yes/no research question at random because they do not wish to appear ignorant or uninformed. To minimize this problem, researchers should construct their measurement instruments with great care. Noise is always present, but a large and representative sample should decrease the effects of some research noise. (In later chapters, noise is referred to as "error.")

Table 3.1 *Examples of Operational Definitions*

| Study | Variable | Operational Definition |
|---|---|---|
| Whitmore and Tiene (1994) | Current events knowledge | Scores on the Associated Press Weekly News Quiz |
| Jacobs (1995) | Consumer satisfaction with cable system | 15-item scale designed to tap subscribers' evaluations of cable systems |
| Kaid, Chanslor and Hovind (1992) | Image evaluation of political candidate | Summated ratings on a 12-item semantic differential |
| Shah and Gayatri (1994) | Development news | Any news item related to development priorities outlined in the fifth Indonesian Five-Year Plan, 1989–1994 |
| Demers (1994) | Organizational size of daily newspapers | Newspapers' daily circulation figures |

Researchers learn to solve many simplistic problems in their studies with experience. In many situations, however, researchers understand that total control over all aspects of the research is impossible, and they account for the impossibility of achieving perfect control in the interpretation of their results.

### *Defining Variables Operationally*

In Chapter 2 we stated that an operational definition specifies the procedures to be followed in experiencing or measuring a concept. Research depends on observations, and observations cannot be made without a clear statement of what is to be observed. An operational definition is such a statement.

Operational definitions are indispensable in scientific research because they enable investigators to measure relevant variables. In any study, it is necessary to provide operational definitions for both independent variables and dependent variables. Table 3.1 lists examples of such definitions taken from research studies in mass communication.

Kerlinger (1986) identifies two types of operational definitions, measured and experimental. A measured operational definition specifies how to measure a variable. For instance, a researcher investigating *dogmatism* and media use might operationally define the term *dogmatism* as a subject's score on the Twenty-Item Short Form Dogmatism Scale. An experimental operational definition explains how an investigator has manipulated a variable. Obviously, this type of definition is used when the independent variable is defined in a laboratory setting. For example, in a study on the impact of television violence, the researcher might manipulate media violence by constructing two 8-minute films. The first film, labeled "the violent condition," could contain scenes from a boxing match. The second film, labeled "the nonviolent condition," could depict a swimming race. Similarly, source credibility might be manipulated by alternately attributing an article on health to the *New England Journal of Medicine* and to the *National Enquirer.*

Operationally defining a variable forces a researcher to express abstract concepts in concrete terms. Occasionally, after unsuccessfully grappling with the task of making a key variable operational, the researcher may conclude that the variable as originally conceived is too vague or ambiguous and must be redefined. Because operational definitions are expressed so concretely, they can communicate exactly what the terms represent. For instance, a researcher might define "political knowledge" as the number of correct answers on a 20-item true/false test. Although it is possible to argue about the validity of the definition, there is no confusion as to what the statement "Women possess more political knowledge than men" actually means.

Finally, there is no single infallible method for operationally defining a variable. No operational definition satisfies everybody. The investigator must decide which method is best suited for the research problem at hand. This is demonstrated by the numerous articles and examples available from an Internet search of "operational definition."

## ▪ Measurement

Mass media research, like all research, can be qualitative or quantitative. **Qualitative research** involves several methods of data collection, such as focus groups, field observation, in-depth interviews, and case studies. Although there are substantial differences among these techniques, all involve what some writers refer to as "getting close to the data" (Chadwick, Bahr & Albrecht, 1984).

Qualitative research has certain advantages. In most cases, it allows a researcher to view behavior in a natural setting without the artificiality that sometimes surrounds experimental or survey research. In addition, qualitative techniques can increase a researcher's depth of understanding of the phenomenon under investigation. This is especially true when the phenomenon has not been investigated previously. Finally, qualitative methods are flexible and allow the researcher to pursue new areas of interest. A questionnaire is unlikely to provide data about questions that were not asked, but a person conducting a field observation or focus group might discover facets of a subject that were not considered before the study began.

There are, however, some disadvantages associated with qualitative methods. First of all, sample sizes are usually too small (sometimes as small as one) to allow the researcher to generalize the data beyond the sample selected for the particular study. For this reason, qualitative research is often the preliminary step to further investigation rather than the final phase of a project. The information collected from qualitative methods is often used to prepare a more elaborate quantitative analysis, although the qualitative data may in fact constitute all the information needed for a particular study.

Reliability of the data can also be a problem, since single observers are describing unique events. Because a person doing qualitative research must become closely involved with the respondents, it is possible to lose objectivity when collecting data. A researcher who becomes too close to the study may lose the necessary professional detachment.

Finally, if qualitative research is not properly planned, the project may produce nothing of value. Qualitative research appears to be easy to conduct, but projects must be carefully planned to ensure that they focus on key issues. Although this book is primarily concerned with quantitative research, we discuss several qualitative methods in Chapter 6.

**Quantitative research** requires that the variables under consideration be measured. This form of research is concerned with how often a variable is present and generally uses numbers to communicate this amount. Quantitative research has certain advantages. One is that the use of numbers allows greater precision in reporting results. For example, the Violence Index (Gerbner, Gross, Morgan & Signorielli, 1980), a quantitative measuring device, makes it possible to report the exact increase or decrease in violence from one television season to another, whereas qualitative research could describe only whether there was more or less violence. Another advantage is that quantitative research permits the use of powerful methods of mathematical analysis. The importance of mathematics to mass media research is difficult to overemphasize. As pointed out by measurement expert J. P. Guilford (1954, p. 1):

> The progress and maturity of a science are often judged by the extent to which it has succeeded in the use of mathematics. . . . Mathematics is a universal language that any science or technology may use with great power and convenience. Its vocabulary of terms is unlimited. . . . Its rules of operation . . . are unexcelled for logical precision.

For the past several years, some friction has existed in the mass media field and in other disciplines between those who favor quantitative methods and those who prefer qualitative methods. Most researchers have now come to realize that both methods are important in understanding any phenomenon. In fact, the term **triangulation**, commonly used by marine navigators, frequently comes up in conversations about communication research. If a ship picks up signals from only one navigational aid, it is impossible to know the vessel's precise location. If, however, signals from more than one source are detected, elementary geometry can be used to pinpoint the ship's location. In this book, the term *triangulation* refers to the use of both qualitative methods and quantitative methods to fully understand the nature of a research problem.

For example, an investigation by Krugman and Johnson (1991) illustrates the use of triangulation. The purpose of their investigation was to determine the differences in viewer involvement when subjects viewed standard broadcast television programs as opposed to VCR movie rentals. Using a combination of focus groups, mail surveys, and in-home observations, the authors found that respondents viewing VCR rentals showed a higher level of undistracted viewing and were more involved than when they were viewing standard broadcast television programs.

Although most of this book is concerned with skills relevant to quantitative research, we are not implying that quantitative research is in any sense "better" than qualitative research. Obviously, each technique has value, and different research questions and goals may make one or the other more appropriate in a given application. Over the past 30 years, however, quantitative research has become more common in mass media research. Consequently, it is increasingly important for beginning researchers to familiarize themselves with common quantitative techniques.

## The Nature of Measurement

The idea behind **measurement** is simple: A researcher assigns numerals to objects, events, or properties according to certain rules. Examples of measurement are everywhere: "She or he is a 10" or "Unemployment increased by 1%" or "The earthquake measured 5.5 on the Richter scale." Note that the definition contains three central concepts: numerals, assignment, and rules. A *numeral* is a symbol, such as V, X, C, or 5, 10, 100. A numeral has no implicit quantitative meaning. When it is given quantitative meaning, it becomes a number and can be used in mathematical and statistical computations. *Assignment* is the designation of numerals or numbers to certain objects or events. A simple measurement system might entail assigning the numeral 1 to the people who obtain most of their news from television, the numeral 2 to those who get most of their news from a newspaper, and the numeral 3 to those who receive most of their news from some other source.

*Rules* specify the way that numerals or numbers are to be assigned. Rules are at the heart of any measurement system; if they are faulty, the system will be flawed. In some situations, the rules are obvious and straightforward. To measure reading speed, a stopwatch and a standardized message may be sufficient. In other instances, the rules are not so apparent. Measuring certain psychological traits, such as "source credibility" or "attitude toward violence," calls for carefully explicated measurement techniques.

Additionally, in mass media research and in much of social science research, investigators usually measure indicators of the properties of individuals or objects, rather than the individuals or objects themselves. Concepts such as "authoritarianism" or "motivation for reading the newspaper" cannot be observed directly; they must be inferred from presumed indicators. Thus, if a person endorses statements such as "Orders from a superior should always be followed without question" and "Law and order are the most important things in society," it can be deduced that he or she is more authoritarian than someone who disagrees with the same statements.

Measurement systems strive to be isomorphic to reality. **Isomorphism** means *identity or similarity of form or structure.* In some research areas, such as the physical sciences, isomorphism is not a problem because there is usually a direct relationship between the objects being measured and the numbers assigned to them. For example, if an electric current travels through Substance A with less resistance than it does through Substance B, it can be deduced that A is a better conductor than B. Testing more substances can lead to a ranking of conductors, where the numbers assigned indicate the degrees of conductivity. The measurement system is isomorphic to reality.

In mass media research, the correspondence is seldom that obvious. For example, imagine that a researcher is trying to develop a scale to measure the "persuasibility" of people in connection with a certain type of advertisement. She devises a test and administers it to five people. The scores are displayed in Table 3.2. Now imagine that an omniscient being is able to disclose the "true" persuasibility of the same five people. These scores are also shown in Table 3.2. For two people, the test scores correspond exactly to the "true" scores. The other three scores miss the "true" scores, but there is a correspondence between the rank orders. Also note that the "true" persuasibility scores range from 0 to 12 and the measurement scale ranges from 1 to 8. To summarize, there is a general correspondence between the test and reality, but the test is far from an exact measure of what actually exists.

Unfortunately, the degree of correspondence between measurement and reality is rarely known in research. In some cases, researchers are not even sure they are actually measuring what they are trying to measure. In any event, researchers must carefully consider the degree of isomorphism between measurement and reality. This topic is discussed in greater detail later in the chapter.

## Levels of Measurement

Scientists have distinguished four different ways to measure things, or four different levels of measurement, depending upon the rules that are used to assign numbers to objects or events. The operations that can be performed with a

Table 3.2 *Illustration of Isomorphism*

| Person | Test score | "True" score |
|---|---|---|
| A | 1 | 0 |
| B | 3 | 1 |
| C | 6 | 6 |
| D | 7 | 7 |
| E | 8 | 12 |

given set of scores depend on the level of measurement achieved. The four levels of measurement are nominal, ordinal, interval, and ratio.

The nominal level is the weakest form of measurement. In nominal measurement, numerals or other symbols are used to classify persons, objects, or characteristics. For example, in the physical sciences, rocks can generally be classified into three categories: igneous, sedimentary, and metamorphic. A geologist who assigns a 1 to igneous, a 2 to sedimentary, and a 3 to metamorphic has formed a nominal scale. Note that the numerals are simply labels that stand for the respective categories; they have no mathematical significance. A rock that is placed in Category 3 does not have more "rockness" than those in Categories 2 and 1. Other examples of nominal measurement are the numbers on football jerseys and license plates and Social Security numbers. An example of nominal measurement in mass media is classifying respondents according to the medium they depend on most for news. Those depending most on TV may be in Category 1, those depending most on newspapers in Category 2, those depending on magazines in Category 3, and so on.

The nominal level, like all levels, possesses certain formal properties. Its basic property is equivalence. If an object is placed in Category 1, it is considered equal to all other objects in that category. Suppose a researcher is attempting to classify all the advertisements in a magazine according to primary appeal. If an ad has economic appeal, it is placed in Category 1; if it uses an appeal to fear, it is placed in Category 2; and so on. Note that all ads using "fear appeal" are equal even though they may differ on other dimensions such as product type or size, or use of illustrations.

Another property of nominal measurement is that all categories are exhaustive and mutually exclusive. This means that each measure accounts for every possible option and that each measurement is appropriate to only one category. For instance, in the example of primary appeals in magazine advertisements, all possible appeals need to be included in the analysis (exhaustive): economic, fear, morality, religion, and so on. Each advertisement is placed in one and only one category (mutually exclusive).

Nominal measurement is frequently used in mass media research. Hinkle and Elliot (1989) divided science coverage by supermarket tabloids and mainstream newspapers into medical coverage and hard technology stories and discovered that tabloids had far more medical stories. Weinberger and Spotts (1989) divided the use of humorous devices in British and American ads into six nominal categories—pun, understatement, joke, ludicrous, satire, and irony—and found that the use of humor was similar in both countries.

Even a variable measured at the nominal level may be used in higher-order statistics if it is converted into another form. The result of this conversion process is known as **dummy variables**. For example, political party affiliation could be coded as follows:

| | |
|---|---|
| Republican | 1 |
| Democrat | 2 |
| Independent | 3 |
| Other | 4 |

This measurement scheme could be interpreted incorrectly to imply that a person classified as "Other" is three units "better" than a person classified as a "Republican." To measure political party affiliation and use the data in higher-order statistics, a researcher must convert the variable into a more neutral form.

One way of converting the variable to give equivalent value to each option is to recode it as a dummy variable that creates an "either/or" situation for each option; in this example, a person is either a "Republican" or something else. For example, a binary coding scheme could be used:

| | |
|---|---|
| Republican | 001 |
| Democrat | 010 |
| Independent | 100 |
| Other | 000 |

This scheme treats each affiliation equivalently and allows the variable to be used in higher-order statistical procedures. Note that the final category "Other" is coded using all zeros. A complete explanation for this practice is beyond the scope of this book; basically, however, its purpose is to avoid redundancy, since the number of individuals classified as "Other" can be found from the data on the first three options. If, in a sample of 100 subjects, 25 are found to belong in each of the first three options, then it is obvious that there are 25 in the "Other" option. (For more information on the topic of dummy variable coding, see Kerlinger & Pedhazur, 1997.)

Objects measured at the **ordinal level** are usually ranked along some dimension, such as from smallest to largest. For example, one might measure the variable "socioeconomic status" by categorizing families according to class: lower, lower middle, middle, upper middle, or upper. A rank of 1 is assigned to lower, 2 to lower middle, 3 to middle, and so forth. In this situation, the numbers have some mathematical meaning: Families in Category 3 have a higher socioeconomic status than families in Category 2. Note that nothing is specified with regard to the distance between any two rankings. Ordinal measurement often has been compared to a horse race without a stopwatch. The order in which the horses finish is relatively easy to determine, but it is difficult to calculate the difference in time between the winner and the runner-up.

An ordinal scale possesses the property of *equivalence*. Thus, in the previous example, all families placed in a category are treated equally, even though some might have greater incomes than others. It also possesses the property of order among the categories. Any given category can be defined as being higher or lower than any other category. Common examples of ordinal scales are rankings of football or basketball teams, military ranks, restaurant ratings, and beauty pageant finishing orders.

Ordinal scales are frequently used in mass communication research. Schweitzer (1989) ranked 16 factors that were important to the success of mass communication researchers. In a study of electronic text news, Heeter, Brown, Soffin, Stanley, and Salwen (1989) rank-ordered audience evaluations of the importance of 25 different issues in the news and found little evidence of an effect on content, known as **agenda setting**.

When a scale has all the properties of an ordinal scale and also the intervals between adjacent points on the scale are of equal value, the scale is at the **interval level.** The most obvious example of an interval scale is temperature. The same amount of heat is required to warm an object from 30 to 40 degrees as to warm it from 50 to 60 degrees. Interval scales incorporate the formal property of *equal differences*; that is, numbers are assigned to the positions of objects on an interval scale in such a way that one may carry out arithmetic operations on the differences between them.

One disadvantage of an interval scale is that it lacks a true zero point, or condition of nothingness. For example, it is difficult to conceive of a person having zero intelligence or zero personality. The absence of a true zero point means that a researcher cannot make statements of a proportional nature; for example, someone with an IQ of 100 is not twice as smart as someone with an IQ of 50, and a person who scores 30 on a test of aggression is not three times as aggressive as a person who scores 10. Despite this disadvantage, interval scales are frequently used in mass communication research. Zohoori (1988) constructed a "motivations for using TV" scale by presenting respondents with a list of 11 reasons for viewing television. The response options were "not at all like me," coded 1; "a little like me," coded 2; and "a lot like me," coded 3. Baran, Mok, Land, and Kang (1989) developed a five-point agree/disagree interval scale to measure a person's worth as seen by others by eliciting responses to seven statements such as "It's likely that I'd have this woman/man as a friend" and "It's fairly likely that this man/woman is punctual."

Scales at the **ratio level** of measurement have all the properties of interval scales plus one more: the existence of a *true zero point*. With the introduction of this fixed zero point, ratio judgments can be made. For example, since time and distance are ratio measures, one can say that a car traveling at 50 miles per hour is going twice as fast as a car traveling at 25. Ratio scales are relatively rare in mass media research, although some variables, such as time spent watching television or number of words per story, are ratio measurements. For example, Gantz (1978) measured news recall ability by asking subjects to report whether they had seen or heard 10 stories taken from the evening news. Scores could range from 0 to 10 on this test. Giffard (1984) counted the length of wire service reports related to 101 developed or developing nations. Theoretically, scores could range from zero (no coverage) to hundreds of words.

As we shall see in Chapter 11, researchers who use interval or ratio data can use parametric statistics, which are specifically designed for these data. Procedures designed for use with "lower" levels of measurement can also be used with data at a higher level of measurement. Statistical procedures designed for higher-level data, however, are generally more powerful than those designed for use with nominal or ordinal levels of measurement. Thus, if an investigator has achieved the interval level of measurement, parametric statistics should generally be used. Statisticians disagree about the importance of the distinction between ordinal scales and interval scales and about the legitimacy of using interval statistics with data that may in fact be ordinal. Without delving too deeply into these arguments, we suggest that the safest procedure is to assume interval measurement unless there is clear evidence to the contrary, in which case ordinal statistics should be used. For example, for a research task in which a group of subjects ranks a set of objects, ordinal statistics should be used. On the other hand, if subjects are given an attitude score constructed by rating responses to various questions, the researcher is justified in using parametric procedures.

Most statisticians seem to feel that statistical analysis is performed on the numbers yielded by the measures, not on the measures themselves, and that the properties of interval scales belong to the number system (Nunnally & Bernstein, 1978; Roscoe, 1975). Additionally, there have been several studies in which various types of data have been subjected to different statistical analyses. These studies suggest that the distinction between ordinal data and interval data is not particularly crucial in selecting an analysis method (McNemar, 1969).

## ▪ Discrete and Continuous Variables

Two forms of variables are used in mass media investigation. A **discrete variable** includes only a finite set of values; it cannot be divided into subparts. For instance, the number of children in a family is a discrete variable because the unit is a person. It does not make much sense to talk about a family size of 2.24 because it is hard to conceptualize 0.24 of a person. Political affiliation, population, and gender are other discrete variables.

A **continuous variable** can take on any value (including fractions) and can be meaningfully broken into smaller subsections. Height is a continuous variable. If the measurement tool is sophisticated enough, it is possible to distinguish between one person 72.113 inches tall and another 72.114 inches tall. Time spent watching television is another example; it is perfectly meaningful to say that Person A spent 3.12115 hours viewing while Person B watched 3.12114 hours. The average number of children in a family is a continuous variable; thus, in this context, it may be perfectly meaningful to refer to 0.24 of a person.

When dealing with continuous variables, researchers should keep in mind the distinction between the variable and the measure of the variable. If a child's attitude toward television violence is measured by counting his or her positive responses to six questions, then there are only seven possible scores: 0, 1, 2, 3, 4, 5, and 6. It is entirely likely, however, that the underlying variable is continuous even though the measure is discrete. In fact, even if a fractionalized scale were developed, it would still be limited to a finite number of scores. As a generalization, most of the measures in mass media research tend to be discrete approximations of continuous variables.

Variables measured at the nominal level are always discrete variables. Variables measured at the ordinal level are generally discrete, although there may be some underlying continuous measurement dimension. Variables measured at the interval or ratio level can be either discrete (number of magazine subscriptions in a household) or continuous (number of minutes per day spent reading magazines). Both the level of measurement and the type of variable under consideration are important in developing useful measurement scales.

## ▪ Measurement Scales

A scale represents a composite measure of a variable; it is based on more than one item. Scales are generally used with complex variables that do not easily lend themselves to single-item or single-indicator measurements. Some items, such as age, newspaper circulation, or number of radios in the house, can be adequately measured without scaling techniques. Measurement of other variables, such as attitude toward TV news or gratification received from going to a movie theater, generally requires the use of scales. Several scaling techniques have been developed over the years. This section discusses only the better-known methods. For additional information about all types of measurement scales, search the Internet.

### Thurstone Scales

Thurstone scales are also called *equal-appearing interval scales* because of the technique used to develop them. They are typically used to measure the attitude toward a given concept or construct. To develop a Thurstone scale, a researcher first collects a large number of statements (Thurstone recommends at least 100) that relate to the concept or construct to be measured. Next, judges rate these statements along an 11-category scale in which each category expresses a different degree of favorableness toward the concept. The items are then ranked according to the mean or median ratings assigned by the judges and are used to construct a questionnaire of 20–30 items that are chosen more or less evenly from across the range of ratings. The statements are worded so that a person can agree or disagree with them. The scale is then administered to a sample of respondents whose scores are determined by computing the mean or median value of the items agreed with. A person who disagrees with all the items has a score of zero.

One advantage of the Thurstone method is that it is an interval measurement scale. On the downside, this method is time-consuming and labor-intensive. Thurstone scales are not often used in mass media research, but they are common in psychology and education research.

### Guttman Scaling

Guttman scaling, also called *scalogram* analysis, is based on the idea that items can be arranged along a continuum in such a way that a person who agrees with an item or finds an item acceptable will also agree with or find acceptable all other items expressing a less extreme position. For example, here is a hypothetical four-item Guttman scale:

1. Indecent programming on TV is harmful to society.
2. Children should not be allowed to watch indecent TV shows.
3. Television station managers should not allow indecent programs on their stations.
4. The government should ban indecent programming from TV.

Presumably, a person who agrees with Statement 4 will also agree with Statements 1–3. Furthermore, if we assume the scale is valid, then a person who agrees with Statement 2 will also agree with Statement 1 but will not necessarily agree with Statements 3 and 4. Because each score represents a unique set of responses, the number of items a person agrees with is the person's total score on a Guttman scale.

A Guttman scale requires a great deal of time and energy to develop. Although they do not appear often in mass media research, Guttman scales are fairly common in political science, sociology, public opinion research, and anthropology.

### Likert Scales

Perhaps the most commonly used scale in mass media research is the Likert scale, also called the *summated rating approach*. A number of statements are developed with respect to a topic, and respondents can strongly agree, agree, be neutral, disagree, or strongly disagree with the statements (see Figure 3.1). Each response option is weighted, and each subject's responses are added to produce a single score on the topic.

This is the basic procedure for developing a Likert scale:

1. Compile a large number of statements that relate to a specific dimension. Some statements are positively worded; some are negatively worded.
2. Administer the scale to a randomly selected sample of respondents.

Figure 3.1 *Sample of Likert Scale Items*

1. Only U.S. citizens should be allowed to own broadcasting stations.

| Response | Score Assigned |
|---|---|
| ______ Strongly agree | 5 |
| ______ Agree | 4 |
| ______ Neutral | 3 |
| ______ Disagree | 2 |
| ______ Strongly Disagree | 1 |

2. Prohibiting foreign ownership of broadcasting stations is bad for business.

| Response | Score Assigned |
|---|---|
| ______ Strongly agree | 1 |
| ______ Agree | 2 |
| ______ Neutral | 3 |
| ______ Disagree | 4 |
| ______ Strongly Disagree | 5 |

*Note:* To maintain attitude measurement consistency, the scores are reversed for a negatively worded item. Question 1 is a positive item; Question 2 is a negative item.

3. Code the responses consistently so that high scores indicate stronger agreement with the attitude in question.
4. Analyze the responses and select for the final scale those statements that most clearly differentiate the highest from the lowest scorers.

### *Semantic Differential Scales*

Another commonly used scaling procedure is the **semantic differential** technique. As originally conceived by Osgood, Suci, and Tannenbaum (1957), this technique is used to measure the meaning an item has for an individual. Research indicated that three general factors—activity, potency, and evaluation—were measured by the semantic differential. Communication researchers were quick to adapt the evaluative dimension of the semantic differential for use as a measure of attitude.

To use the technique, a name or a concept is placed at the top of a series of seven-point scales anchored by bipolar attitudes. Figure 3.2 shows an example of this technique as used to measure attitudes toward *Time* magazine. The bipolar adjectives that typically "anchor" such evaluative scales are *pleasant/unpleasant, valuable/worthless, honest/dishonest, nice/awful, clean/dirty, fair/unfair,* and *good/bad.* It is recommended, however, that a unique set of anchoring adjectives be developed for each particular measurement situation. For example, Markham (1968), in his study of the credibility of television newscasters, uses 13 variable sets, including *deep/shallow, ordered/chaotic, annoying/pleasing,* and *clear/hazy.* Robinson and Shaver (1973) present a collection of scales commonly used in

Figure 3.2 *Sample Form for Applying the Semantic Differential Technique*

| | *Time* Magazine | |
|---|---|---|
| Biased | ______ : _ : ______ : ______ : ______ : ______ : ______ | Unbiased |
| Trustworthy | ______ : _ : ______ : ______ : ______ : ______ : ______ | Untrustworthy |
| Valuable | ______ : _ : ______ : ______ : ______ : ______ : ______ | Worthless |
| Unfair | ______ : _ : ______ : ______ : ______ : ______ : ______ | Fair |

social science research. (Search the Internet for "semantic differential" to find several examples of how the technique is used.)

Strictly speaking, the semantic differential technique attempts to place a concept in semantic space through the use of an advanced statistical procedure called factor analysis. When researchers borrow parts of the technique to measure attitudes, or images or perceptions of objects, persons, or concepts, they are not using the technique as originally developed. Consequently, perhaps a more appropriate name for this technique is bipolar rating scales.

### Reliability and Validity

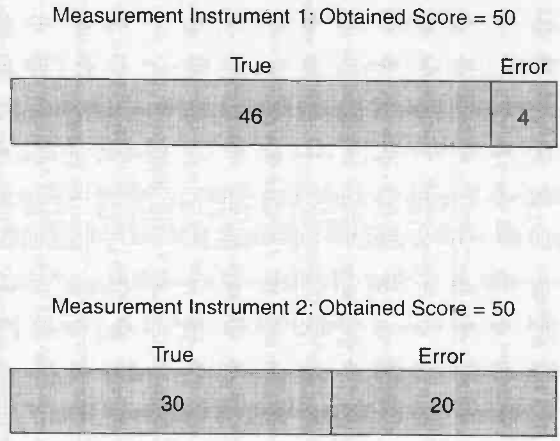
Using any scale without prior testing results is poor research. At least one pilot study should be conducted for any newly developed scale to ensure its reliability and validity. To be useful, a measurement must possess these two related qualities. A measure is reliable if it consistently gives the same answer. Reliability in measurement is the same as reliability in any other context. For example, a reliable person is one who is dependable, stable, and consistent over time. An unreliable person is unstable and unpredictable and may act one way today and another way tomorrow. Similarly, if measurements are consistent from one session to another, they are reliable and can be believed to some degree.

In understanding measurement reliability, you may think of a measure as containing two components. The first represents an individual's "true" score on the measuring instrument. The second represents random error and does not provide an accurate assessment of what is being measured. Error can slip into the measurement process from several sources. Perhaps a question was worded ambiguously, or a person's pencil slipped as he or she was filling out a measuring instrument. Whatever the cause, all measurement is subject to some degree of random error. Figure 3.3 illustrates this concept. As is evident, Measurement Instrument 1 is highly reliable because the ratio of the true component of the score to the total score is high. Measurement Instrument 2 is unreliable because the ratio of the true component to the total is low.

A completely unreliable measurement measures nothing at all. If a measure is repeatedly given to individuals and each person's responses at a later session are unrelated to his or her earlier responses, the measure is useless. If the responses are identical or nearly identical each time the measure is given, the measure is reliable; it at least measures something, though not necessarily what the researcher intended. (This problem is discussed later.)

The importance of reliability should be obvious now. Unreliable measures cannot be used to detect relationships between variables. When the measurement of a variable is unreliable, it is composed mainly of random error, and random error is seldom related to anything else.

Figure 3.3 *Illustration of "True" and "Error" Components of a Scale*




Reliability is not a unidimensional concept. It consists of three different components: stability, internal consistency, and equivalency.

Stability is the easiest of the components to understand. It refers to the consistency of a result or of a measure at different points in time. For example, suppose that a test designed to measure proofreading ability is administered during the first week of an editing class and again during the second week. The test possesses stability if the two results are consistent. Caution should be exercised whenever stability is used as a measure of reliability, since people and things can change over time. In the proofreading example, it is entirely possible for a person to score higher the second time because some people might actually improve their ability from Week 1 to Week 2. In this case the measure is not really unstable; actual change has occurred.

An assessment of reliability is necessary in all mass media research and should be reported along with other facets of the research as an aid in interpretation and evaluation. One commonly used statistic for assessing reliability is the correlation coefficient denoted as $r_{xx}$. Chapter 11 provides a more detailed examination of the correlation coefficient. For now let's say only that $r_{xx}$ is a number ranging from $-1.00$ to $+1.00$ and is used to gauge the strength of a relationship between two variables. When $r_{xx}$ is high—that is, approaching $+1.00$—the relationship is strong. A negative number indicates a negative relationship (high scores on one variable are associated with low scores on the other), and a positive number indicates a positive relationship (a high score goes with another high score). In measuring reliability, a high positive $r_{xx}$ is desired.

One method that uses correlation coefficients to compute reliability is the *test-retest method*. This procedure measures the stability component of reliability. The same people are measured at two different points in time, and a coefficient between the two scores is computed. An $r_{xx}$ that approaches $+1.00$ indicates that a person's score at Time A was similar to his or her score at Time B, showing consistency over time. There are two limitations to the test-retest technique. First, the initial administration of the measure might affect scores on the second testing. If the measuring device is a questionnaire, a person might remember responses from session to session, thus falsely inflating reliability. Second, the concept measured may change from Time A to Time B, thus lowering the reliability estimate.

**Internal consistency** involves examining the consistency of performance among the items that compose a scale. If separate items on a scale assign the same values to the concept being measured, the scale possesses internal consistency. For instance, suppose a researcher designs a 20-item scale to measure attitudes toward newspaper reading. For the scale to be internally consistent, the total score on the first half of the test should correlate highly with the score on the second half of the test. This method of determining reliability is called the *split-half technique.*

Only one administration of the measuring instrument is made, but the test is split into halves and scored separately. For example, if the test is in the form of a questionnaire, the even-numbered items might constitute one half and the odd-numbered items the other half. A correlation coefficient is then computed between the two sets of scores. Since this coefficient is computed from a test that is only half as long as the final form, it is corrected by using the following formula:

$$r_{xx} = \frac{2(r_{oe})}{1 + r_{oe}}$$

where $r_{oe}$ is the correlation between the odd items and the even items. (Search the Internet for "split-half reliability" for additional information and examples.)

Another common reliability coefficient is *alpha* (sometimes referred to as Cronbach's alpha), which uses the analysis of variance approach to assess the internal consistency of a measure (see Chapter 13).

The **equivalency** component of reliability, sometimes referred to as **cross-test reliability**, assesses the relative correlation between two parallel forms of a test. Two instruments that use different scale items or different measurement techniques are developed to measure the same concept. The two versions are then administered to the same group of people during a single time period, and the correlation between the scores on the two forms of the test is taken as a measure of the reliability. The major problem with this method, of course, is developing two forms of a scale that are perfectly equivalent. The less parallel the two forms, the lower the reliability.

A special case of the equivalency component occurs when two or more observers judge the same phenomenon, as is the case in content analysis (see Chapter 7). This type of reliability is called **intercoder reliability** and is used to assess the degree to which a result can be achieved or reproduced by other observers. Ideally, two individuals who use the same operational measure and the same measuring instrument should reach the same results. For example, if two researchers try to identify acts of violence in television content based on a given operational definition of violence, the degree to which their results are consistent is a measure of intercoder reliability. Disagreements reflect a difference either in perception or in the way the original definition was interpreted. Special formulas for computing intercoder reliability are discussed in Chapter 7.

In addition to being reliable, a measurement must have **validity** if it is to be of use in studying variables. A valid measuring device measures what it is supposed to measure. Or, to put it another way, determining validity requires an evaluation of the congruence between the operational definition of a variable and its conceptual or constitutive definition. Assessing validity requires some judgment on the part of the researcher. In the following discussion of the major types of measurement validity, note that each one depends at least in part on the judgment of the researcher. Also, validity is almost never an all-or-none proposition; it is usually a matter of degree. A measurement rarely turns out to be totally valid or invalid. Typically it winds up somewhere in the middle.

In regard to measurement, there are four major types of validity, and each has a corresponding technique for evaluating the measurement method. They are face validity, predictive validity, concurrent validity, and construct validity.

The simplest and most basic kind of validity, *face validity,* is achieved by examining the measurement device to see whether, on the face of it, it measures what it appears to measure. For example, a test designed to measure proofreading ability could include accounting problems, but this measure would lack face validity. A test that asks people to read and correct certain paragraphs has more face validity as a measure of proofreading skill. Whether a measure possesses face validity depends to some degree on subjective judgment. To minimize subjectivity, the relevance of a given measurement should be judged independently by several experts.

Checking a measurement instrument against some future outcome assesses *predictive validity.* For example, scores on a test to predict whether a person will vote in an upcoming election can be checked against actual voting behavior. If the test scores allow the researcher to predict with a high degree of accuracy which people will actually vote and which will not, then the test has predictive validity. Note that it is possible for a measure to have predictive validity and at the same time lack face validity. The sole factor in determining validity in the predictive method is the measurement's ability to forecast future behavior correctly. The concern is not with what is being measured but with whether the measurement instrument can predict something. Thus, a test to determine whether a person will become a successful mass media researcher could conceivably consist of geometry problems. If it predicts the ultimate success of a researcher reasonably well, the test has predictive validity but little face validity. The biggest problem associated with predictive validity is determining the criteria against which test scores are to be checked. What, for example, constitutes a "successful mass media researcher"? One who obtains an advanced degree? One who publishes research articles? One who writes a book?

*Concurrent validity* is closely related to predictive validity. In this method, however, the measuring instrument is checked against some present criterion. For example, it is possible to validate a test of proofreading ability by administering the test to a group of professional proofreaders and to a group of nonproofreaders. If the test discriminates well between the two groups, it can be said to have concurrent validity. Similarly, a test of aggression might discriminate between one group of children who are frequently detained after school for fighting and another group who have never been reprimanded for antisocial behavior.

The fourth type of validity, *construct validity,* is the most complex. In simplified form, construct validity involves relating a measuring instrument to some overall theoretic framework to ensure that the measurement is logically related to other concepts in the framework. Ideally, a researcher should be able to suggest various relationships between the property being measured and the other variables. For construct validity to exist, the researcher must show that these relationships are in fact present. For example, an investigator might expect the frequency with which a person views a particular television newscast to be influenced by his or her attitude toward that program. If the measure of attitudes correlates highly with the frequency of viewing, there is some evidence for the va-

Figure 3.4 *Types of Validity*

| Judgment-based | Criterion-based | Theory-based |
|---|---|---|
| Face validity | Predictive validity | Construct validity |
| | Concurrent validity | |

lidity of the attitude measure. By the same token, construct validity is evidenced if the measurement instrument under consideration does *not* relate to other variables when there is no theoretic reason to expect such a relationship. Thus, if an investigator finds a relationship between a measure and other variables that is predicted by a theory and fails to find other relationships that are not predicted by a theory, there is evidence for construct validity. For example, Milavsky, Kessler, Stipp, and Rubens (1982) established the validity of their measure of respondent aggression by noting, as expected, that boys scored higher than girls and that high aggression scores were associated with high levels of parental punishment. In addition, aggression was negatively correlated with scores on a scale measuring prosocial behavior. Figure 3.4 summarizes the four types of validity.

Before closing this discussion, we should point out that reliability and validity are related. Reliability is necessary to establish validity, but it is not a sufficient condition; a reliable measure is not necessarily a valid one. Figure 3.5 shows this relationship. An X represents a test that is both reliable and valid; the scores are consistent from session to session and lie close to the true value. An O represents a measure that is reliable but not valid; the scores are stable from session to session but they are not close to the true score. A + represents a test that is neither valid nor reliable; scores vary widely from session to session and are not close to the true score.

## ▪▪▪ Summary

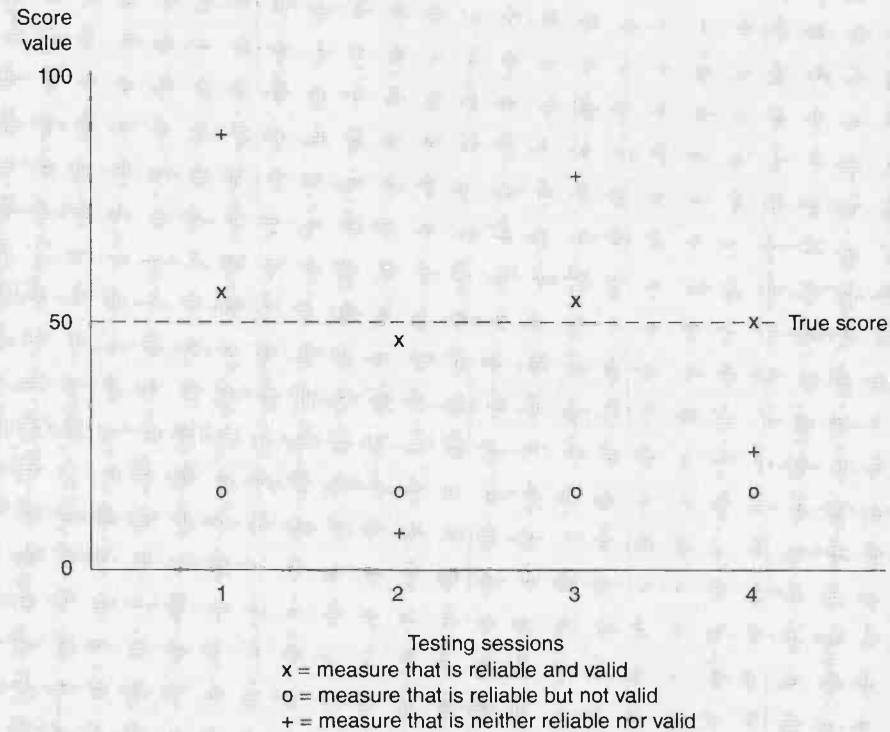
Understanding empirical research requires a basic knowledge of concepts, constructs, variables, and measurement. Concepts summarize related observations and express an abstract notion that has been formed by generalizing from particulars. Connections among concepts form propositions that, in turn, are used to build theories. Constructs consist of combinations of concepts and are also useful in building theories.

Variables are phenomena or events that take on one or more different values. Independent variables are manipulated by the researcher, whereas dependent variables are what the researcher attempts to explain. All variables are related to the observable world by operational definitions.

Researchers frequently use scales to measure complex variables. Thurstone, Guttman, Likert, and semantic differential scales are used in mass media research.

Measurement is the assignment of numerals to objects, events, or properties according to certain rules. The four levels of measurement are nominal, ordinal, interval, and ratio. To be useful, a measurement must be both reliable and valid.

Figure 3.5 *Relationship of Reliability and Validity*




## Questions and Problems for Further Investigation

1. Provide conceptual and operational definitions for the following items:

   Violence
   Artistic quality
   Programming appeal
   Sexual content
   Objectionable song lyrics

   Compare your definitions to those of others in the class. Would there be any difficulty in conducting a study using these definitions? Have you demonstrated why so much controversy surrounds the topics, for example, of sex and violence on television? What can you find on the Internet about these terms?

2. What type of data (nominal, ordinal, interval, or ratio) is associated with each of the following concepts or measurements?

   Baseball team standings
   A test of listening comprehension
   A. C. Nielsen's list of the top 10 television programs
   Frequency of heads versus tails on coin flips
   Baseball batting averages
   A scale measuring intensity of attitudes toward violence
   VHF channels 2–13
   A scale for monitoring your weight over time

3. Try to develop a measurement technique to examine each of these concepts:

   Newspaper reading
   Aggressive tendencies
   Brand loyalty (in purchasing products)
   Television viewing

4. Search the Internet for the four levels of measurement to get additional information. While you're there, check for "reliability" and "validity." In your validity search, find the article entitled "Grounds of Validity of the Laws of Logic: Further Consequences of Four Incapacities" by Charles S. Peirce [*Journal of Speculative Philosophy* 2 (1869), 193–208]. The article is rather "lofty" sounding, but it may provide some interesting research ideas.
5. The semantic differential is a widely used measurement technique in social science. If you are using *InfoTrac College Edition,* find three recent studies that have used this method. What concepts were measured?

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Chapter 4

# Research Ethics


- *Ethics and the Research Process*
- *Why Be Ethical?*
- *General Ethical Theories*
- *Ethical Principles*
- *Specific Ethical Problems*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

This chapter focuses on an area that is not part of the research process itself but is nevertheless vital to the execution of any research project: ethics.

## Ethics and the Research Process

Most mass media research involves observations of human beings—asking them questions or examining what they have done. In this probing process, however, the researcher must ensure that the rights of the participants are not violated. This requires a consideration of ethics: distinguishing right from wrong and proper from improper. Unfortunately, there are no universal definitions for these terms. Instead, several guidelines, broad generalizations, and suggestions have been endorsed or at least tacitly accepted by most in the research profession. These guidelines do not provide an answer to every ethical question that may arise, but they can help make researchers more sensitive to the issues.

Before discussing these specific guidelines, let's pose some hypothetical research situations involving ethics.

- A researcher at a large university hands questionnaires to the students in an introductory mass media course and tells them that if they do not complete the forms, they will lose points toward their grade in the course.
- A researcher is conducting a mail survey about attendance at X-rated motion pictures. The questionnaire states that the responses will be anonymous. Unknown to the respondents, however, each return envelope is marked with a code that enables the researcher to identify the sender.
- A researcher recruits subjects for an experiment by stating that participants will be asked to watch "a few scenes from some current movies." Those who decide to participate are shown several scenes of bloody and graphic violence.
- A researcher shows one group of children a violent television show and another group a nonviolent program. Afterward, the children are sent to a public playground, where they are told to play with the children who are already there. The researcher records each instance of violent behavior exhibited by the young subjects.
- Subjects in an experiment are told to submit a sample of their news writing to an executive of a large newspaper. They are led to believe that whoever submits the best work will be offered a job at the paper. In fact, the "executive" is a confederate in the experiment and severely criticizes everyone's work.

These examples of ethically flawed study designs should be kept in mind while you read the following guidelines to ethics in mass media research.

## Why Be Ethical?

Ethical behavior is the right thing to do. The best reason to behave ethically is the personal knowledge that you have acted in a morally appropriate manner. In addition, there are other cogent reasons that argue for ethical behavior. Unethical behavior may have an adverse effect on research participants. Just one experience with an ethically questionable research project may completely alienate a respondent. A person who was improperly deceived into thinking that he or she was being evaluated for a job at a newspaper when it was all just an experiment might not be so willing to participate in another study. Since mass communication research depends upon the continued goodwill and cooperation of respondents, it is important to shield them from unethical research practices.

Moreover, unethical research practices reflect poorly on the profession and may result in an increase in negative public opinion. Many readers have probably heard about the infamous Tuskegee syphilis study in which impoverished African-American men suffering from syphilis were studied without their consent and left untreated so that researchers could study the progress of the disease (see Jones, 1981, for a complete description). The distrust and suspicion engendered by this experiment in the African-American community have yet to subside and have been cited as a factor in the rise of some conspiracy theories about the spread of AIDS (Thomas & Quinn, 1981). It is fortunate that the mass communication research community has not had an ethical lapse of this magnitude, but the Tuskegee experiment illustrates the harmful fallout that can result from an unethical research project.

Unethical research usually does not result from some sinister motivation. Instead, it generally comes from pressures on researchers to cut corners in an attempt to publish an article or gain prestige or impress other colleagues. Nonetheless, it is behavior that is potentially serious and little tolerated within the community of mass media scholars.

## ▪ General Ethical Theories

The problem of determining what is right and proper has been examined for hundreds of years. At least three general types of theories have evolved to suggest answers: (1) rule-based or deontological theories, (2) balancing or teleological theories, and (3) relativistic theories.

The best known deontological theory is the one associated with the philosopher Immanuel Kant. Kant posited moral laws that constituted **categorical imperatives**—principles that define appropriate action in any and all situations. Following these categorical imperatives represents a moral duty for all humans. To define a categorical imperative, a person should ask whether or not the behavior in question is something that he or she would like to see universally implemented. In other words, a person should act in a way that he or she wants all others to act. Note that in many ways Kant's thinking parallels what we might call the Golden Rule: Do unto others as you would have them do unto you.

A mass media researcher, for example, might develop a categorical imperative about deception. Deception is not something that a researcher wants to see universally practiced by all; nor does the researcher wish to be deceived. Therefore, deception is something that should not be used in research, no matter what the benefits and no matter what the circumstances.

The teleological or balancing theory is best exemplified by what philosopher John Stuart Mill called **utilitarianism**. In this theory, the good that may come from an action is weighed against or balanced against the possible harm. The individual then acts in a way that maximizes good and minimizes harm. In other words, the ultimate test for determining the rightness of some behavior depends upon the outcomes that result from this behavior. The end may justify the means.

A mass media researcher who follows the utilitarian approach must balance the good that will come from a research project against its possible negative effects. In this situation, a researcher might decide it is appropriate to use deception in an experiment if the positive benefits of the knowledge obtained outweigh the possible harmful effects of the deception on the subjects. Note that a researcher might use a different course of action depending upon which ethical theory is used as a guide.

The *relativism* approach argues that there is no absolute right or wrong way of behaving. Instead, ethical decisions are determined by the culture within which a researcher is working. Indeed, behavior that is judged to be wrong in one culture may be judged ethical in another. One of the ways that the ethical norms of a culture may be established is through the creation of codes of behavior or of good conduct that spell out what most researchers in the field think are desirable or undesirable behaviors. Thus a researcher confronted with a particular ethical problem might look to these codes for guidance.

These three theories help form the basis for the ethical principles discussed next.

## ▪ Ethical Principles

General ethical principles are difficult to construct in the research area. There are, however, at least four relevant principles. First is the principle of **autonomy**, or self-determination, which has its roots in the categorical imperative. Denying autonomy is not something that a researcher wishes to see universally practiced. Basic to this concept is the demand that the researcher respects the rights, values, and decisions of other people. The reasons for a person's action should be respected and the actions not interfered with. This principle is exemplified by the use of informed consent in the research procedure.

A second ethical principle important to social science research is **nonmaleficence**. In short, it is wrong to intentionally inflict harm on another. A third ethical principle—**beneficence**—is usually considered in tandem with nonmaleficence. Beneficence stipulates a positive obligation to remove existing harms and to confer benefits on others. These two principles operate together, and often the researcher must weigh the harmful risks of research against its possible benefits (for example, an increase in knowledge or a refinement of a theory). Note how the utilitarian theory relates to these principles.

A fourth ethical principle, the principle of justice, is related to both deontological and teleological theories of ethics. At its general level, this principle holds that people who are equal in relevant respects should be treated equally. In the research context, this principle should be applied when new programs or policies are being evaluated. The positive results of such research should be shared with all. It would be unethical, for example, to deny the benefit of a new teaching procedure to children because they were originally chosen to be in the control group rather than in the group that received the experimental procedure. Benefits should be shared with all who are qualified.

It is clear that mass media researchers must follow some set of rules to meet their ethical obligations to their subjects and respondents. Cook (1976), discussing the laboratory approach, offers one such code of behavior that represents norms in the field:

- Do not involve people in research without their knowledge or consent.
- Do not coerce people to participate.
- Do not withhold from the participant the true nature of the research.
- Do not actively lie to the participant about the nature of the research.
- Do not lead the participant to commit acts that diminish his or her self-respect.
- Do not violate the right to self-determination.
- Do not expose the participant to physical or mental stress.

- Do not invade the privacy of the participant.
- Do not withhold benefits from participants in control groups.
- Do not fail to treat research participants fairly and to show them consideration and respect.

To this list we add:

- Always treat every respondent or subject with unconditional human regard. (That is, accept and respect a person for what he or she is, and do not criticize the person for what he or she is not.)

Are ethical principles transmitted from one generation of researchers to another? A study by McEuen, Gordon, and Todd-Mancillas (1990) that examined Ph.D. programs in communication found that no program offered a graduate-level course devoted to the study of research ethics. About 70% of the programs, however, did offer one or more courses that were partly devoted to ethics instruction. Their survey also revealed that the four ethical issues that received the most attention were subjects' confidentiality, subjects' right of withdrawal, informed consent, and dealing with institutional review boards.

## ▪ *Specific Ethical Problems*

The following subsections discuss some of the common areas where mass media researchers might encounter ethical dilemmas.

### *Voluntary Participation and Informed Consent*

An individual is entitled to decline to participate in any research project or to terminate participation at any time. Participation in an experiment, survey, or focus group is always voluntary, and any form of coercion is unacceptable. Researchers who are in a position of authority over subjects (as when the researcher handed questionnaires to the university students) should be especially sensitive to implied coercion: Even though the researcher might tell the class that failure to participate will not affect grades, many students may not believe this. In such a situation, it is better to keep the questionnaires anonymous and for the person in authority to be absent from the room while the survey is administered.

**Voluntary participation** is not a pressing ethical issue in mail and telephone surveys because respondents are free to hang up the phone or to throw away the questionnaire. Nonetheless, a researcher should not attempt to induce subjects to participate by misrepresenting the organization sponsoring the research or by exaggerating its purpose or importance. For example, telephone interviewers should not be instructed to identify themselves as representatives of the "Department of Information" to mislead people into thinking the survey is government-sponsored. Likewise, mail questionnaires should not be constructed to mimic census forms, tax returns, Social Security questionnaires, or other official government forms.

Closely related to voluntary participation is the notion of **informed consent**. For people to volunteer for a research project, they need to know enough about the project to make an intelligent choice. Researchers have the responsibility to inform potential subjects or respondents of all features of the project that can reasonably be expected to influence participation. Respondents should understand that an interview may take as long as 45 minutes, that a second interview is required, or that after completing a mail questionnaire they may be singled out for a telephone interview.

In an experiment, informed consent means that potential subjects must be warned of any possible discomfort or unpleasantness that might be involved. Subjects should be told if they are to receive or administer electric shocks, be subjected to unpleasant audio or visual stimuli, or undergo any procedure that might cause concern. Any unusual measurement techniques that may be used must be described. Researchers have an obligation to answer candidly and truthfully, as far as possible, all the participants' questions about the research.

Experiments that involve deception (as described in the next subsection) cause special problems about obtaining informed consent. If deception is absolutely necessary to conduct an experiment, is the experimenter obligated to inform subjects that they may be deceived during the upcoming experiment? Will such a disclosure affect participation in the experiment? Will it also affect the experimental results? Should the researcher compromise by telling all potential subjects that deception will be involved for some participants but not for others?

Another problem is deciding exactly how much information about a project a researcher must disclose in seeking informed consent. Is it enough to explain that the experiment involves rating commercials, or is it necessary to add that the experiment is designed to test whether subjects with high IQs prefer different commercials from those with low IQs? Obviously, in some situations the researcher cannot reveal everything about the project for fear of contaminating the results. For example, if the goal of the research is to examine the influence of peer pressure on commercial evaluations, alerting the subjects to this facet of the investigation might change their behavior in the experiment.

Problems might occur in research that examines the impact of mass media in nonliterate communities—for example, if the research subjects did not comprehend what they were told regarding the proposed investigation. Even in literate societies, many people fail to understand the implications for confidentiality of the storage of survey data on computer disks. Moreover, an investigator might not have realized in advance that some subjects would find part of an experiment or survey emotionally disturbing.

In 1992 the American Psychological Association (APA) released its statement on "Ethical Principles of Psychologists and Code of Conduct," which addresses a wide range of ethical issues of relevance to that discipline. Since mass communication researchers face many of the same ethical issues faced by psychologists, it seems useful to quote from that document several provisions concerning informed consent:

- Researchers should use language understandable to participants to obtain consent.
- Researchers should tell participants they can withdraw from the research.
- Researchers should inform participants of the important things that might affect their decision (such as discomfort and loss of confidentiality).
- If participation in a research project is a course requirement or an opportunity for extra credit, students should be given a choice of alternative activities.
- Prior consent must be obtained if participants will be filmed, taped, or recorded in any form unless the research involves natural observation in public places.

Examine the APA's Code of Conduct at *www.apa.org/ethics/code.*

Research findings provide some indication of what research participants should be told in order to ensure informed consent. Epstein, Suedefeld, and Silverstein (1973) found that subjects wanted a general description of the experiment and what was expected of them; they wanted to know whether danger was involved, how long the experiment would last, and the experiment's purpose. As for informed consent and survey participation, Sobal (1984) found wide variation among researchers about what to tell respondents in the survey introduction. Almost all introductions identified the research organization and the interviewer by name and described the research topic. Less frequently mentioned in introductions were the sponsor of the research and guarantees of confidentiality or anonymity. Few survey introductions mentioned the length of the survey or that participation was voluntary. More recently, Greenberg and Garramone (1989) reported the results of a survey of 201 mass media researchers that disclosed that 96% usually provided guaranteed confidentiality of results, 92% usually named the sponsoring organization, 66% usually told respondents that participation is voluntary, and 61% usually disclosed the length of the questionnaire. Brody, Gluck, and Aragon (1997) surveyed subjects in psychological experiments and found that 41% of them had negative experiences. A major reason for the negative experience was the invasiveness of the experiment, which suggests that the unpleasant aspects of the research were not well explained during the informed consent process.

Finally, one must consider the form of the consent to be obtained. Written consent is a requirement in certain government-sponsored research programs and may also be required by many university research review committees, as discussed next in connection with guidelines promulgated by the federal government. In several generally recognized situations, however, signed forms are regarded as impractical. These include telephone surveys, mail surveys, personal interviews, and cases in which the signed form itself might represent an occasion for breach of confidentiality. For example, a respondent who has been promised anonymity as an inducement to participate in a face-to-face interview might be suspicious if asked to sign a consent form after the interview. In these circumstances, the fact that the respondent agreed to participate is taken as implied consent.

As a general rule, the greater the risk of potential harm to subjects, the greater the need to obtain a consent statement.

### *Concealment and Deception*

Concealment and deception are encountered most frequently in experimental research. Concealment is the withholding of certain information from the subjects; deception is deliberately providing false information. Both practices raise ethical problems. The difficulty in obtaining consent has already been mentioned. A second problem derives from the general feeling that it is wrong for experimenters to lie to or otherwise deceive subjects.

Many critics argue that deception transforms a subject from a human being into a manipulated object and is therefore demeaning to the participant. Moreover, once subjects have been deceived, they are likely to expect to be deceived again in other research projects. At least two research studies seem to suggest that this concern is valid. Stricker and Messick (1967) reported finding a high incidence of suspicion among subjects of high school age after they had been deceived. Fillenbaum (1966) found that one-third to one-half of subjects were suspicious at the beginning of an experiment after experiencing deception in a prior research project.

On the other hand, some researchers argue that certain studies could not be conducted at all without the use of deception. They use the utilitarian approach to argue that the harm done to those who are deceived is outweighed by the benefits of the research to scientific knowledge. Indeed, Christensen (1988) suggests that it may be immoral to fail to investigate important areas that cannot be investigated without the use of deception. He also argues that much of the sentiment against deception in research exists because deception has been analyzed only from the viewpoint of abstract moral philosophy. The subjects who were "deceived" in many experiments did not perceive what was done to them as deception but viewed it as a necessary element in the research procedure. Christensen illustrates the relativistic approach when he suggests that any decision regarding the use of deception should take into account the context and aim of the deception. Research suggests that subjects are most disturbed when deception violates their privacy or increases their risk of harm.

Obviously, deception is not a technique that should be used indiscriminately. Kelman (1967) suggests that before the investigator settles on deception as an experimental tactic, three questions should be examined:

1. How significant is the proposed study?
2. Are alternative procedures available that would provide the same information?
3. How severe is the deception? (It is one thing to tell subjects that the experimentally constructed message they are reading was taken from the *New York Times*; it is another to report that the test a subject has just completed was designed to measure latent suicidal tendencies.)

Another set of criteria is put forth by Elms (1982), who suggests five necessary and sufficient conditions under which deception can be considered ethically justified in social science research:

1. When there is no other feasible way to obtain the desired information
2. When the likely benefits substantially outweigh the likely harm
3. When subjects are given the option to withdraw at any time without penalty
4. When any physical or psychological harm to subjects is temporary
5. When subjects are debriefed about all substantial deception and the research procedures are made available for public review

Together the suggestions of Kelman and Elms offer researchers good advice for the planning stages of investigations.

When an experiment is concluded, especially one involving concealment or deception, it is the responsibility of the investigator to debrief subjects. Debriefing should be thorough enough to remove any lasting effects that might have been created by the experimental manipulation or by any other aspect of the experiment. Subjects' questions should be answered and the potential value of the experiment stressed. How common is debriefing among mass media researchers? In the survey cited in Greenberg and Garramone (1989), 71% of the researchers reported they usually debrief subjects, 19% debrief sometimes, and 10% rarely or never debrief subjects. Although an ethical requirement of most experiments, the practice of debriefing has yet to be embraced by all investigators.

The APA's 1992 statement of principles contains the following provisions concerning deception:

- Deception should not be used unless it is justified by the study's scientific value and other nondeceptive techniques are not feasible.
- Subjects should never be deceived about factors that might have an impact on their informed consent.
- If deception is used, subjects should be debriefed as promptly as possible.

No data are available on how often deception is used in mass media research. Some information, however, is available from the psychology field. In a study of 23 years of articles published in a leading psychology journal, Sieber (1995) found that 66% of all studies published in 1969 used deception, compared to 47% in 1992. Since a good deal of psychological research utilizes the experimental approach (see Chapter 10), a strategy not used nearly as often in mass communication research, the percentages for media research would probably be significantly lower.

### Protection of Privacy

The problem of protecting the privacy of participants arises more often in field observation and survey research than in laboratory studies. In field studies, observers may study people in public places without their knowledge (for example, individuals watching TV at an airport lounge). The more public the place, the less a person has an expectation of privacy and the fewer ethical problems are encountered. There are, however, some public situations that present ethical concerns. Is it ethical, for example, for a researcher to pretend to browse in a video rental store when in fact the researcher is observing who rents pornographic videos? What about eavesdropping on people's dinner conversations to determine how often news topics are discussed? To minimize ethical problems, a researcher should violate privacy only to the minimum degree needed to gather the data.

When they take a survey, respondents have a right to know whether their privacy will be maintained and who will have access to the information they provide. There are two ways to guarantee privacy: by assuring anonymity and by assuring confidentiality. A promise of **anonymity** is a guarantee that a given respondent cannot possibly be linked to any particular response. In many research projects, anonymity is an advantage because it encourages respondents to be honest and candid in their answers. Strictly speaking, personal and telephone interviews cannot be anonymous because the researcher can link a given questionnaire to a specific person, household, or telephone number. In such instances, the researcher should promise **confidentiality**; that is, respondents should be assured that even though they can be identified as individuals, their names will never be publicly associated with the information they provide. A researcher should never use "anonymous" in a way that is or seems to be synonymous with "confidential."

Additionally, respondents should be told who *will* have access to the information they provide. The researcher's responsibility for assuring confidentiality does not end once the data have been analyzed and the study concluded. Questionnaires that identify persons by name should not be stored in public places, nor should other researchers be given permission to examine confidential data unless all identifying marks have been obliterated. The APA's statement does not contain much guidance on issues of privacy and confidentiality. It does say that researchers should inform subjects if they are planning to share or use data that are personally identifiable.

### Federal Regulations Concerning Research

In 1971 the Department of Health, Education, and Welfare (HEW) drafted rules for obtaining informed consent from research participants, which included full documentation of informed consent procedures. In addition, the government set up a system of institutional review boards (IRBs) to safeguard the rights of human subjects. In 1995 there were more than 700 IRBs at medical schools, colleges, universities, hospitals, and other institutions. At most universities, IRBs have become part of the permanent bureaucracy. They hold regular meetings and have developed standardized forms that must accompany research proposals that involve human subjects or respondents. For a description of how a typical IRB operates, consult *www.nova.edu/cwis/ogc/intro*.

In 1981 the Department of Health and Human Services (successor to HEW) softened its regulations concerning social science research. The department's *Policy for the Protection of Human Research Subjects* exempts studies that use existing public data, research in educational settings about new instructional techniques, research involving the use of anonymous education tests, and survey, interview, and observational research in public places, provided the subjects are not identified and sensitive information is not collected. Signed consent forms are deemed unnecessary if the research presents only a minimal risk of harm to subjects and involves no procedures for which written consent is required outside the research context. This means that signed consent forms are no longer necessary in the interview situation because a person does not usually seek written consent before asking a question. Although the new guidelines apparently exempt most nonexperimental social science research from federal regulation, IRBs at some institutions still review all research proposals that involve human subjects, and some IRBs still follow the old HEW standards. In fact, some IRB regulations are even more stringent than the federal guidelines. As a practical matter, a researcher should always build a little more time into the research schedule to accommodate IRB procedures.

Researchers who tell respondents that the information they provide will be held confidential need to understand the consequences of that statement. Consider the case of Rik Scarce, a sociologist who specializes in ethnographic research (see Chapter 6). In the early 1990s, Scarce's research interest was the sociology of the radical environmentalist movement. One of the people Scarce interviewed at length was a suspect in a 1992 bombing at a mink research facility at Michigan State University. When a federal grand jury learned that Scarce had spoken with the subject, the researcher was summoned and asked to reveal the content of his talks with the suspect. Scarce refused, citing a portion of the ethics code of the American Sociological Association, which requires that scholars maintain confidentiality even if the information they have gathered "enjoys no legal protection or privilege and legal force is applied." He was then cited for contempt and placed in jail. He maintained his pledge of confidentiality for 159 days while being held in a Washington state prison. Eventually, the judge relented and released him.

### Ethics in Data Analysis and Reporting

Researchers are responsible for maintaining professional standards in analyzing and reporting their data. The ethical guidelines in this area are less controversial and more clear-cut. One cardinal rule is that researchers have a moral and ethical obligation to refrain from tampering with data: Questionnaire responses and experimental observations may not be fabricated, altered, or discarded. Similarly, researchers are expected to exercise reasonable care in processing the data to guard against needless errors that might affect the results.

Another universal ethical principle is that authors should not plagiarize. The work of someone else should not be reproduced without giving proper credit to the original author. Somewhat related, only those individuals who contribute significantly to a research project should be given authorship credit. This last statement addresses the problem of piggybacking, when a subordinate is pressured by someone in authority to include the superior's name on a manuscript even though the superior had little input into the finished product. The definition of a "significant contribution" might be fuzzy at times; generally, however, to be listed as an author, a person should play a major role in conceptualizing, analyzing, or writing the final document. Finally, special problems are involved when university faculty do research with students. (This topic is discussed later in the chapter.)

Researchers should never conceal information that might influence the interpretation of their findings. For example, if 2 weeks elapsed between the testing of an experimental group and the testing of a control group, this delay should be reported so that other researchers can discount the effects of history and maturation on the results. Every research report should contain a full and complete description of method, particularly any departure from standard procedures.

Since science is a public activity, researchers have an ethical obligation to share their findings and methods with other researchers. All questionnaires, experimental materials, measurement instruments, instructions to subjects, and other relevant items should be made available to those who wish to examine them.

Finally, all investigators are under an ethical obligation to draw conclusions from their data that are consistent with those data. Interpretations should not be stretched or distorted to fit a personal point of view or a favorite theory, or to gain or maintain a client's favor. Nor should researchers attribute greater significance or credibility to their data than the data justify. For example, when analyzing correlation coefficients obtained from a large sample, a researcher could achieve statistical significance with an $r$ of only, for example, .10. It would be perfectly acceptable to report a statistically significant result in this case, but the investigator should also mention that the predictive utility of the correlation is not large and, specifically, that it explains only 1% of the total variation. In short, researchers should report their results with candor and honesty.

### Ethics in the Publication Process

Publishing the results of research in scholarly journals is an important part of the process of scientific inquiry. Science is a public activity, and publication is the most efficient way to share research knowledge. In addition, success in the academic profession is often tied to a successful publication record. Consequently, certain ethical guidelines are usually followed with regard to publication procedures. From the perspective of the researcher seeking to submit an article for publication, the first ethical guideline comes into play when the article is ready to be sent off for review. The researcher should submit the proposed article to only one journal at a time because simultaneous submission to several sources is inefficient and wasteful. When an article is submitted for review to an academic journal, it is usually sent to two, three, or more reviewers for evaluation. Simultaneous submission means that several sets of referees spend their time pointing out the same problems and difficulties that could have been reported by a single set. This duplication of effort is unnecessary and might delay consideration of other potential articles waiting for review.

A related ethical problem concerns attempts to publish nearly identical or highly similar articles based on the same data set. For example, suppose a researcher has data on the communication patterns in a large organization. The investigator writes up one article emphasizing the communication angle for a communication journal and a second article with a management slant for a business journal. Both articles draw upon the same database and contain comparable results. Is this practice ethical? This is not an easy question to answer. Some journal editors apparently do not approve of writing multiple papers from the same data; others suggest that this practice is acceptable, provided submissions are made to journals that do not have overlapping audiences. In addition, there is the sticky question of how different one manuscript has to be from another in order to be considered a separate entity. Campbell (1987) discusses these and other vexing issues.

On the other side of the coin, journal editors and reviewers have ethical obligations to those who submit manuscripts to be evaluated. Editors and reviewers should not let the decision process take an inordinate amount of time; a prompt and timely decision is owed to all contributors. (Most editors of mass communication journals try to notify their contributors of their decision within 3 months.) Reviewers should try to provide positive and helpful reviews; they should not do "hatchet jobs" on articles submitted to them. Moreover, reviewers should not unjustly squelch manuscripts that argue against one of their pet ideas or contradict or challenge some of their own research. Each contributor to a journal is due an objective and impartial review. Neither should reviewers quibble needlessly over minor points in an article or demand unreasonable changes. Reviewers also owe contributors consistency. Authors find it frustrating to revise their manuscripts according to a reviewer's wishes only to find that, on a second reading, the reviewer has a change of mind and prefers the original version.

## A Professional Code of Ethics

Formalized codes of ethics have yet to be developed by all professional associations involved in mass media research. One organization that has developed a code is the American Association for Public Opinion Research (shown in the box on page 77).

## Ethical Problems of Student-Faculty Research

Schiff and Ryan (1996) list several ethical dilemmas that can occur in a college setting, including using undergraduate classes in research and claiming joint authorship of articles based on student theses and dissertations. With regard to the first problem, they found that about 36% of a sample of 138 faculty members who had recently chaired thesis or dissertation committees reported that using a research class to collect data for a thesis or dissertation was unethical, and 65% thought it was unethical to require undergraduate classes to participate in thesis or dissertation research. (Note that Schiff and Ryan were investigating the ethics involved in using undergraduates for dissertation or thesis research—not research projects conducted by faculty members. Presumably, however, the numbers should be similar.)

Schiff and Ryan found uniform ethical norms concerning authorship of articles stemming from theses and dissertations. About 86% of the respondents stated that requiring students to list a professor as coauthor on any article stemming from the thesis or dissertation as a condition for directing the project was unethical.

The APA's Ethics Committee provides some guidelines with regard to the joint authorship of articles based on a dissertation or thesis:

- The dissertation adviser may receive only second authorship.
- Secondary authorship for the adviser may be considered obligatory if the adviser supplies the database, designates variables, or makes important interpretive contributions.
- If the adviser suggests the general topic, is significantly involved in the design or instrumentation of the project, or substantially contributes to the writing, then the student may offer the adviser second authorship as a courtesy.
- If the adviser offered only financial aid, facilities, and periodic critiques, then secondary authorship is inappropriate.

Some researchers, however, argue that a dissertation should comprise original and independent work, and involvement by the re-

*American Association for Public Opinion Research Code of Professional Ethics and Practices*

I. Principles of Professional Practice in Conduct of Our Work
   A. We shall exercise due care in gathering and processing data, taking all reasonable steps to assure the accuracy of results.
   B. We shall exercise due care in the development of research designs and in the analysis of data.
      1. We shall recommend and employ only research tools and methods of analysis which, in our professional judgment, are well suited to the research problem at hand.
      2. We shall not select research tools and methods of analysis because of their capacity to yield a misleading conclusion.
      3. We shall not knowingly make interpretations of research results, nor shall we tacitly permit interpretations, which are inconsistent with the data available.
      4. We shall not knowingly imply that interpretations should be accorded greater confidence than the data actually warrant.
   C. We shall describe our findings and methods accurately and in appropriate detail in all research reports.

II. Principles of Professional Responsibility in Our Dealings with People
   A. The Public
      1. We shall cooperate with legally authorized representatives of the public by describing the methods used in our studies.
      2. When we become aware of the appearance in public of serious distortions of our research we shall publicly disclose what is required to correct the distortions.
   B. Clients and Sponsors
      1. When undertaking work for a private client we shall hold confidential all proprietary information obtained about the client's business affairs and about the finding of research conducted for the client, except when the dissemination of the information is expressly authorized by the client or becomes necessary under terms of Section II-A-2.
      2. We shall be mindful of the limitations of our techniques and facilities and shall accept only those research assignments which can be accomplished within these limitations.
   C. The Profession
      1. We shall not cite our membership in the Association as evidence of professional competence, since the Association does not so certify any persons or organizations.
      2. We recognize our responsibility to contribute to the science of public opinion research and to disseminate as freely as possible the ideas and findings which emerge from our research.
   D. The Respondent
      1. We shall not lie to survey respondents or use practices and methods which abuse, coerce, or humiliate them.
      2. Unless the respondent waives confidentiality for specified uses, we shall hold as privileged and confidential all information that tends to identify a respondent with his or her responses. We shall also not disclose the names of respondents for nonresearch purposes.

searcher sufficient enough to merit coauthorship may be too much involvement (Audi, 1990).

### The Rights of Students As Research Participants

College students provide much of the data in social research. In psychology, for example, more than 70% of studies use students (Korn, 1988). In fact, it is the rare liberal arts major who has not participated in (or had a request to participate in) social science research. The ethical dimensions of this situation have not been overlooked. Korn (1988) suggests a "bill of rights" for students who agree to be research subjects:

- Participants should know the general purpose of the study and what they will be expected to do. Beyond this, they should be told everything a reasonable person would want to know in order to participate.
- Participants have the right to withdraw from a study at any time after beginning participation in the research.
- Participants should expect to receive benefits that outweigh the costs or risks involved. To achieve the educational benefit, participants have the right to ask questions and to receive clear, honest answers. If they don't receive what was promised, they have the right to remove their data from the study.
- Participants have the right to expect that anything done or said during their participation in a study will remain anonymous or confidential, unless they specifically agree to give up this right.
- Participants have the right to decline to participate in any study and may not be coerced into research. When learning about research is a course requirement, an equivalent alternative to participation should be available.
- Participants have the right to know when they have been deceived in a study and why the deception was used. If the deception seems unreasonable, participants have the right to withhold their data.
- When any of these rights is violated or participants have objections about a study, they have the right and responsibility to inform the appropriate university officials.

## ▪ ▪ ▪ Summary

Ethical considerations in conducting research should not be overlooked. Nearly every research study could affect subjects in some way, either psychologically or physically. Researchers who deal with human subjects must ensure that all precautions are taken to avoid any potential harm to subjects. This includes carefully planning a study and debriefing subjects upon completion of a project.

### Questions and Problems for Further Investigation

1. Using the five examples on page 66, suggest alternative ways of conducting each study that would be ethically acceptable.
2. In your opinion, what types of media research are unfair to respondents? What types of studies encroach on the guidelines discussed in this chapter?
3. In your opinion, is it wrong for researchers to give respondents the impression that they are being recruited for a particular study when the researchers actually have another purpose in mind? What are the limits to this behavior?
4. The World Wide Web has raised new issues concerning research and plagiarism. If you are using *InfoTrac College Edition*, look for articles that discuss this growing problem.

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Chapter 5

# Sampling


- *Population and Sample*
- *Probability and Nonprobability Samples*
- *Sample Size*
- *Sampling Error*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

This chapter describes the basics of the sampling methods that are used in mass media research. However, because sampling theory has become a distinct discipline in itself, there are some studies, such as nationwide surveys, that require a consultation of more technical discussions of sampling (for example, Cochran, 1977; Kish, 1965; and the Internet for a variety of articles about sampling).

## Population and Sample

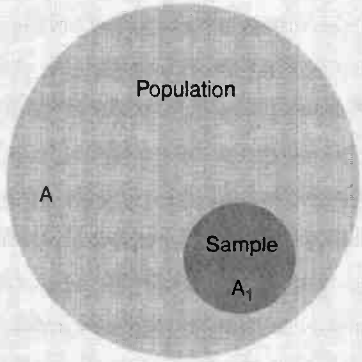
One goal of scientific research is to describe the nature of a population—that is, a group or class of subjects, variables, concepts, or phenomena. In some cases, an entire class or group is investigated, as in a study of prime-time television programs during the week of September 10–16. The process of examining every member of such a population is called a **census.** In many situations, however, an entire population cannot be examined due to time and resource constraints. Studying every member of a population is also generally cost-prohibitive and may in fact confound the research because measurements of large numbers of people often affect measurement quality.

The usual procedure in these instances is to take a sample from the population. A **sample** is a subset of the population that is representative of the entire population. An important word in this definition is *representative.* A sample that is not representative of the population, regardless of its size, is inadequate for testing purposes because the results cannot be generalized.

The sample selection process is illustrated using a Venn diagram (see Figure 5.1); the population is represented by the larger of the two circles. A census would test or measure every element in the population (A), whereas a sample would measure or test a segment of the population ($A_1$). Although in Figure 5.1 it might seem that the sample is drawn from only one portion of the population, it is actually selected from every portion. If a sample is chosen according to proper guidelines and is representative of the population, then the results from a study using the sample can be generalized to the population. The results must be generalized with some caution, however, because of the error that is inherent in all sample-selection methods. Theoretically, when a population is studied, only **measurement error** (that is, inconsistencies produced by the instrument used) is present. But when a sample is drawn from the population, the procedure introduces the likelihood of sampling error (that is, the degree to which measurements of the units or subjects selected differ from those of the population as a whole). Because a sample does not provide the exact data that a population would, the potential error must be taken into account.

A classic example of how sampling error can affect the results of a research study occurred during the 1936 presidential campaign. *Literary Digest* had predicted, based on the results of a sample survey, that Alf Landon would beat Franklin D. Roosevelt. Although the *Literary Digest* sample included more than a million voters, it was composed mainly of affluent Republicans. Consequently, it inaccurately represented the

Figure 5.1 *A Venn Diagram. As Used in the Process of Sample Selection*




population of eligible voters in the election. The researchers who conducted the study had failed to consider the population parameters (characteristics) before selecting their sample. Of course, FDR was reelected in 1936, and it may be no coincidence that the *Literary Digest* went out of business shortly thereafter. (This 1936 research fiasco was the focus of many discussions about political polls by both Bob Dole and Bill Clinton during the 1996 presidential campaign.)

Have the "pollsters" improved? The following list shows the final poll results of the five national media-sponsored polls conducted for the 1996 presidential contest between Bill Clinton (Democrat) and Bob Dole (Republican).

| Poll | Clinton | Dole |
|---|---|---|
| Actual vote | 49% | 41% |
| CBS/*New York Times* | 53 | 35 |
| *USA Today*/CNN/Gallup | 52 | 41 |
| The Harris Poll | 51 | 39 |
| ABC News/*Washington Post* | 51 | 39 |
| NBC News/*Wall Street Journal* | 49 | 37 |

It is clear that researchers have become better at predicting the outcome of elections. Considering the margin of error, the polls accurately predicted the final election results.

## ▪ *Probability and Nonprobability Samples*

A **probability sample** is selected according to mathematical guidelines whereby each unit's chance for selection is known. A **nonprobability sample** does not follow the guidelines of mathematical probability. However, the most significant characteristic distinguishing the two types of samples is that probability sampling allows researchers to calculate the amount of sampling error present in a research study; nonprobability sampling does not.

A researcher should consider four issues when deciding whether to use a probability or a nonprobability sample:

- *Purpose of the study.* Some research studies are not designed to be generalized to the population but rather to investigate variable relationships or collect exploratory data for designing questionnaires or measurement instruments. A nonprobability sample is often appropriate in these situations.

- *Cost versus value.* The sample should produce the greatest value for the least investment. If the cost of a probability sample is too high in relation to the type and quality of information collected, then a nonprobability sample is a possible alternative.
- *Time constraints.* In many cases researchers collecting preliminary information operate under time constraints imposed by sponsoring agencies, management directives, or publication guidelines. Since probability sampling is often time-consuming, a nonprobability sample may meet the need temporarily.
- *Amount of acceptable error.* In preliminary or pilot studies, where error control is not a prime concern, a nonprobability sample is usually adequate.

Although nonprobability sampling may have merit in some cases, it is always best to use a probability sample when the results will be generalized to the population. Any research study conducted to support or refute a significant question or a hypothesis should use a probability sample.

Probability sampling generally incorporates some type of systematic selection procedure, such as a table of random numbers, to ensure that each unit has an equal chance of being selected. However, it does not always guarantee a representative sample from the population, even when systematic selection is followed. It is possible to randomly select 50 members of the student body at a university in order to determine the average number of hours the students spend watching television during a typical week and, by extraordinary coincidence, end up with 50 students who do not own a TV set. Such an event is unlikely, but possible, and this underscores the need to replicate any study.

## Types of Nonprobability Samples

Nonprobability sampling is frequently used in mass media research, particularly in the form of available samples, samples using volunteer subjects, and purposive samples. Mall intercepts use nonprobability sampling (see Chapter 6). An **available sample** (also known as a **convenience sample**) is a collection of readily accessible subjects for study, such as a group of students enrolled in an introductory mass media course or shoppers in a mall. Although available samples can be helpful in collecting exploratory information and may produce useful data in some instances, the samples are problematic because they contain unknown quantities of error. Researchers need to consider the positive and negative qualities of available samples before using them in a research study.

Available samples are a subject of heated debate in many research fields. Critics argue that regardless of what results they generate, available samples do not represent the population and therefore have no external validity. (This problem was discussed in Chapter 2.) Proponents of using available samples claim that if a phenomenon, characteristic, or trait does in fact exist, then it should exist in any sample. Available samples can be useful in pretesting questionnaires or other preliminary (pilot study) work. They often help eliminate potential problems in research procedures, testing, and methodology before the final research study is attempted.

Subjects who constitute a **volunteer sample** also form a nonprobability sample, since the individuals are not selected mathematically. There is concern in all areas of research that persons who willingly participate in research projects differ greatly from nonvolunteers and may consequently produce erroneous research results. Rosenthal and Rosnow (1969) identified the characteristics

*Volunteer Samples*

Some people involved in research claim that the worry about volunteer samples is a waste of time. Their claim is that all research conducted in mass media (as well as all behavioral research) uses volunteer samples all of the time—that in fact there are probably few, if any, behavioral research projects conducted with a truly random sample. Why? Because respondents in research projects must agree to participate. We cannot force a person to answer questions. Some critics say that because researchers ask questions of only those people who agree (volunteer) to answer them, the argument about using a random sample is moot.

of volunteer subjects on the basis of several studies and found that such subjects, in comparison with nonvolunteers, tend to exhibit higher educational levels, higher occupational status, greater need for approval, higher intelligence levels, and lower levels of authoritarianism. They seem to be more sociable, more "arousal-seeking," and more unconventional; they are more likely to be first children; and they are generally younger.

These characteristics mean that the use of volunteer subjects may significantly bias the results of a research study and may lead to inaccurate estimates of various population parameters (Rosenthal & Rosnow, 1969). Also, available data seem to indicate that volunteers may, more often than nonvolunteers, provide data that support a researcher's hypothesis. In some cases volunteer subjects are necessary—for example, in comparison tests of products or services. However, volunteers should be used carefully because, as with available samples, the data have an unknown quantity of error.

Although volunteer samples have been shown to be inappropriate in scientific research, the media have begun to legitimize volunteers through the various polls conducted on radio and television stations and on the television networks. Local television news programs and radio station morning shows, for example, often report the results of the latest viewer or listener poll about some local concern. Even though announcers occasionally say that the polls are not intended to be scientific, the results are presented as such. The media are deceiving unwary listeners and viewers. The Federal Communications Commission (FCC) should disallow these types of "studies."

A **purposive sample** includes subjects selected on the basis of specific characteristics or qualities and eliminates those who fail to meet these criteria. Purposive samples are often used in advertising studies; researchers select subjects who use a particular type of product and ask them to compare it with a new product. A purposive sample is chosen with the knowledge that it is not representative of the general population. In a similar method, the **quota sample**, subjects are selected to meet a predetermined or known percentage. For example, a researcher interested in finding out how VCR owners differ from non-VCR owners in their use of television may know that 40% of a particular population owns a VCR. The sample the researcher selects, therefore, would be composed of 40% VCR owners and 60% non-VCR owners (to reflect the population characteristics).

Another nonprobability sampling method is to select subjects haphazardly on the basis of appearance or convenience, or because they seem to meet certain requirements (for example, the subjects "look" like they qualify for the study in progress). Haphazard selection involves researcher subjectivity and introduces error. Some haphazard samples give the illusion of a probability sample; these must be approached carefully. For example, interviewing every 10th person who walks by in a shopping center is haphazard because not everyone in the population has an equal chance of walking by that particular location. Some people live across town; some shop in other centers; and so on.

Some researchers, research suppliers, and field services try to work around the problems associated with convenience samples in mall intercepts by using a procedure based on what is called "The Law of Large Numbers." Essentially, the researchers interview thousands of respondents instead of hundreds. The presumption (and the sales approach used on clients) is that the large number of respondents eliminates the problems of convenience sampling and somehow compensates for the fact that the sample is not random. *It does not.* The large number approach is a *convenience sample.* It is not a random sample, which is described next.

### Types of Probability Samples

The most basic type of probability sampling is the simple **random sample** for which each subject or unit in the population has an equal chance of being selected. If a subject or unit is drawn from the population and removed from subsequent selections, the procedure is known as random sampling *without replacement*—the most widely used random sampling method. Random sampling *with replacement* involves returning the subject or unit to the population so that it has a chance of being chosen another time. Sampling with replacement is often used in more complicated research studies such as nationwide surveys (Raj, 1972).

Researchers usually use a table of random numbers to generate a simple random sample. For example, a researcher who wants to analyze 10 prime time television programs out of a population of 100 programs to determine how the medium portrays elderly people can take a random sample from the 100 programs by numbering each show from 00 to 99 and then selecting 10 numbers from a table of random numbers, such as the brief listing in Table 5.1. First, a starting point in the table is selected at random. There is no specific way to choose a starting point; it is an arbitrary decision. The researcher then selects the remaining 9 numbers by going up, down, left, or right on the table—or even randomly throughout the table. For example, if the researcher decides to go down the table from the starting point of 44 until a sample of 10 has been drawn, the sample would include television programs numbered 44, 85, 46, 71, 17, 50, 66, 56, 03, and 49.

Simple random samples for use in telephone surveys are often obtained by a process called **random digit dialing,** or RDD. One RDD method involves randomly selecting four-digit numbers (usually generated by a computer or through the use of a random numbers table) and adding them to the three-digit exchange prefixes in the city in which the survey is conducted. A single four-digit series may be used once, or it may be added to all the prefixes.

Unfortunately, many of the telephone numbers generated by this method of RDD are invalid because some phones have been disconnected, some numbers generated have not yet been assigned, and so on. Therefore it is advisable to produce at least three times the number of telephone numbers needed; if a sample of 100 is required, then at least 300 numbers should be generated to allow for invalid numbers.

A second RDD method that tends to decrease the occurrence of invalid numbers involves adding from one to three random digits to a telephone number selected from a phone directory or a list of phone numbers. One first selects a number from a list of

Table 5.1 *Random Numbers*

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38 | 71 | 81 | 39 | 18 | 24 | 33 | 94 | 56 | 48 | 80 | 95 | 52 | 63 | 01 | 93 | 62 |
| 27 | 29 | 03 | 62 | 76 | 85 | 37 | 00 | 44 | 11 | 07 | 61 | 17 | 26 | 87 | 63 | 79 |
| 34 | 24 | 23 | 64 | 18 | 79 | 80 | 33 | 98 | 94 | 56 | 23 | 17 | 05 | 96 | 52 | 94 |
| 32 | 44 | 31 | 87 | 37 | 41 | 18 | 38 | 01 | 71 | 19 | 42 | 52 | 78 | 80 | 21 | 07 |
| 41 | 88 | 20 | 11 | 60 | 81 | 02 | 15 | 09 | 49 | 96 | 38 | 27 | 07 | 74 | 20 | 12 |
| 95 | 65 | 36 | 89 | 80 | 51 | 03 | 64 | 87 | 19 | 06 | 09 | 53 | 69 | 37 | 06 | 85 |
| 77 | 66 | 74 | 33 | 70 | 97 | 79 | 01 | 19 | 44 | 06 | 64 | 39 | 70 | 63 | 46 | 86 |
| 54 | 55 | 22 | 17 | 35 | 56 | 66 | 38 | 15 | 50 | 77 | 94 | 08 | 46 | 57 | 70 | 61 |
| 33 | 95 | 06 | 68 | 60 | 97 | 09 | 45 | 44 | 60 | 60 | 07 | 49 | 98 | 78 | 61 | 88 |
| 83 | 48 | 36 | 10 | 11 | 70 | 07 | 00 | 66 | 50 | 51 | 93 | 19 | 88 | 45 | 33 | 23 |
| 34 | 35 | 86 | 77 | 88 | 40 | 03 | 63 | 36 | 35 | 73 | 39 | 44 | 06 | 51 | 48 | 84 |
| 58 | 35 | 66 | 95 | 48 | 56 | 17 | 04 | 44 | 99 | 79 | 87 | 85 | 01 | 73 | 33 | 65 |
| 98 | 48 | 03 | 63 | 53 | 58 | 03 | 87 | 97 | 57 | 16 | 38 | 46 | 55 | 96 | 66 | 80 |
| 83 | 12 | 51 | 88 | 33 | 98 | 68 | 72 | 79 | 69 | 88 | 41 | 71 | 55 | 85 | 50 | 31 |
| 56 | 66 | 06 | 69 | 44 | 70 | 43 | 49 | 35 | 46 | 98 | 61 | 17 | 63 | 14 | 55 | 74 |
| 68 | 07 | 59 | 51 | 48 | 87 | 64 | 79 | 19 | 76 | 46 | 68 | 50 | 55 | 01 | 10 | 61 |
| 20 | 11 | 75 | 63 | 05 | 16 | 96 | 95 | 66 | 00 | 18 | 86 | 66 | 67 | 54 | 68 | 06 |
| 26 | 56 | 75 | 77 | 75 | 69 | 93 | 54 | 47 | 39 | 67 | 49 | 56 | 96 | 94 | 53 | 68 |
| 26 | 45 | 74 | 77 | 74 | 55 | 92 | 43 | 37 | 80 | 76 | 31 | 03 | 48 | 40 | 25 | 11 |
| 73 | 39 | 44 | 06 | 59 | 48 | 48 | 99 | 72 | 90 | 88 | 96 | 49 | 09 | 57 | 45 | 07 |
| 34 | 36 | 64 | 17 | 21 | 39 | 09 | 97 | 33 | 34 | 40 | 99 | 36 | 12 | 12 | 53 | 77 |
| 26 | 32 | 06 | 40 | 37 | 02 | 11 | 83 | 79 | 28 | 38 | 49 | 44 | 84 | 94 | 47 | 32 |
| 04 | 52 | 85 | 62 | 24 | 76 | 53 | 83 | 52 | 05 | 14 | 14 | 49 | 19 | 94 | 62 | 51 |
| 33 | 93 | 35 | 91 | 24 | 92 | 47 | 57 | 23 | 06 | 33 | 56 | 07 | 94 | 98 | 39 | 27 |
| 16 | 29 | 97 | 86 | 31 | 45 | 96 | 33 | 83 | 77 | 28 | 14 | 40 | 43 | 59 | 04 | 79 |

*Simple Random Sampling*

*Advantages*
1. Detailed knowledge of the population is not required.
2. External validity may be statistically inferred.
3. A representative group is easily obtainable.
4. The possibility of classification error is eliminated.

*Disadvantages*
1. A list of the population must be compiled.
2. A representative sample may not result in all cases.
3. The procedure can be more expensive than other methods.

telephone numbers (a directory or list purchased from a supplier). Assume that the number 448-3047 was selected from the list. The researcher then simply adds a predetermined number, say 6, to produce 448-3053; or a predetermined two-digit number, say 21, to get 448-3068; or even a three-digit number, say 112, to produce 448-3159. Each variation of the method helps to eliminate many of the invalid numbers produced in pure random number generation, since telephone companies tend to distribute telephone numbers in series, or blocks. In this example, the block "30" is in use, and there is a good chance that random add-ons to this block will be residential telephone numbers.

Random number generation is possible via a variety of methods. However, two rules are always applicable: (1) each unit or subject in the population must have an equal chance of being selected, and (2) the selection procedure must be free from subjective intervention by the researcher. The purpose of random sampling is to reduce sampling error; violating random sampling rules only increases the chance of introducing such error into a study.

Similar in some ways to simple random sampling is a procedure called **systematic random sampling** in which every *n*th subject or unit is selected from a population. For example, to obtain a sample of 20 from a population of 100, or a sampling rate of 1/5, a researcher randomly selects a starting point and a **sampling interval**. Thus, if the number 11 is chosen as the starting point, then the sample will include the 20 subjects or items numbered 11, 16, 21, 26, and so on. To add further randomness to the process, the researcher may randomly select both the starting point and the sampling interval. For example, an interval of 11 with a starting point of 29 generates the numbers 40, 51, 62, 73, and so on.

Systematic samples are used frequently in mass media research. They often save time, resources, and effort when compared to simple random samples. In fact, since the procedure so closely resembles a simple random sample, many researchers consider systematic sampling as effective as the random procedure. The method is widely used to select subjects from lists such as telephone directories, *Broadcasting/Cablecasting Yearbook*, and *Editor & Publisher*.

The accuracy of systematic sampling depends on the adequacy of the **sampling frame**, or the complete list of members in the population. Telephone directories are inadequate sampling frames in most cases because

*Systematic Sampling*

*Advantages*

1. Selection is easy.
2. Selection can be more accurate than in a simple random sample.
3. The procedure is generally inexpensive.

*Disadvantages*

1. A complete list of the population must be obtained.
2. Periodicity may bias the process.

not all phone numbers are listed and some people do not have telephones at all. However, lists that include all the members of a population have a high degree of precision. Before deciding to use systematic sampling, one should consider the goals and purpose of a study and the availability of a comprehensive list of the population. If such a list is not available, then systematic sampling is probably ill advised.

One major problem associated with systematic sampling is **periodicity**; that is, the arrangement or order of the items in the population list may bias the selection process. For example, consider the problem mentioned earlier of analyzing television programs to determine how the elderly are portrayed. Quite possibly, ABC may have aired every 10th program listed; the result would be a nonrepresentative sampling of the three networks.

Periodicity also causes problems when telephone directories are used to select samples. The alphabetical listing does not allow each person or household an equal chance of being selected. One way to solve the problem is to cut each name from the directory, place them all in a "hat," and draw names randomly. Obviously, this would take days to accomplish and it is not a real alternative. An easier way to use a directory is to tear the pages loose, mix them up, randomly select pages, and then randomly select names. Although this procedure does not totally solve the problem, it is generally accepted when simple random sampling is impossible. If periodicity is eliminated, systematic sampling can be an excellent sampling methodology.

Although a simple random sample is the usual choice in most research projects, some researchers do not wish to rely on randomness. In some projects, researchers want to *guarantee* that a specific subsample of the population is adequately represented, and no such guarantee is possible using a simple random sample. A **stratified sample** is the approach used to get adequate representation of a subsample. The characteristics of the subsample (strata or segment) may include almost any variable: age, gender, religion, income level, or even individuals who listen to specific radio stations or read certain magazines. The strata may be defined by an almost unlimited number of characteristics; however, each additional variable or characteristic makes the subsample more difficult to find. Therefore incidence drops.

Stratified sampling ensures that a sample is drawn from a homogeneous subset of the population—that is, from a population that has similar characteristics. Homogeneity helps researchers to reduce sampling error. For example, consider a research study on subjects' attitudes toward two-way, interac-

*Stratified Sampling*

*Advantages*
1. Representativeness of relevant variables is ensured.
2. Comparisons can be made to other populations.
3. Selection is made from a homogeneous group.
4. Sampling error is reduced.

*Disadvantages*
1. A knowledge of the population prior to selection is required.
2. The procedure can be costly and time-consuming.
3. It can be difficult to find a sample if incidence is low.
4. Variables that define strata may not be relevant.

tive cable television. The investigator, knowing that cable subscribers tend to have higher achievement levels, may wish to stratify the population according to education. Before randomly selecting subjects, the researcher divides the population into three education levels: grade school, high school, and college. Then, if it is determined that 10% of the population completed college, a random sample proportional to the population should contain 10% of the population who meet this standard. As Babbie (1997) notes:

> Stratified sampling ensures the proper representation of the stratification variables to enhance representation of other variables related to them. Taken as a whole, then, a stratified sample is likely to be more representative on a number of variables than a simple random sample.

Stratified sampling can be applied in two different ways. **Proportionate stratified sampling** includes strata with sizes based on their proportions in the population. If 30% of the population is adults ages 18–24, then 30% of the total sample will be subjects in this age group. This procedure is designed to give each person in the population an equal chance of being selected. **Disproportionate stratified sampling** is used to oversample or overrepresent a particular stratum. The approach is used basically because that stratum is considered important for marketing, advertising, or other similar reasons. For example, a radio station that targets 25- to 54-year-olds may have ratings problems with the 25- to 34-year-old group. In a telephone study of 500 respondents, the station management may wish to have the sample represented as follows: 70% in the 24–34 group, 20% in the 35–49 group, and 10% in the 50–54 group. This distribution would allow researchers to break the 25–34 group into smaller groups such as males, females, fans of specific stations, and other subcategories and still have reasonable sample sizes.

The usual sampling procedure is to select one unit or subject at a time, but this requires the researcher to have a complete list of the population. In some cases there is no way to obtain such a list. One way to avoid this problem is to select the sample in groups or categories; this procedure is known as **cluster sampling**. For example, analyzing magazine readership habits of people in Wisconsin would be time-consuming and complicated if individual subjects were randomly selected. With cluster sampling, one can divide the

### Cluster Sampling

*Advantages*
1. Only part of the population need be enumerated.
2. Costs are reduced if clusters are well defined.
3. Estimates of cluster parameters are made and compared to the population.

*Disadvantages*
1. Sampling errors are likely.
2. Clusters may not be representative of the population.
3. Each subject or unit must be assigned to a specific cluster.

state into districts, counties, or zip code areas and select groups of people from these areas.

Cluster sampling creates two types of errors: errors in defining the initial clusters and errors in selecting from the clusters. For example, a zip code area may contain mostly residents of a low socioeconomic status who are unrepresentative of the rest of the state; if selected for analysis, such a group may confound the research results. To help control such error, it is best to use small areas or clusters, both to decrease the number of elements in each cluster and to maximize the number of clusters selected (Babbie, 1997).

In many nationwide studies, researchers use a form of cluster sampling called multistage sampling, in which individual households or persons (not groups) are selected. Figure 5.2 illustrates a four-stage sequence for a nationwide survey. First, a cluster of counties (or another specific geographic area) in the United States is selected. Researchers then narrow this cluster by randomly selecting a county, district, or block group within the principal cluster. Next, individual blocks are selected within each area. Finally, a convention such as "the third household from the northeast corner" is established, and then the individual households in the sample can be identified by applying the selection formula in the stages just described.

In many cases researchers also need to randomly select an individual in a given household. Researchers usually cannot count on being able to interview the person who happens to answer the telephone. *Demographic quotas* may be established for a research study, which means that a certain percentage of all respondents must be of a certain gender or age. In this type of study, researchers determine which person in the household should answer the questionnaire by using a form of random numbers table, as illustrated in Table 5.2.

To get a random selection of individuals in the selected households, the interviewer simply asks each person who answers the telephone, "How many people are there in your home who are age 12 or older?" If the first respondent answers "Five," the interviewer asks to speak to the fifth-oldest (in this case the youngest) person in the home. Each time a call is completed, the interviewer checks off on the table the number representing the person questioned. If the next household called also has five family members, the interviewer moves to the next number in the 5 column and asks to talk to the third-oldest person in the home.

The same table can be used to select respondents by gender; that is, the interviewer could ask, "How many men who are age 12 or older live in your home?" The interviewer could then ask for the *n*th-oldest

Figure 5.2 *Census Tracts*

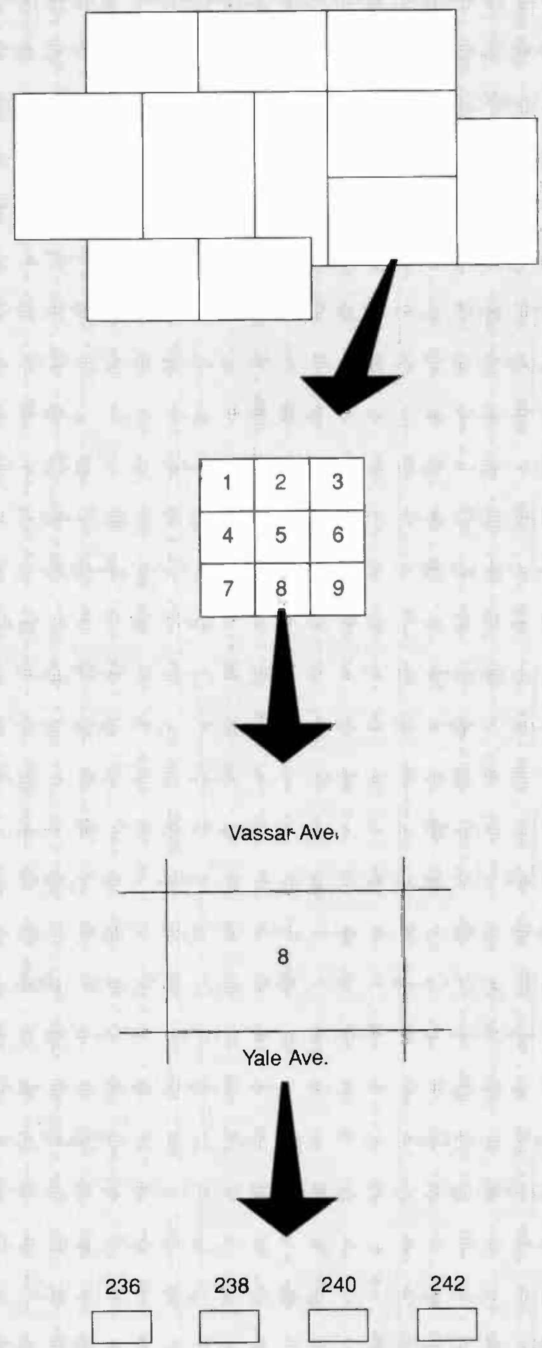


Table 5.2 *Example of Matrix for Selecting Respondents at Random*

| | Number of people in household | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Person to interview: | 1 | 2 | 1 | 3 | 5 | 5 | 7 |
| | | 1 | 3 | 4 | 3 | 2 | 6 |
| | | | 2 | 2 | 1 | 4 | 1 |
| | | | | 1 | 2 | 6 | 4 |
| | | | | | 4 | 1 | 3 |
| | | | | | | 3 | 2 |
| | | | | | | | 5 |

male, or female, according to the requirements of the survey.

Since the media are complex systems, researchers frequently encounter complicated sampling methods. These are known as *hybrid* situations. Consider some researchers attempting to determine the potential for videotext distribution of a local newspaper to cable subscribers. This problem requires investigating readers and nonreaders of the newspaper in addition to cable subscribers and nonsubscribers. The research therefore requires random sampling from the following four groups:

| | |
|---|---|
| Group A | Subscribers/Readers |
| Group B | Subscribers/Nonreaders |
| Group C | Nonsubscribers/Readers |
| Group D | Nonsubscribers/Nonreaders |

The researcher must identify each subject as belonging to one of these four groups. If three variables are involved, sampling from eight groups is required, and so on. In other words, researchers are often faced with very complicated sampling situations that involve numerous steps.

## ▪ Sample Size

Determining an adequate sample size is one of the most controversial aspects of sampling. How large must a sample be to provide the desired level of confidence in the results? Unfortunately, there is no simple answer. Certain sample sizes are suggested for various statistical procedures, but no single sample-size formula or method is available for every research method or statistical procedure. For this reason, we advise you to consult sampling texts for information concerning specific techniques (Cochran, 1977; Raj, 1972). The size of the sample required for a study depends on at least one or more of the following seven factors: (1) project type, (2) project purpose, (3) project complexity, (4) amount of error tolerated, (5) time constraints, (6) financial constraints, and (7) previous research in the area. (An eighth factor in private sector research is how much the client is willing to spend.) Research designed as a preliminary search for general indications generally does not require a large sample. However, projects intended to answer significant questions (those designed to provide information for decisions involving large sums of money or decisions that may affect people's lives) require high levels of precision and therefore large samples.

A few general principles guide researchers in determining an acceptable sample size. These suggestions are not based on mathematical or statistical theory, but they provide a starting point in most cases.

1. A primary consideration in determining sample size is the research method used. Focus groups (see Chapter 6) use samples of 6–12 people, but the results are not intended to be generalized to the population from which the respondents are selected. Samples with 10–50 subjects are commonly used for pretesting measurement instruments and pilot studies, and for conducting studies that will be used for only heuristic value.

2. Researchers often use samples of 50, 75, or 100 subjects per group (such as adults 18–24 years old). This base figure is used to "back in" to a total sample size. For example, assume a researcher is planning to conduct a telephone study with adults aged 18–54. Using the normal mass media age spans of 18–24, 25–34, 35–44, and 45–54, the researcher would probably consider a total sample of 400 as satisfactory (100 per age group, or "cell"). However, the client may also wish to investigate the differences in opinions and attitudes among men and women, which produces a total of eight age cells. In this case, a sample of 800 would be used—100 for each of the cell possibilities. Realistically, however, not many clients in private sector research are willing to pay for a study with a sample of 800 respondents (approximately $56,000 for a 20-minute telephone interview). More than likely, the client would accept 50 respondents in each of the eight cells, producing a total sample of 400 (8 × 50).

3. Cost and time considerations always control sample size. Although researchers may wish to use a sample of 1,000 for a survey, the economics of such a sample are usually prohibitive. Research with 1,000 respondents can easily cost more than $70,000. Most research is conducted using a sample size that conforms to the project's budget. If a smaller sample is forced on a researcher by someone else (a client or a project manager), the results must be interpreted accordingly—that is, with caution. However, considering that reducing a sample size from 1,000 to 400 (for example) reduces the sampling error by only a small percentage, researchers may be wise to consider using smaller samples for most projects.

4. Multivariate studies always require larger samples than do univariate studies because they involve analyzing multiple response data (several measurements on the same subject). One guideline recommended for multivariate studies is as follows: 50 = very poor; 100 = poor; 200 = fair; 300 = good; 500 = very good; 1,000 = excellent (Comrey & Lee, 1992). Other researchers suggest using a sample of 100 plus 1 subject for each dependent variable in the analysis (Gorsuch, 1983).

5. For panel studies, central location testing, focus groups, and other prerecruit projects, researchers should always select a larger sample than is actually required. The larger sample compensates for those subjects who drop out of research studies for one reason or another, and allowances must be made for this in planning the sample selection. High dropout rates are especially prevalent in panel studies, where the same group of subjects is tested or measured frequently over a long period of time. Usually researchers can expect 10%–25% of the sample to drop out of a study before it is completed, and 50% or more is not uncommon.

6. Information about sample size is available in published research. Consulting the work of other researchers provides a starting point. If a survey is planned and similar research indicates that a representative sample of 400 has been used regularly with reliable

results, then a sample larger than 400 may be unnecessary.

7. Generally speaking, the larger the sample, the better. However, a large unrepresentative sample ("The Law of Large Numbers") is as meaningless as a small unrepresentative sample, so researchers should not consider numbers alone. Quality is always more important in sample selection than mere size. During our 25 years of research, we have found that a sample size of less than 30 in a given cell (such as females, 18–24) produces results that are unstable. For more information about sampling, see Tukey, 1986.

8. Several sample size calculators are available on the Internet. See, for example, *www.surveysystem.com/sscalc.htm.*

## Sampling Error

Since researchers deal with samples from a population, there must be some way for them to compare the results of (or make inferences about) what was found in the sample to what exists in the target population. The comparison allows researchers to determine the accuracy of their data and involves the computation of error. All research involves error—be it sampling error, measurement error, or random error (also called unknown, or uncontrollable, error). **Sampling error** is also known as standard error. The different sources of error are additive; that is, total error is the sum of the three different sources. This section discusses sampling error in mass media research.

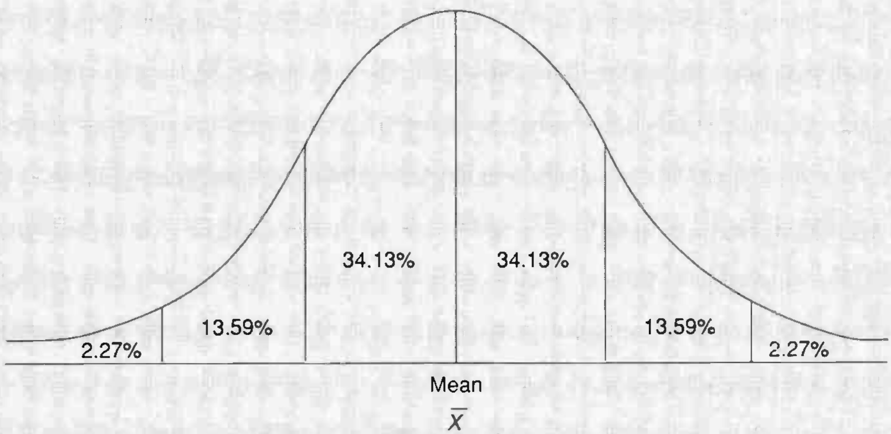
Sampling error occurs when measurements taken from a sample do not correspond to what exists in the population. For example, assume we wish to measure attitudes toward a new television program by 18–24-year-old viewers in Denver, Colorado. Further assume that all the viewers produce an average score of 6 on a 10-point program appeal measurement scale. Some viewers may dislike the program and rate the show 1, 2, or 3; some may find it mediocre and rate it 4, 5, 6, or 7; and the remaining viewers may like the show a lot and rate it 8, 9, or 10. The differences among the 18–24-year-old viewers provide an example of how sampling error may occur. If we asked each viewer to rate the show in a separate study and each one rated the program a 6, then no error exists. However, an error-free sample is highly unlikely.

Respondent differences do exist; some dislike the program, and others like it. Although the average program rating is 6 in the hypothetical example, it is possible to select a sample from the target population that does not match the average rating. A sample could be selected that includes only viewers who dislike the program. This would misrepresent the population because the average appeal score would be lower than the mean score. Computing the rate of sampling error allows researchers to assess the risk involved in accepting research findings as "real."

Computing sampling error is appropriate only with probability samples. Sampling error cannot be computed with research that uses nonprobability samples because not everyone has an equal chance of being selected. This is one reason nonprobability samples are used only in preliminary research or in studies where error rates are not considered important.

Sampling error computations are essential in research and are based on the concept of the **central limit theorem.** In its simplest form, the theorem states that the sum of a large number of independent and identically distributed random variables (or **sampling distributions**) has an approximate normal **distribution.** A theoretical sampling distribution is the set of all possible samples of a given size. This distribution of values is described by a bell-shaped curve or normal curve (also known as a *Gaussian distribution,* after German mathematician and astronomer Karl F. Gauss, who used the concept to analyze observational errors). The

Figure 5.3 *Areas Under the Normal Curve*




normal distribution is important in computing sampling error because sampling errors (a sampling distribution) that are made in repeated measurements tend to be normally distributed.

Computing standard error is a process of determining, with a certain amount of confidence, the difference between a sample and the target population. Error can occur by chance or through some fault of the research procedure. However, when probability sampling is used, the incidence of error can be determined because of the relationship between the sample and the normal curve. A normal curve, as shown in Figure 5.3, is symmetrical about the mean or midpoint, which indicates that an equal number of scores lies on either side of the midpoint.

### Confidence Level and Confidence Interval

Sampling error involves two concepts: confidence level and confidence interval. After a research project has been conducted, the researcher estimates the accuracy of the results in terms of a level of confidence that the results lie within a specified interval. For example, a researcher may say he is 95% confident (*confidence level*) that his finding—in which 50% of his study's respondents named "ER" as their favorite TV program—is within ±5% (*confidence interval*) of the *true* population percentage.

In every normal distribution, the standard deviation defines a standard unit of distance from the midpoint of the distribution to the outer limits of the distribution. These standard deviation interval units (values) are used in establishing the confidence interval that is accepted in a research project. In addition, the standard deviation units indicate the amount of standard error. For example, using an interval (confidence interval) of −1 or +1 standard deviation unit—1 standard error—says that the probability is that 68% of the samples selected from the population will produce estimates within that distance from the population value (1 standard deviation unit; see Figure 5.3).

Researchers use a number of different confidence intervals. Greater confidence in results is achieved when the data are tested at higher levels, such as 95%. Research projects that are preliminary in nature or whose results are not intended to be used for significant decision making can and should use more conservative confidence levels, such as 68%. Conducting research that deals with human subjects is difficult enough on its own, without further complicating the work with highly restrictive confidence levels. The researcher must balance necessity with practicality. For instance, a researcher might need to ask whether her investigation concerning tastes and preferences in music needs to be tested at a confidence level of 95% or 99%. The answer is no. In fact, the necessity for confidence levels and confidence intervals in behavioral research is under debate. Research is often judged as good or bad depending on whether a study is "statistically significant," not on whether the study contributed anything to the advancement of knowledge. Statistical significance alone does not anoint a research project as scientific; a nonsignificant finding is as important to knowledge as a study that "finds" statistical significance. For more information about the misguided nature of statistical significance, see Tukey, 1986.

The areas under the normal curve in Table 3 of Appendix 1 are used to determine other confidence intervals. For example, the 68% confidence interval (.34 on either side of the mean) corresponds to 1.00 standard error, the 95% interval corresponds to 1.96 standard errors, and the 99% interval corresponds to 2.576 standard errors. If the statistical data from the sample fall outside the range set by the researcher, the results are considered significant.

### Computing Standard Error

The essence of statistical hypothesis testing is to draw a sample from a target population, compute some type of statistical measurement, and compare the results to the theoretical sampling distribution. The comparison determines the frequency with which sample values of a statistic are expected to occur.

The *expected value* of a statistic is the mean of the sampling distribution. The standard error is the standard deviation of the sampling distribution. There are several ways to compute standard (sampling) error, but no single method is appropriate for all sample types or all situations. In addition, error formulas vary in complexity. One error formula, designed for use with dichotomous (yes/no) data, that estimates audience size for certain TV programs during certain time periods uses the standard error of a percentage derived from a simple random sample. If the sample percentage (the ones who answered yes) is designated as $p$, the size of the sample as $n$, and the estimated or standard error of the sample percentage as $SE(p)$, this is the formula:

$$SE(p) = \sqrt{\frac{p(100 - p)}{n}}$$

Suppose a sample of 500 households produces a rating (or estimate of the percentage of viewers—see Chapter 15) of 20 for a particular show. This means that 20% of those households were turned to that channel at that time. The formula can be used to calculate the standard error of this percentage as follows:

$$SE(p) = \sqrt{\frac{20 \times 80}{500}}$$

$$SE(p) = \sqrt{\frac{1{,}600}{500}}$$

$$SE(p) = 1.79$$

This estimate of the standard error can be used to calculate confidence intervals at various confidence levels. For example, to calculate the confidence interval at the .68 confidence level, simply add and subtract 1 standard error from the percentage. (Note

Table 5.3 *Finding Error Rate Using a Rating of 20*

| Sample size | Error | Lower limit | Upper limit |
|---|---|---|---|
| 600 | ±1.63 | 18.37 | 21.63 |
| 700 | ±1.51 | 18.49 | 21.51 |
| 800 | ±1.41 | 18.59 | 21.41 |
| 900 | ±1.33 | 18.67 | 21.33 |
| 1,000 | ±1.26 | 18.74 | 21.26 |
| 1,500 | ±1.03 | 18.97 | 21.03 |

that 68% of the normal curve is encompassed by plus and minus 1 standard error.) Thus we are 68% confident that the true rating lies somewhere between 18.21 (20 − 1.79) and 21.79 (20 + 1.79).

If we want to have greater confidence in our results, we can calculate the confidence interval at the .95 confidence level by adding and subtracting 1.96 × $SE(p)$ from our percentage. (Recall that 95% of the normal curve is encompassed by plus and minus 1.96 standard errors.) In our example, the interval at the .95 level would be: 16.5 (20 − 1.96 × 1.79) to 23.5 (20 + 1.96 × 1.79).

Standard error is directly related to sample size. The error figure improves as the sample size is increased, but in decreasing increments. Thus an increase in sample size does not provide a big gain, as illustrated by Table 5.3. As can be seen, even with a sample of 1,500, the standard error is only .75 better than with the sample of 500 computed above. A researcher would need to determine whether the increase in time and expense created by 1,000 additional subjects justifies such a proportionally small increase in precision. (See *www.wimmer-hudson.com* for an on-line sampling error calculator.)

Table 5.4 shows the amount of error at the 95% and 99% confidence level for measurements that contain dichotomous variables (such as yes/no). For example, using a 95% confidence level, with a sample of 1,000 and a 30% "yes" response to a question, the probable error due to sample size alone is ±2.8. This means that we are 95% sure that our values for this particular question fall between 27.2% and 32.8%.

Sampling error is an important concept in all research areas because it provides an indication of the degree of accuracy of the research. Research studies published by large audience measurement firms such as Arbitron and A. C. Nielsen are required by the Electronic Media Ratings Council (EMRC) to include simplified charts to assist in determining sampling error. In addition, each company provides some type of explanation about error, such as the Arbitron statement entitled "Description of Methodology" contained in every ratings book section:

> Arbitron estimates are subject to statistical variances associated with all surveys which use a sample of the universe . . . the accuracy of Arbitron estimates, data and reports and their statistical evaluators cannot be determined to any precise mathematical value or definition.

Statistical error due to sampling is found in all research studies. Researchers must pay

Table 5.4 *Sampling Error at 95% and 99% Confidence Levels*

**Sampling Error at 95% Confidence Level**

| Result is: | | 1% or 99% | 5% or 95% | 10% or 90% | 15% or 85% | 20% or 80% | 25% or 75% | 30% or 70% | 35% or 65% | 40% or 60% | 45% or 55% | 50% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample: | 10 | 6.2 | 13.5 | 18.6 | 22.1 | 24.8 | 26.8 | 28.4 | 29.6 | 30.4 | 30.8 | 31.0 |
| | 20 | 4.4 | 9.6 | 13.1 | 15.6 | 17.5 | 19.0 | 20.1 | 20.9 | 21.5 | 21.8 | 21.9 |
| | 30 | 3.6 | 7.8 | 10.7 | 12.8 | 14.3 | 15.5 | 16.4 | 17.1 | 17.5 | 17.8 | 17.9 |
| | 40 | 3.1 | 6.8 | 9.3 | 11.1 | 12.4 | 13.4 | 14.2 | 14.8 | 15.2 | 15.4 | 15.5 |
| | 50 | 2.8 | 6.0 | 8.3 | 9.9 | 11.1 | 12.0 | 12.7 | 13.2 | 13.6 | 13.8 | 13.9 |
| | 75 | 2.3 | 4.9 | 6.8 | 8.1 | 9.1 | 9.8 | 10.4 | 10.8 | 11.1 | 11.3 | 11.3 |
| | 100 | 2.0 | 4.3 | 5.9 | 7.0 | 7.8 | 8.5 | 9.0 | 9.3 | 9.6 | 9.8 | 9.8 |
| | 200 | 1.4 | 3.0 | 4.2 | 4.9 | 5.5 | 6.0 | 6.4 | 6.6 | 6.8 | 6.9 | 6.9 |
| | 300 | 1.1 | 2.5 | 3.4 | 4.0 | 4.5 | 4.9 | 5.2 | 5.4 | 5.5 | 5.6 | 5.7 |
| | 400 | 1.0 | 2.1 | 2.9 | 3.5 | 3.9 | 4.2 | 4.5 | 4.7 | 4.8 | 4.9 | 4.9 |
| | 500 | .87 | 1.9 | 2.6 | 3.1 | 3.5 | 3.8 | 4.0 | 4.2 | 4.3 | 4.4 | 4.4 |
| | 600 | .80 | 1.7 | 2.4 | 2.9 | 3.2 | 3.5 | 3.7 | 3.8 | 3.9 | 4.0 | 4.0 |
| | 700 | .74 | 1.6 | 2.2 | 2.6 | 3.0 | 3.2 | 3.4 | 3.5 | 3.6 | 3.7 | 3.7 |
| | 800 | .69 | 1.5 | 2.1 | 2.5 | 2.8 | 3.0 | 3.2 | 3.3 | 3.4 | 3.4 | 3.5 |
| | 900 | .65 | 1.4 | 2.0 | 2.3 | 2.6 | 2.8 | 3.0 | 3.1 | 3.2 | 3.3 | 3.3 |
| | 1,000 | .62 | 1.4 | 1.9 | 2.2 | 2.5 | 2.7 | 2.8 | 3.0 | 3.0 | 3.1 | 3.1 |
| | 2,000 | .44 | 1.0 | 1.3 | 1.6 | 1.8 | 1.9 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 |
| | 3,000 | .36 | .78 | 1.1 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.8 | 1.8 |
| | 4,000 | .31 | .68 | .93 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 |
| | 5,000 | .28 | .60 | .83 | 1.0 | 1.1 | 1.2 | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 |
| | 10,000 | .20 | .43 | .59 | 0.70 | 0.78 | 0.85 | 0.9 | 0.93 | 1.0 | 1.0 | 1.0 |

**Sampling Error at 99% Confidence Level**

| Result is: | | 1% or 99% | 5% or 95% | 10% or 90% | 15% or 85% | 20% or 80% | 25% or 75% | 30% or 70% | 35% or 65% | 40% or 60% | 45% or 55% | 50% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample: | *10* | *8.1* | *17.7* | *24.4* | *29.0* | *32.5* | *35.2* | *37.2* | *38.8* | *39.8* | *40.4* | *40.6* |
| | *20* | *5.7* | *12.5* | *17.2* | *20.5* | *23.0* | *24.9* | *26.3* | *27.4* | *28.2* | *28.6* | *28.7* |
| | *30* | *4.7* | *10.2* | *14.1* | *16.8* | *18.8* | *20.3* | *21.5* | *22.4* | *23.0* | *23.3* | *23.5* |
| | *40* | *4.0* | *8.9* | *12.2* | *14.5* | *16.3* | *17.6* | *18.6* | *19.4* | *19.9* | *20.2* | *20.3* |
| | *50* | *3.6* | *7.9* | *10.9* | *13.0* | *14.5* | *15.7* | *16.7* | *17.3* | *17.8* | *18.1* | *18.2* |
| | *75* | *3.0* | *6.5* | *8.9* | *10.6* | *11.9* | *12.9* | *13.6* | *14.2* | *14.5* | *14.8* | *14.8* |
| | *100* | *2.6* | *5.6* | *7.7* | *9.2* | *10.3* | *11.1* | *11.8* | *12.3* | *12.6* | *12.8* | *12.9* |
| | *200* | *1.8* | *4.0* | *5.5* | *6.5* | *7.3* | *7.9* | *8.3* | *8.7* | *8.9* | *9.0* | *9.1* |
| | *300* | *1.5* | *3.2* | *4.5* | *5.3* | *5.9* | *6.4* | *6.8* | *7.1* | *7.3* | *7.4* | *7.4* |
| | *400* | *1.3* | *2.8* | *3.9* | *4.6* | *5.1* | *5.6* | *5.9* | *6.1* | *6.3* | *6.4* | *6.4* |
| | *500* | *1.1* | *2.5* | *3.4* | *4.1* | *4.6* | *5.0* | *5.3* | *5.5* | *5.6* | *5.7* | *5.7* |
| | *600* | *1.0* | *2.3* | *3.1* | *3.7* | *4.2* | *4.5* | *4.8* | *5.0* | *5.1* | *5.2* | *5.2* |
| | *700* | *1.0* | *2.1* | *2.9* | *3.5* | *3.9* | *4.2* | *4.5* | *4.6* | *4.8* | *4.8* | *4.9* |
| | *800* | *.90* | *2.0* | *2.7* | *3.2* | *3.6* | *3.9* | *4.2* | *4.3* | *4.5* | *4.5* | *4.5* |
| | *900* | *.85* | *1.9* | *2.6* | *3.1* | *3.4* | *3.7* | *3.9* | *4.1* | *4.2* | *4.3* | *4.3* |
| | *1,000* | *.81* | *1.8* | *2.4* | *2.9* | *3.3* | *3.5* | *3.7* | *3.9* | *4.0* | *4.0* | *4.1* |
| | *2,000* | *.57* | *1.3* | *1.7* | *2.1* | *2.3* | *2.5* | *2.6* | *2.7* | *2.8* | *2.9* | *2.9* |
| | *3,000* | *.47* | *1.0* | *1.4* | *1.7* | *1.9* | *2.0* | *2.2* | *2.2* | *2.3* | *2.3* | *2.3* |
| | *4,000* | *.40* | *.89* | *1.2* | *1.5* | *1.6* | *1.8* | *1.9* | *1.9* | *2.0* | *2.0* | *2.0* |
| | *5,000* | *.36* | *.79* | *1.1* | *1.3* | *1.5* | *1.6* | *1.7* | *1.7* | *1.8* | *1.8* | *1.8* |
| | *10,000* | *.26* | *.56* | *.77* | *.92* | *1.0* | *1.1* | *1.2* | *1.2* | *1.3* | *1.3* | *1.3* |

specific attention to the potential sources of error in any study. Producing a study riddled with error is tantamount to never having conducted the study at all. If the magnitude of error were subject to accurate assessment, researchers could simply determine the source of error and correct it. Since this is not possible, they must accept error as part of the research process, attempt to reduce its effects to a minimum, and remember always to consider its presence when interpreting their results.

### Sample Weighting

In an ideal study, a researcher has enough respondents or subjects with the required demographic, psychographic (why people behave in specific ways), or lifestyle characteristics. The ideal sample, however, is rare due to the time and budget constraints of most research. Instead of canceling a research project because of sampling inadequacies, most researchers utilize a statistical procedure known as weighting, or *sample balancing*. That is, when the subject totals in given categories do not reach the necessary population percentages, subjects' responses are multiplied (weighted) to allow for the shortfall. A single subject's responses may be multiplied by 1.3, 1.7, 2.0, or any other figure to reach the predetermined required level.

Subject weighting is a controversial data manipulation technique, especially in broadcast ratings. The major question is just how much one subject's responses can be weighted and still be representative. Weighting is discussed in greater detail in Chapter 15.

## ▪ ▪ ▪ Summary

To make predictions about events, concepts, or phenomena, researchers must perform detailed, objective analyses. One procedure to use in such analyses is a census, in which every member of the population is studied. Conducting a census for each research project is impractical, however, and researchers must resort to alternative methods. The most widely used alternative is to select a random sample from the population, examine it, and make predictions from it that can be generalized to the population. There are several procedures for identifying the units that make up a random sample.

If the scientific procedure is to provide valid and useful results, researchers must pay close attention to the methods they use in selecting a sample. This chapter described several types of samples commonly used in mass media research. Some are elementary and do not require a great deal of time or resources; others entail great expense and time. Researchers must decide what costs and time are justified in relation to the results generated.

Sampling procedures must not be considered lightly in the process of scientific investigation. It makes no sense to develop a research design for testing a valuable hypothesis or research question and then nullify this effort by neglecting correct sampling procedures. These procedures must be continually scrutinized to ensure that the results of an analysis are not sample-specific—that is, that the results are not based on the type of sample used in the study.

### Questions and Problems for Further Investigation

1. Using available samples in research has long been a target for heated debate. Some researchers say that available samples are inaccurate representations of the population; others claim that if a concept or phenomenon exists, it should exist in an available sample as well as in a random sample. Which argument do you support? Explain your answer.
2. Many research studies use small samples. What are the advantages and disadvantages of this practice? Can any gain other than cost savings be realized by using a small sample in a research study?

3. What sampling technique might be appropriate for the following research projects?
   - A pilot study to test whether people understand the directions to a telephone questionnaire
   - A study to determine who buys videocassette recorders
   - A study to determine the demographic makeup of the audience for a local television show
   - A content analysis of commercials aired during Saturday morning children's programs
   - A survey examining the differences between newspaper readership in high-income households and low-income households
4. Check the Internet for updates on sampling information.
5. One of the controversies surrounding the census in the year 2000 involved sampling. If you are using *InfoTrac College Edition,* find articles that deal with this topic and explain what the controversy was about. (*Hint:* Search using "statistical sampling" as a key word.)

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Part Two

# Research Approaches


**6** *Qualitative Research Methods*

**7** *Content Analysis*

**8** *Survey Research*

**9** *Longitudinal Research*

**10** *Experimental Research*

Chapter 6

# Qualitative Research Methods


- *Aims and Philosophy*
- *Field Observations*
- *Focus Groups*
- *Intensive Interviews*
- *Case Studies*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

Part Two proceeds from the more general to the more specific research techniques. Chapter 6 discusses qualitative analysis, which relies mainly on the analysis of visual data (observations) and verbal data (words) that reflect everyday experience. A chapter follows this on content analysis, which also focuses on words and other message characteristics but is conducted in a more systematic and measured way. Chapter 8 discusses survey research, which relies on greater quantification and greater measurement sophistication than either qualitative research or content analysis. This sophistication, however, comes with a price: Increasing quantifiability also narrows the types of research questions that can be addressed. Or to put it another way, research depth is sacrificed to gain research breadth. The survey chapter is followed by a chapter on longitudinal research, since most longitudinal research is based on surveys. Finally, this part concludes with a discussion of experimental methods, which are among the most precise, complex, and intricate of methodologies.

## Aims and Philosophy

Discussing the qualitative approach to research can be confusing because, as Potter (1996) ably demonstrates, there is no commonly accepted definition of the term *qualitative*. Indeed, some qualitative researchers resist defining the term at all for fear of limiting the technique. The task is further complicated because of the several levels of reference connected with the term. The word *qualitative* has been used to refer to (1) a broad philosophy and approach to research, (2) a research methodology, and (3) a specific set of research techniques. To better understand this area, it may be helpful to back up and examine some general considerations related to social science research.

Neuman (1997) and Blaikie (1993) suggest that there are three distinct approaches to social science research: positivism (or objectivism), interpretive, and critical. Each of these represents a model or a *paradigm* for research. A paradigm is an accepted set of theories, procedures, and assumptions about how researchers look at the world. Paradigms are based on axioms, statements that are universally accepted as true. Paradigms are important because they are related to the selection of certain research methods.

The *positivist* paradigm is the oldest and still the most widely used in mass communication research. Derived from the writings of philosophers such as Comte and Mill, positivism is the paradigm most used in the natural sciences. When the social sciences developed, researchers modified this technique for their own purposes. The positivist paradigm involves such concepts as quantification, hypotheses, and objective measures. The positivist paradigm is the one that underlies the approach of this book.

*Interpretive* social science traces its roots to Max Weber and Wilhelm Dilthey. The aim of this paradigm is to understand how people in everyday natural settings create meaning and interpret the events of their world. This paradigm became popular in mass communication research during the 1970s and 1980s and has gained added visibility in the 1990s.

The *critical* paradigm draws on analysis models used in the humanities. Critical researchers are interested in such concepts as power and political ideology. Though useful in many cases, a consideration of the critical paradigm is beyond the scope of this book. Interested readers should consult Hall (1982). At the risk of oversimplification, in the rest of this section we compare the positivist and interpretive paradigms.

The positivist paradigm differs from the interpretive paradigm along three main dimensions. First, the two methods have a different philosophy of reality. For the positivist researcher, reality is objective; it exists apart from researchers and can be seen by all. In other words, it is out there. For the interpretive researcher, there is no single reality. Each observer creates reality as part of the research process. It is subjective and exists only in reference to the observer. Perhaps a classic example will help here. If a tree falls in the forest and there is no one there to hear it, does it make any noise? On the one hand, a positivist would answer yes. Reality doesn't depend on an observer; it exists independently. On the other hand, an interpretive researcher would say no noise was made. Reality exists only in the observer. Furthermore, the positivist researcher believes that reality can be divided into component parts, and knowledge of the whole is gained by looking at the parts. In contrast, the interpretive researcher examines the entire process, believing that reality is holistic and cannot be subdivided.

Second, the two methods have different views of the individual. The positivist researcher believes all human beings are basically similar and looks for general categories to summarize their behaviors or feelings. The interpretive investigator believes that human beings are fundamentally different and cannot be pigeonholed.

Third, positivist researchers aim to generate general laws of behavior and explain many things across many settings. In contrast, interpretive scholars attempt to produce a unique explanation about a given situation or individual. Whereas positivist researchers strive for breadth, interpretive researchers strive for depth.

The practical differences between these approaches are perhaps most apparent in the research process. The following five major research areas demonstrate significant differences between the positivist and interpretive approaches:

1. *Role of the researcher.* The positivist researcher strives for objectivity and is separated from the data. The interpretive researcher is an integral part of the data; in fact, without the active participation of the researcher, no data exist.
2. *Design.* For a positivist, the design of a study is determined before it begins. In interpretive research, the design evolves during the research; it can be adjusted or changed as the research progresses.
3. *Setting.* The positivist researcher tries to limit contaminating and confounding variables by conducting investigations in controlled settings. The interpretive researcher conducts studies in the field, in natural surroundings, trying to capture the normal flow of events without controlling extraneous variables.
4. *Measurement instruments.* In positivist research, measurement instruments exist apart from the researcher; another party could use the instruments to collect data in the researcher's absence. In interpretive research, the researcher is the instrument; no other individual can substitute.
5. *Theory building.* Whereas the positivist researcher uses research to test, support, or reject theory, the interpre-

*In My Room: A Qualitative Approach to Studying Teen Identities*

One of the advantages of the qualitative approach is that it allows for great flexibility during the research process. For example, Brown, Dykers, Steele, and White (1994) started out to study the best way to construct health messages to reach adolescents. In the course of their study, the researchers conducted interviews with several teenagers in the teens' bedrooms. The interviewers were struck by the wide variation in the general appearance of the bedrooms and the way the walls were decorated.

Subsequent investigation led to the notion of "room culture," which analyzed how bedrooms and the things they contain helped teens relate to the world and create their own identities. A big part of the study of room culture concerned the way media were used as a source of cultural options. Pictures were taken of each room and analyzed to see what they suggested about how the young people were using the media.

The investigators also found that having teens talk about their bedrooms was a good way to establish rapport for subsequent interviews and helped convince the teens to keep journals and diaries about their use of the media. This study shows the versatility of the qualitative method.

tive researcher develops theories as part of the research process—theory is "data driven" and emerges as part of the research process, evolving from the data as they are collected.

A researcher's paradigm has a great influence on the specific research methods that he or she uses. As Potter (1996, p. 36) explains: "Two scholars who hold different beliefs [paradigms]. . . may be interested in examining the same phenomenon but their beliefs will lead them to set up their studies very differently because of their differing views of evidence, analysis and the purpose of the research." The positivist approach is most closely associated with quantitative content analysis, surveys, and experiments, techniques discussed in detail in subsequent chapters. The interpretive approach is most closely connected with the specific research methods discussed in this chapter. Research methods, however, are not conscious of the philosophy that influenced their selection. It is not unusual to find a positivist using focus groups or intensive interviewing, two methods commonly categorized as qualitative, in connection with a quantitative study. Nor is it rare to find an interpretive researcher using numbers from a survey or content analysis. Thus the guidelines for focus groups that are discussed in this chapter, or the discussion of survey research in a subsequent chapter, are relevant to both paradigms. But although the methods may be the same, the research goal, the research question, and the way the data are interpreted are quite different.

To use a concrete example, a positivist researcher is interested in testing the hypothesis that viewing negative political ads increases political cynicism. The researcher conducts a focus group to help develop a questionnaire that measures cynicism and exposure to what the researchers define as *negative advertising.* A statistical analysis is then conducted to see if these two items are related and if the hypothesis is supported.

An interpretive researcher interested in the same question might also conduct a focus group, but the questions discussed in the group concentrate on how group members interpret a political ad, what meanings they derive from a negative ad, the context of their viewing, and what makes them feel cynical toward politics. The focus group or groups stand alone as the source of data for the analysis. The interpretive researcher uses induction to try to find commonalities or general themes in participants' remarks. Thus both researchers use focus groups, a method traditionally defined as qualitative, but each uses the method somewhat differently.

Despite their differences, many researchers are now using a combination of the quantitative and qualitative approaches in order to understand fully the phenomenon they are studying. As Miles and Huberman (1994, p. 20) state:

> It is getting harder to find any methodologists solidly encamped in one epistemology or the other. More and more "quantitative" methodologists. . . are using naturalistic and phenomenological approaches to complement tests, surveys, and structured interviews. On the other side, an increasing number of ethnographers and qualitative researchers are using predesigned conceptual frameworks and prestructured instrumentation. . . . Most people now see the world with more ecumenical eyes.

Cooper, Potter, and Dupagne (1994) document the importance of qualitative methods in the field. They report that although almost 60% of published mass communication research studies conducted since 1971 have used quantitative methods, qualitative techniques were used either exclusively (33%) or partially in the other 40%.

Although qualitative research can be an excellent way to collect and analyze data, researchers must keep in mind that the results of such studies have interpretational limits. Researchers interested in generalizing results should consider other methods. In most cases, qualitative research studies use small samples—respondents or units that are not representative of the population from which they are drawn. Like quantitative research, qualitative research is a useful mass media research tool only when its limitations are recognized. All too often, the results from small-sample qualitative projects are interpreted as though they had been collected with large-sample quantitative techniques. This approach can only cause problems in the long run. Decisions are highly likely to be incorrect if they are based on small-sample research.

## Data Analysis in Qualitative Research

Before examining some specific types of qualitative research, let's discuss qualitative data and methods of analysis in general. Qualitative data come in a variety of forms, such as notes made while observing in the field, interview transcripts, documents, diaries, and journals. In addition, a researcher accumulates a great deal of data during the course of a study. Organizing, analyzing, and making sense of all this information pose special challenges for the researcher using qualitative methods.

Unlike the quantitative approach, which waits until all the numbers are in before analysis begins, data analysis in qualitative studies is done early in the collection process and continues throughout the project. In addition, quantitative researchers generally follow a deductive model in data analysis: Hypotheses are derived prior to the study, and relevant data are then collected and analyzed to determine whether the hypotheses are confirmed or not confirmed. On the other hand, qualitative researchers use an inductive method: Data are collected relevant to some topic and are grouped into appropriate and meaningful categories; explanations emerge from the data themselves.

### Preparing the Data

To facilitate working with the large amounts of data generated by a qualitative analysis, the researcher generally first organizes the information along a temporal dimension. In other words, the data are arranged in chronological order according to the sequence of events that occurred during the investigation. Furthermore, each piece of information should be coded to identify the source. Multiple photocopies of the notes, transcripts, and other documents should be made.

The data are then organized into a preliminary category system. These categories might arise from the data themselves, or they might be suggested by prior research or theory. Many researchers prefer to do a preliminary run-through of the data and jot possible category assignments in the margins. For example, a qualitative study of teenage radio listening might produce many pages of interview transcripts. The researcher would read the comments and might write "peer group pressure" next to one section and "escape" next to another. When the process is finished, a preliminary category system may have emerged from the data. Other researchers prefer to make many multiple copies of the data, cut them into coherent units of analysis, and physically sort them into as many categories as might be relevant. Finally, several software programs are available that help organize qualitative data.

Moreover, many qualitative researchers like to have a particular room or other space that is specially suited for the analysis of qualitative data. Typically, this room has bulletin boards or other arrangements for the visual display of data. Photocopies of notes, observations written on index cards, large flowcharts, and marginal comments can then be conveniently arrayed to simplify the analysis task. This "analytical wallpaper" approach is particularly helpful when several members of the research team are working on the project because it is an efficient way to display the data to several people at once.

Finally, since the researcher is the main instrument in qualitative data collection and analysis, he or she must do some preparation before beginning the task of investigation. Maykut and Morehouse (1994) describe this preparation as *epoche*, the process by which the researcher tries to remove or at least become aware of prejudices, viewpoints, or assumptions that might interfere with the analysis. Epoche helps the researcher put aside personal viewpoints so that the phenomenon under study may be seen for itself.

### Analysis Techniques

Many different analysis techniques can be brought to bear on qualitative data. This section discusses two of the best known: the constant comparative technique and the analytical induction technique.

The **constant comparative technique** was first articulated by Glaser and Strauss (1967) and has been refined in recent years (Lincoln & Guba, 1985). At a general level, the process consists of four steps:

1. Comparative assignment of incidents to categories
2. Elaboration and refinement of categories
3. Searching for relationships and themes among categories
4. Simplifying and integrating data into a coherent theoretical structure

Each step is discussed in turn.

After the data have been prepared for analysis, the researcher groups each unit of analysis into a set of provisional categories. As each new unit is examined, it is compared to the other units previously assigned to that category to see whether its inclusion is appropriate. It is possible that some initial categories may have only one or two incidents assigned to them while others may have a large number. If some units of analysis do not fit any preexisting category, new classifications may have to be created. Units that fit into more than one category should be copied and included where relevant. Throughout the process, the emphasis is on comparing units and finding similarities among the units that fit into the category.

For example, suppose a researcher is doing a qualitative study about why individuals subscribe to on-line services such as America Online. Interviews are conducted with several people and transcribed. The researcher then defines each individual assertion as the unit of analysis and writes each statement on an index card. The first two cards selected for analysis mention getting news faster from on-line services. The researcher places both of these into a category tentatively labeled "news." The next statement talks about e-mail; it does not seem to belong to the first category and is set aside. The next card mentions chat lines; the researcher decides this reason is similar to the one that mentioned e-mail and creates a new category called "interpersonal communication." The process is then repeated with every unit of analysis, which can be a long and formidable task. At some point during the process, however, the researcher begins to fine-tune and refine the categories.

During the category refinement stage, the researcher writes rules or propositions that attempt to describe the underlying meaning that defines the category. Some rules for inclusion might be rewritten and revised throughout the study. These rules not only help to focus the study but also allow the researcher to start to explore the theoretical dimensions of the emerging category system. The ultimate value of these rules, however, is that they reveal what you are learning about your chosen topic and help you determine your research outcome.

After scanning all the data cards in the "interpersonal communication" category, a researcher might write a proposition such as "People subscribe to on-line services in order to expand their circle of casual friends." Similar statements are written for the other categories.

The third phase of the method involves searching for relationships and common patterns across categories. The researcher examines the propositional statements and looks for meaningful connections. Some propositions are probably strong enough to stand alone; others might be related in several important ways. Whatever the situation, the goal of this phase is to generate assertions that can explain and further clarify the phenomenon under study.

In our on-line example, the researcher might note that several propositions refer to the notion of expansion. People use on-line services to expand their shopping opportunities, to enlarge their pool of potential chess opponents, or to have a greater number of news sources. The analyst then generalizes that the expansion of one's informational space is an essential reason for subscribing.

In the final phase of the process, the report summarizing the research is written. All the results of the foregoing analyses are integrated into some coherent explanation of the phenomenon. The researcher attempts to offer a brief explanation but in sufficient detail to convey an idea of the scope of the project. The goal of this phase of the project is to arrive at an understanding of the people and events being studied.

The **analytic induction strategy** blends together hypothesis construction and data analysis. It consists of the following steps (adapted from Stainback & Stainback, 1988):

1. Define a topic of interest and develop a hypothesis.
2. Study a case to see whether the hypothesis works. If it doesn't work, reformulate it.

*Personal Computers and Qualitative Research*

Quantitative researchers have made extensive use of personal computers (PCs) in compiling and summarizing statistics. Qualitative researchers have discovered that the PC can aid them in their work as well. For instance, before the use of PCs became commonplace, field notes were either handwritten or typed and stored in file folders or boxes. Today, however, a researcher can store field notes as text with a text editing or word processing program and can structure data as text files. The availability of notebook computers enables researchers to process field notes on location. Without a computer, creating typologies and concepts from the text was a laborious process. Using a PC, however, a researcher can cut and paste, move, scan, and search field notes for key words and phrases. In addition, key items or sections of text in notes can be flagged or specially coded for easy retrieval or indexing. When researchers worked without computers, the number of times a particular event or theme occurred had to be counted manually and summarized. PCs can scan text for codes and count and display frequencies. Many specific programs have been written for the qualitative researcher and many more are in the works. For more specifics, see Brent and Anderson (1990). (Perform an Internet search on "qualitative data analysis" to discover the many software programs that exist to aid researchers.)

3. Study other cases until the hypothesis is in refined form.
4. Look for "negative cases" that might disprove the hypothesis. Reformulate again.
5. Continue until the hypothesis is adequately tested.

Note that in this method, an explanation for the phenomenon in the form of a hypothesis is generated at the beginning of the study. This is in contrast to the constant comparative technique, in which an explanation is derived as the end result of the research.

Perhaps the best way to demonstrate how this approach works is with a simplified example. Let's suppose that a researcher is interested in explaining why people watch home shopping channels. Colleagues tell the researcher that the answer is obvious: People watch because they want to buy the merchandise. The researcher is not convinced of this but decides to use this explanation as an initial hypothesis. He or she seeks out a person who is known to be a heavy viewer of these channels. During the interview the person says that although she has ordered a couple of things off the air, her primary reason for watching is to find out about new and unusual products.

Armed with this information, the researcher reformulates the hypothesis: People watch the home shopping channels to buy and find out about new products. Another viewer is interviewed and reports essentially the same reasons but also adds that he uses the prices advertised on the channel to comparison shop. Once again, the hypothesis is refined. The researcher posits that the home shopping channels are viewed for practical consumer-related reasons: finding bargains, learning about products, and comparing prices.

At this point, the researcher tries to find cases that might not fit the new hypothesis. A colleague points out that all of the people interviewed so far have been affluent with substantial disposable income and that perhaps people who are less well-off economically might watch the home shopping channels for other reasons. The researcher interviews a viewer from a different economic background and discovers that this person watches because he finds the people who do the selling entertaining to watch. Once again, the initial hypothesis is modified to take this finding into account.

The researcher then seeks out other cases from different economic levels to check the validity of this new hypothesis and continues to gather data until no more cases can be located that do not fit the revised hypothesis.

Note that this process can be exhausting, and it can be difficult for the researcher to determine an exact stopping point. One might always argue that there are still cases in the environment that would not support the hypothesis that the researcher simply did not find.

### Reliability and Validity in Qualitative Data

The concepts of reliability and validity have different connotations for qualitative data. As we discuss later, quantitative methods use distinct and precise ways to calculate indexes of reliability and several articulated techniques that help establish validity. These concepts, however, do not translate well into the interpretive paradigm. As Lindlof (1995) points out, interpretive research recognizes the changing nature of behavior and perception over time. Nonetheless, though envisioned differently, reliability and validity are no less important in qualitative research. They help the reader determine how much confidence can be placed in the outcomes of the study and whether we can believe the researcher's conclusions. Or as Lindlof (1995, p. 238) puts it: "Basically, we want to inspire confidence in readers (and ourselves) that we have achieved right interpretations."

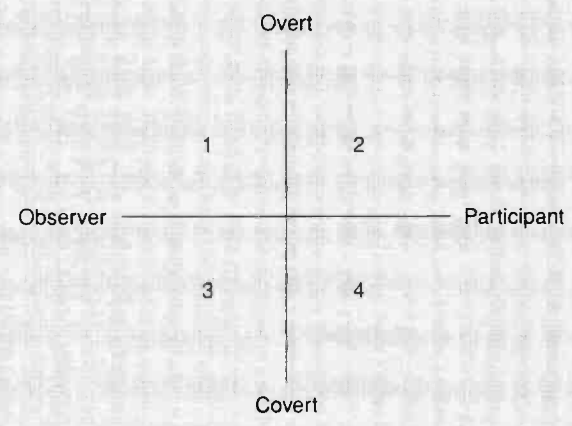
Rather than emphasizing reliability and validity, Maykut and Morehouse (1994) address the trustworthiness of a qualitative research project. They summarize four factors that help build credibility:

1. *Multiple methods of data collection.* This is similar to the notion of triangulation that was discussed in Chapter 3. The use of interviews along with field observations and analysis of existing documents suggests that the topic was examined from several different perspectives, which helps build confidence in the findings.
2. *Audit trail.* This is essentially a permanent record of the original data used for analysis and the researcher's comments and analysis methods. The audit trail allows others to examine the thought processes involved in your work and allows them to assess the accuracy of your conclusions.
3. *Member checks.* In this technique, research participants are asked to read your notes and conclusions and tell whether you have accurately described what they told you.
4. *Research team.* This method assumes that team members keep one another honest and on target when describing and interpreting their data. Sometimes an outside person is asked to observe the process and raise questions of possible bias or misinterpretation where appropriate.

Creswell (1998) suggests another method to aid verification. *Debriefing* consists of having an individual external to the project question the meanings, methods, and interpretations of the researcher.

The balance of this chapter discusses four common qualitative techniques: field observations, focus groups, intensive interviews, and case studies.

Figure 6.1 *Dimensions of Field Observation*




## ▪ *Field Observations*

Field observation was rarely used in mass media research before 1980. Lowry (1979) reported that only 2%–3% of the articles published in journalism and broadcasting journals used this technique. Cooper, Potter, and Dupagne (1994) found that about 2% of all published studies from 1965 to 1989 relied on observation. Recently, however, field observations have become more common in the research literature (Anderson, 1987; Lindlof, 1987, 1991, 1995).

Field observation is useful for collecting data and for generating hypotheses and theories. Like all qualitative techniques, it is concerned more with description and explanation than with measurement and quantification. Figure 6.1 shows that field observations are classified along two major dimensions: (1) the degree to which the researcher participates in the behavior under observation, and (2) the degree to which the observation is concealed.

Quadrant 1 in Figure 6.1 represents overt observation. In this situation, the researcher is identified when the study begins and those under observation are aware that they are being studied. Furthermore, the researcher's role is only to observe, refraining from participation in the process under observation. Quadrant 2 represents overt participation. In this arrangement, those being observed also know the researcher, but unlike the situation represented in Quadrant 1, the researcher goes beyond the observer role and becomes a participant in the situation. Quadrant 3 represents the situation where the researcher's role is limited to that of observer, but those under observation are not aware they are being studied. Quadrant 4 represents a study in which the researcher participates in the process under investigation but is not identified as a researcher.

To illustrate the difference between the various approaches, assume that a researcher wants to observe and analyze the dynamics of writing comedy for television. The researcher could choose the covert observer technique and pretend to be doing something else (such as fixing a computer) while actually observing the TV writing team at work.

Or the researcher could be introduced as someone doing a study of comedy writing and watch the team in action. If the research question is best answered by active participation, the researcher might be introduced as a researcher but still participates in the writing process. If the covert participant strategy is used, the researcher might be introduced as a new writer just joining the group (such an arrangement might be made with the head writer, who would be the only person to know the identity of the researcher). The choice of technique depends upon the research problem, the degree of cooperation available from the group or individual observed, and ethical considerations. On the one hand, covert participation may affect subjects' behavior and raise the ethical question of deception. On the other hand, the information gathered may be more valid if subjects are unaware of being scrutinized.

Some examples of field observation studies in mass media research include Gieber's (1956) classic study of gatekeeping (information flow) in the newsroom and Epstein's (1974) description of network news operations. Browne (1991) observed the operations at 11 Swiss radio stations for his study of localism in Swiss radio programming. Pekurny (1980) was an overt participant in his study of NBC's "Saturday Night Live." He was given access to all phases of the program, including discussions with writers about joke structure and the suitability of material for broadcast. Lemish (1987) used overt observation in her study of television viewing by infants and toddlers. Researchers visited the homes of 16 families and observed the viewing behavior of infants during 1- to 2-hour periods. Lull (1982) conducted a mass observation study of the TV viewing habits of more than 90 families. Observers spent 2 days with the families and then returned to conduct interviews with each person they observed. By using the two data sources (observations and interviews), Lull was "triangulating" to gain additional perspective on his data. He found that the interview data were only partially supported by the observations. Observers noted that the father was the primary controller of the TV set, but the interviews suggested the father's influence was somewhat less. Similarly, Moriarty and Everett (1994) conducted a study where researchers observed family members watching television and recorded their behaviors on a moment-to-moment basis during several 45-minute viewing episodes.

### Advantages of Field Observations

Although field observation is not an appropriate technique for every research question, it does have several unique advantages. For one thing, many mass media problems and questions cannot be studied using any other methodology. Field observation often helps the researcher to define basic background information necessary to frame a hypothesis and to isolate independent and dependent variables. For example, a researcher interested in how creative decisions in advertising are made could observe several decision-making sessions to see what happens. Field observations often make excellent pilot studies because they identify important variables and provide useful preliminary information. In addition, since the data are gathered first-hand, observation is not dependent on the subjects' ability or willingness to report their behavior. For example, young children may lack the reading or verbal skills necessary to respond to a questionnaire concerning their TV viewing behavior, but such data are easily gathered by the observational technique.

A field observation is not always used as a preliminary step to other approaches. Sometimes it alone is the only appropriate approach, especially when quantification is difficult. Field observation is particularly suitable for a study of the gatekeeping process in a network television news department because it is difficult to quantify gatekeeping.

Field observation may also provide access to groups that would otherwise be difficult to observe or examine. For example, a questionnaire sent to producers of X-rated movies is not likely to have a high return rate. An observer, however, may be able to establish mutual trust with such a group to persuade them to respond to rigorous questioning.

Field observation is usually inexpensive. In most cases it requires only writing materials or a small tape recorder. Expenses increase if the problem under study requires several observers, extensive travel, or special equipment (such as video recording machines).

Perhaps the most noteworthy advantage of field observation is that the study takes place in the natural setting of the activity being observed and thus can provide data rich in detail and subtlety. Many mass media situations, such as a family watching television, are complex and constantly subjected to intervening influences. Field observation, because of the opportunity for careful examination, allows observers to identify these otherwise unknown variables.

### *Disadvantages of Field Observations*

On the negative side, field observation is a poor choice if the researcher is concerned with external validity. This difficulty is due partly to the potentially questionable representativeness of the observations made and partly to problems in sampling. Observing the TV viewing behavior of a group of children at a day care center can provide valuable insights into the social setting of television viewing, but it probably has little correlation to what preschoolers do in other places and under different circumstances. Besides, since field observation relies heavily on a researcher's perceptions and judgments and on preconceived notions about the material under study, experimenter bias may favor specific preconceptions of results, while observations to the contrary are ignored or distorted. This, primarily, is why it is rare to use only one observer in a field observation study. Observations need to be *cross-validated* by second or third observers.

Finally, field observations suffer from the problem of reactivity. The very process of being observed may influence the behavior under study. Of course, reactivity can be a problem with other research methods, but it is most often mentioned as a criticism of field observation (Chadwick, Bahr & Albrecht, 1984). Lull (1985) provides perspective on observer effects using data taken from an observational study of families' TV viewing behavior. He found that the presence of an observer in the house did have some impact on behavior. About 20% of parents and 25% of children reported that their overall behavior was affected by the presence of an observer. Most of those who were affected thought that they became nicer or more polite and formal because of the observer's presence. As for differences in the key behavior under study, 87% said that the observer's presence had no effect on their TV viewing activity. Additionally, among those who reported an observer effect, there were no systematic differences in the distribution of changes. About the same number said that they watched more because of the observer as said they watched less. Obviously, additional studies of different groups in different settings are needed before this problem is fully understood, but Lull's data suggest that, although reactivity is a problem with observational techniques, its impact may not be as drastic as some suggest.

In any case, at least two strategies are available to diminish the impact of selective perception and reactivity. One is to use several observers to cross-validate the results. A second strategy is triangulation, or supplementing observational data with data gathered by other means (for example, questionnaires or existing records). Accuracy is sought by using multiple data collection methods.

### Field Observation Techniques

There are at least six stages in a typical field observation study: choosing the research site, gaining access, sampling, collecting data, analyzing data, and exiting.

***Choosing the Research Site.*** The nature of the research question or area of inquiry usually suggests a behavior or a phenomenon of interest. Once it is identified, the next step is to select a setting where the behavior or phenomenon occurs with sufficient frequency to make observation worthwhile. The settings also should fit the recording forms and instruments the observer plans to use. For example, videotaping requires adequate lighting for the camera to operate.

Possible research venues can be identified from personal experience, from talking with other researchers, from interviews with people who frequent the site, or from newspaper and magazine stories. Anderson (1987) suggests that researchers select two or three research sites and then "hang around" (Anderson's terminology) each one to discover their main advantages and disadvantages. He cautions researchers that the site must be permanent and stable enough to permit observations over a period of time. Lindlof (1995) suggests a similar process that he labels "casing the scene." He suggests that researchers gain an understanding of what is possible from a site and make sure that the site holds the potential for fruitful data collection.

Qualitative researchers should avoid choosing sites where they are well known or have some involvement. Studying one's own workplace, for example, is difficult because the researcher's preconceptions may preclude observations that are more objective. Furthermore, at a site where the researcher is a familiar figure, other individuals may find it difficult to relate to a colleague or friend in the new role of researcher.

***Gaining Access.*** Once the site is selected, the next step is to establish contact. Williamson, Karp, and Dalphin (1977) note that the degree of difficulty faced by researchers in gaining access to settings depends on two factors: (1) how public the setting is and (2) the willingness of the subjects in the setting to be observed. The easiest setting to enter is one that is open to the public and that gives people little reason to keep their behavior secret (for example, a place in which people are watching TV in public—an airport, a bar, a dormitory viewing room). The most difficult setting to enter is one in which entry is restricted because participants have good reason to keep their activities secret (for example, a place in which one could observe the behavior of hostage takers).

Observing a formal group (such as a film production crew) often requires permission from management and perhaps union officials. School systems and other bureaucracies usually have a special unit to handle requests from researchers and to help them obtain necessary permissions.

Gaining permission to conduct field observation research requires persistence and public relations skills. Researchers must decide how much to disclose about the nature of the research. Usually it is not necessary to provide a complete explanation of the hypothesis and procedures unless there are objections to sensitive areas. Researchers interested in observing which family member actually controls the television set might explain that they are studying patterns of family communication. After the contact is made, rapport must be established with the subject(s). Bogdan and Taylor (1984) suggest the following techniques for building rapport: establish common interests with the participants; start relationships slowly; if appropriate, participate in common events and activities; and do not disrupt participants' normal routines.

Lindlof (1995) suggests these ways of gaining access:

- Identify the scene's gatekeeper and attempt to persuade him or her of the project's relevance.
- Find a sponsor who can vouch for the usefulness of the project and can help locate participants.
- Negotiate an agreement with participants.

Neuman (1997) illustrates entry and access as an access ladder. The bottom rung represents the easiest situation in which the researcher is looking for public information. The highest rung on the ladder, which requires the most time spent in the field site, involves gaining access to sensitive events and information.

***Sampling.*** Sampling in field observation is more ambiguous than in most other research approaches. First, there is the problem of how many individuals or groups to observe. If the focus of the study is communication in the newsroom, how many newsrooms should be observed? If the topic is family viewing of television, how many families should be included? Unfortunately, there are no guidelines to help answer these questions. The research problem and the goals of the study are indicators of the appropriate sample size; for example, if the results are intended for generalization to a population, studying one subject or group is inadequate.

Another problem is deciding what behavior episodes or segments to sample. The observer cannot be everywhere and see everything, so what is observed becomes a de facto sample of what is not observed. If an observer views one staff meeting in the newsroom, this meeting represents other unobserved meetings; one conversation at the coffee machine represents all such conversations. Representativeness must be considered even when researchers cannot follow the principles of probability sampling.

Most field observations use purposive sampling, where observers draw on their knowledge of the subject(s) under study and sample only from the relevant behaviors or events. Sometimes previous experience and study of the activity in question suggest what needs to be examined. In a study of newsroom decision making, for example, researchers would want to observe staff meetings because they are an important part of the process. However, restricting the sampling to observations of staff meetings would be a mistake because many decisions are made at the water fountain, at lunch, and in the hallways. Experienced observers tend not to isolate a specific situation but instead to consider even the most insignificant situation for analysis. For most field observations, researchers need to spend some time simply getting the feel of the situation and absorbing the pertinent aspects of the environment before beginning a detailed analysis.

Here are some sampling strategies that might be used (Lindlof, 1995):

- *Maximum variation sampling:* Settings, activities, events, and informants are chosen purposefully to yield as many different and varied situations as possible.
- *Snowball sampling:* A participant refers the researcher to another person who can provide information. This person, in turn, mentions another, and so forth.
- *Typical case sampling:* In contrast to the maximum variation technique, the researcher chooses cases that seem to be most representative of the topic under study.

A more extensive listing of 16 possible sampling strategies is found in Miles and Huberman (1994), including *extreme case sampling,* which looks for highly unusual examples of the phenomenon under study, and *politically important case sampling,* which examines cases that have attracted major attention.

***Collecting Data.*** The traditional data collection tools—notebook and pencil—have been supplemented if not supplanted by other instruments in recent years. For example, Bechtel, Achelpohl, and Akers (1972) installed television cameras in a small sample of households to document families' TV viewing behavior. Two cameras, automatically activated when the television set was turned on, videotaped the scene in front of the set. However, even though a camera can record more information than an observer, Bechtel reported that the project was difficult because of problems in finding consenting families, maintaining the equipment, and interpreting tapes shot at low light levels.

Similarly, Anderson (1987) notes that, even though the advantages offered by audio and video recording are tempting, there are five major drawbacks to their use:

1. Recording devices take time away from the research process because they need regular calibration and adjustment to work properly.
2. The frame of the recording is different from the frame of the observer; a human observer's field of view is about 180°, whereas a camera's is about 60°.
3. Recordings have to be cataloged, indexed, and transcribed, adding extra work to the project.
4. Recordings take behavior out of context.
5. Recordings tend to fragment behavior and distract attention from the overall process.

Consequently, researchers must weigh the pros and cons carefully before deciding to use recording equipment for observations.

Note taking in the covert participant situation requires special attention. Continually scribbling away on a notepad is certain to draw attention and suspicion to the note taker and might expose the study's real purpose. In this type of situation, researchers should make mental notes and transcribe them at the first opportunity. If a researcher's identity is known initially, the problem of note taking is eliminated. Regardless of the situation, it is not wise for a researcher to spend a lot of time taking notes; subjects are already aware of being observed, and note taking can make them uneasy. Brief notes jotted down during natural breaks in a situation attract a minimum of attention and can be expanded later.

Field notes constitute the basic corpus of data in any field study. In these notes, the observers record not only what happened and what was said, but also personal impressions, feelings, and interpretations of what was observed. A useful procedure is to separate personal opinions from the descriptive narrative by enclosing the former in brackets.

How much should be recorded? It is always better to record too much information than too little. A seemingly irrelevant observation made during the first viewing session might become significant later on in the project. If the material is sensitive or if the researcher does not wish it known that research is taking place, notes may be written in abbreviated form or in code. (Search the Internet for "field notes" for several examples of research documentation.)

In addition to firsthand observation, three other data collection techniques are available to field researchers: diary keeping, unobtrusive measures, and document analysis. With the first technique, an investigator routinely supplements his or her field notes by keeping a research diary. This diary consists of personal feelings, sentiments, occasional reflections, and other private thoughts about the research process itself; the writings augment and help interpret the raw data contained in the field notes. Moreover, the researcher may ask the individuals under study to keep a diary for a specified length of time. This enables the researcher to learn about behaviors that take place out of his or her sight and extends the horizontal dimension of the observation. Individuals may be instructed to track certain habits—such as the reading of books or magazines during a specific time of day—or to record general feelings and thoughts—such as the way they felt while watching commercials on TV.

One form of diary keeping actually provides researchers with a glimpse of the world as seen through the eyes of the subject(s). The researcher gives the subjects still cameras and asks them to make photographic essays or to keep photographic diaries. Analysis of these photographs might help determine how the subjects perceive reality and what they find important. To illustrate, Ziller and Smith (1977) asked current and former students of the University of Florida to take photographs that described the school. The perceptions of the two groups were different: Current students brought in pictures of buildings, and former students brought in pictures of people. (An Internet search for "field diary" provides many examples, including electronic diaries for research.)

A second data collection technique available to the field researcher is unobtrusive measurement. This technique helps overcome the problem of reactivity by searching out naturally occurring phenomena relevant to the research task. The people who provide data through unobtrusive measurement are unaware that they are providing information for a research project. Covert observation, as previously mentioned, is obviously a technique of this type, but there are also other very subtle ways to collect data. It might be possible, for example, to determine the popularity of radio stations in a given market by asking auto mechanics to keep track of the dial positions of the radio pushbuttons of cars brought in for repair. Or, in another case, an investigator might use the parking lot at an auto race to discover which brand of tires appears most often on cars owned by people attending the race. Such information might enable tire companies to determine whether their sponsorship of various races has an impact.

Webb, Campbell, Schwartz, and Sechrest (1968) identify two general types of unobtrusive measurements: erosion and accretion. The first type, erosion, estimates wear and tear on a specific object or material. For example, to determine what textbooks are used heavily by students, a researcher might note how many passages in the text are highlighted, how many pages are dog-eared, whether the book's spine is creased, and so on. Accretion, on the other hand, quantifies deposits that have built up over time, such as the amount of dust that has built up on the cover of a textbook.

Accretion and erosion measurement methods, however, do have drawbacks. First, they are passive measures and out of the control of the researcher. Second, other factors might influence what is being observed. Compulsively neat students, for example, might dust their books every day, whether or not they open them, thus providing a misleading accretion measurement. For these reasons, unobtrusive measurements are usually used to support or corroborate findings from other observational methods rather than to draw conclusions.

Finally, existing documents may represent a fertile source of data for the qualitative researcher. In general terms, two varieties of documents are available for analysis: public and private. Public documents include police reports, newspaper stories, transcripts of TV shows, data archives, and so on. Other items may be less recognizable as public documents, however; messages on computer bulletin boards, company newsletters, tombstones, posters, graffiti, and bumper stickers can all fit into this category. Any of these messages may represent a rich source of data for the qualitative researcher. Shamp (1991), for example, analyzed messages that had been left on computer bulletin boards to examine users' perceptions of their communication partners. Priest (1992) used transcripts of the "Donahue" TV program to structure in-depth interviews with people who appeared on the show.

Private documents, on the other hand, include personal letters, diaries, memos, faxes, home movies and videos, telephone logs, appointment books, reports, and so on. For example, a public relations researcher interested in examining the communication flow among executives in an organization might find copies of memos, faxes, appointments, and telephone logs of special interest.

Much like unobtrusive measurements, document analysis also has occasional disadvantages: missing documents, subjects unwilling to make private documents available, ethical problems with the use of private records such as diaries and letters, and so on. To reduce the possibility of error when working with archival data, Berg (1997) urges researchers to use several data collection methods.

***Analyzing Data.*** We have discussed some general considerations of qualitative data analysis. Concerning the specific technique of field observation, data analysis consists of primarily filing the information and analyzing its content. Constructing a filing system is an important step in observation. The purpose of the filing system is to arrange raw field data in an orderly format that is amenable to systematic retrieval later. (The precise filing categories are determined by the data.) From the hypothetical study of decision making in the newsroom, filing categories might include the headings "Relationships," "Interaction—Horizontal," "Interaction—Vertical," and "Disputes." An observation may be placed in more than one category. It is a good idea to make multiple copies of notes; periodic filing of notes during the observation period will save time and confusion later.

Once all the notes have been assigned to their proper files, a rough content analysis is performed to search for consistent patterns. Perhaps, for example, most decisions in the newsroom are made in informal settings such as hallways rather than in formal settings such as conference rooms. Perhaps most decisions are made with little superior–subordinate consultation. At the same time, deviations from the norm should be investigated. Perhaps all reporters except one are typically asked their opinions on the newsworthiness of events; why the exception?

The overall goal of data analysis in field observation is to arrive at a general understanding of the phenomenon under study. In this regard, the observer has the advantage of flexibility. In laboratory and other research approaches, investigators must at some point commit themselves to a particular design or questionnaire. If it subsequently becomes apparent that a crucial variable was left out, little can be done. In field observation, however, the researcher can analyze data during the course of the study and change the research design accordingly.

***Exiting.*** A participant must have a plan for leaving the setting or the group under study. Of course, if everyone knows the participant, exiting is not a problem. Exiting from a setting that participants regularly enter and leave is also not a problem. Exiting can be difficult, however, when participation is covert. In some instances, the group may have become dependent on the researcher in some way, and the departure may have a negative effect on the group as a whole. In other cases, the sudden revelation that a group has been infiltrated or duped by an outsider might be unpleasant or distressing to some. The researcher has an ethical obligation to do everything possible to prevent psychological, emotional, or physical injury to those being studied. Consequently, leaving the scene must be handled with diplomacy and tact.

### Examples of Field Observation

Wolf (1987) and her research assistants observed the television viewing behavior of more than 100 children aged 4–12 in a day care/summer camp for about 10 months. She concluded that the ways children develop an understanding of TV are not related to age. Traudt and Lont (1987) concentrated their efforts on the five members of one family. They visited the home 14 times in 3 months and observed the family members as they watched TV. Their main finding was that TV influences a person's role as a family member and their life outside the home.

## ▪ Focus Groups

The focus group, or group interviewing, is a research strategy for understanding audience attitudes and behavior. From 6 to 12 people are interviewed simultaneously, with a moderator leading the respondents in a relatively unstructured discussion about the focal topic. The identifying characteristic of the focus group is controlled group discussion, which is used to gather preliminary information for a research project, to help develop questionnaire items for survey research, to understand the reasons behind a particular phenomenon, to see how a group of people interpret a certain phenomenon, or to test preliminary ideas or plans. Appendix 2 is a brief guide for conducting focus groups. The following discussion of advantages and disadvantages is generally from a positivist perspective. Lunt and Livingstone (1996) provide a discussion of the focus group method with more of an interpretive perspective.

### Advantages of Focus Groups

Focus groups allow researchers to collect preliminary information about a topic or a phenomenon. They may be used in pilot studies to detect ideas that will be investigated further using another research method, such as a telephone survey, or another qualitative method. A second important advantage is that focus groups can be conducted very quickly. Most of the time is spent recruiting the respondents. A field service that specializes in recruiting focus groups can usually recruit respondents in 7–10 days, depending on the type of participant required.

The cost of focus groups also makes the approach an attractive research method. In the private sector, most sessions can be conducted for about $1,000–$4,500 per group, depending on the type of respondent required, the part of the country in which the group is conducted, and the moderator or company used to conduct the group. When respondents are difficult to recruit or when the topic requires a specially trained moderator, a focus group may cost much more. However, the cost is not excessive if the groups provide valuable data for further research studies. Focus groups used in academic research, of course, cost much less.

Researchers also like focus groups because of the flexibility in question design and follow-up. In conventional surveys, interviewers work from a rigid series of questions and are instructed to follow explicit directions in asking the questions. A moderator in a focus group, however, works from a list of broad questions as well as more refined probe questions; hence, it is easy to follow up on important points raised by participants in the group. The ability to clear up confusing responses from subjects makes focus groups valuable in the research process.

Most professional focus group moderators use a procedure known as an *extended focus group,* in which respondents are required to complete a written questionnaire before the group session begins. The pregroup questionnaire, which covers the material that will be discussed during the group session, forces that respondents to "commit" to a particular answer or position before entering the group. This commitment eliminates one potential problem created by group dynamics—namely, the person who does not wish to offer an opinion because he or she is in a minority.

Finally, focus group responses are often more complete and less inhibited than those from individual interviews. One respondent's remarks tend to stimulate others to pursue lines of thinking that might not have been elicited in a situation involving just one individual. With a competent moderator, the discussion can have a beneficial snowball effect, as one respondent comments on the views of another. A skilled moderator also can detect the opinions and attitudes of those who are less articulate by noting facial expressions and other nonverbal behavior while others are speaking.

### Disadvantages of Focus Groups

Focus group research is not free of complications; the approach is far from perfect. Some of the problems are discussed here; others are addressed in Appendix 2.

A self-appointed group leader who monopolizes the conversation and attempts to impose his or her opinion on other participants dominates some groups. Such a person usually draws the resentment of the other participants and may have an extremely adverse effect on the performance of the group. The moderator needs to control such situations tactfully before they get out of hand.

A focus group is an inappropriate technique for gathering quantitative data. If quantification is important, it is wise to supplement the focus group with other research tools that permit more specific questions to be addressed to a more representative sample. Many people unfamiliar with focus group research incorrectly assume that the method will answer the question "how many" or "how much." In fact, focus group research is intended to gather qualitative data to answer questions such as "why" or "how." Many times people who hire a person or company to conduct a focus group are disappointed with the results because they expected exact numbers and percentages. Focus groups do not provide such information. As suggested earlier, focus groups depend heavily on the skills of the moderator, who must know when to probe for further information, when to stop respondents from discussing irrelevant topics, and how to involve all respondents in the discussion. All these things must be accomplished with professionalism, since one sarcastic or inappropriate comment to a respondent may have a chilling effect on the group's performance.

Looked at from the positivist perspective, focus groups have other drawbacks as well. The small focus group samples are usually composed of volunteers and do not necessarily represent the population from which they were drawn; the recording equipment or other physical characteristics of the location may inhibit respondents; and if the respondents are allowed to stray too far from the topic under consideration, the data produced may not be useful.

### Methodology of Focus Groups

There are seven basic steps in focus group research:

1. *Define the problem.* This step is similar in all types of scientific research: A well-defined problem is established based on previous investigation or out of curiosity. For example, television production companies that produce pilot programs for potential series often conduct 10–50 focus groups with target viewers to determine the groups' reactions to each concept.

2. *Select a sample.* Because focus groups are small, researchers must define a narrow audience for the study. The type of sample depends on the purpose of the focus group; the sample might consist of consumers who watch a particular type of television program, men aged 18–34 who listen to a certain type of music, or teenagers who purchase more than 10 record albums a year.

3. *Determine the number of groups necessary.* To help eliminate part of the problem of selecting a representative group, most researchers conduct two or more focus groups on the same topic. They can then compare results to determine whether any similarities or differences exist; or one group may be used as a basis for comparison with the other group. A focus group study using only one group is rare because there is no way to know whether the results are group-specific or characteristic of a wider audience.

4. *Prepare the study mechanics.* We present a more detailed description of the mechanical aspects of focus groups in Appendix 2. Suffice it to say here that this step includes arranging for the recruitment of respondents (by telephone or possibly by shopping center intercept), reserving the facilities at which the groups will be conducted, and deciding what type of recording (audio, video, or both) will be used. The moderator must be selected and briefed about the purpose of the group. In addition, the researcher needs to determine the amount of co-op money each respondent will receive for participating. Respondents usually receive between $25 and $50 for attending, although professionals such as doctors and lawyers may require up to $500 or more for co-op.

5. *Prepare the focus group materials.* Each aspect of a focus group must be planned in detail; nothing should be left to chance—in particular, the moderator must not be allowed to "wing it." The screener questionnaire is developed to recruit the desired respondents; recordings and other materials the subjects will hear or see are prepared; any questionnaires the subjects will complete are produced (including the presession questionnaire); and a list of questions is developed for the presession questionnaire and the moderator's guide.

Generally, a focus group session begins with some type of shared experience, so that the individuals have a common base from which to start the discussion. The members may listen to or view a tape or examine a new product, or they may simply be asked how they answered the first question on the presession questionnaire.

The existence of a moderator's guide (see Appendix 2) does not mean that the moderator cannot ask questions not contained in the guide. Quite the opposite is true. The significant quality of a focus group is that it allows the moderator to probe respondents' comments during the session. A professional moderator is able to develop a line of questioning that no one thought about before the group began, and the questioning usually provides important information. Professional moderators who have this skill receive substantial fees for conducting focus groups.

6. *Conduct the session.* Focus groups may be conducted in a variety of settings, from professional conference rooms equipped with one-way mirrors to hotel rooms rented for the occasion. In most situations, a professional conference room is used. Hotel and motel rooms are used when a focus facility is not located close by.

7. *Analyze the data and prepare a summary report.* The written summary of focus group interviews depends on the needs of the study and the amount of time and money available. At one extreme, the moderator/researcher may simply write a brief synopsis of what was said and offer an interpretation of the subjects' responses. For a more elaborate content analysis or a more complete description of what happened, the sessions can be transcribed so that the moderator or researcher can scan the comments and develop a category system, coding

each comment into the appropriate category. Focus groups conducted in the private sector rarely go beyond a summary of the groups; clients also have access to the audiotapes and videotapes if they desire.

### Examples of Focus Groups

Two examples are from the interpretive perspective. Schaefer and Avery (1993) conducted focus groups to examine how late night TV viewers interpreted the David Letterman show. Brown (1997) used focus groups to determine how people negotiate the construction of the image of Hilary Rodham Clinton in broadcast TV news. (Do an Internet search for "focus groups" to discover the different settings in which they are used. In addition, see *www.focusgroups.com* for a national registry of focus group facilities.)

## ▪ Intensive Interviews

**Intensive interviews**, or in-depth interviews, are essentially a hybrid of the one-on-one interview approach discussed in Chapter 8. Intensive interviews are unique for these reasons:

- They generally use smaller samples.
- They provide detailed background about the reasons respondents give specific answers. Elaborate data concerning respondents' opinions, values, motivations, recollections, experiences, and feelings are obtained.
- Intensive interviews allow for lengthy observation of respondents' nonverbal responses.
- They are usually very long. Unlike personal interviews used in survey research that may last only a few minutes, an intensive interview may last several hours and may take more than one session.
- Intensive interviews are customized to individual respondents. In a personal interview, all respondents are usually asked the same questions. Intensive interviews allow interviewers to form questions based on each respondent's answers.
- They can be influenced by the interview climate. To a greater extent than with personal interviews, the success of intensive interviews depends on the rapport established between the interviewer and the respondent.

### Advantages and Disadvantages of Intensive Interviews

The most important advantage of the in-depth interview is the wealth of detail that it provides. Furthermore, when compared to more traditional survey methods, intensive interviewing provides more accurate responses on sensitive issues. The rapport between respondent and interviewer makes it easier to approach certain topics that might be taboo in other approaches. In addition, there may be certain groups for which intensive interviewing is the only practical technique. For example, a study of the media habits of U.S. senators would be hard to carry out as an observational study. Also, it would be difficult to get a sample of senators to take the time to respond to a survey questionnaire. In some cases, however, such persons might be willing to talk to an interviewer.

On the negative side, generalizability is sometimes a problem. Intensive interviewing is typically done with a nonrandom sample. Since interviews are usually nonstandardized, each respondent may answer a slightly different version of a question. In fact, it is very likely that a particular respondent may answer questions not asked of any other respondent. Another disadvantage of in-depth interviews is that they are especially sensitive to interviewer bias. In a long interview, it is possible for a respondent to learn a good deal of information about the interviewer. Despite practice and training, some inter-

*Locating Respondents*

In most cases, identifying and contacting respondents for intensive interviewing are not difficult. In a few cases, however, this can be a downright challenge. Consider the problems faced by Priest (1992) in her study of self-disclosure on television. She wished to recruit subjects who had appeared on TV talk shows and revealed something intimate and personal about themselves. For obvious reasons, the full names and addresses of such people are rarely given when they appear. In addition, executive producers of "Oprah," "Donahue," and "Sally Jesse Raphael" were unwilling to assist Priest in contacting guests. What to do?

Priest taped several months of "Donahue" for clues about how to reach the show's guests. On several occasions, a guest was identified by name and a place of residence was subsequently mentioned during the interview. One panel member mentioned the more tolerant atmosphere in San Francisco. The researcher found her name in the San Francisco phone book and called her. Some guests came with their therapists; since the therapists were usually identified, Priest was able to call them and ask that her request for an interview be forwarded to their patients. Potential respondents were given a toll-free number they could call. One guest had mentioned that she worked at a McDonald's restaurant in a certain town. The researcher called the various McDonald's in that area until the person was located. A couple was reached by addressing a letter to them in care of the show. Another man had mentioned frequenting a local bar in New York City. Priest wrote him a letter in care of the bar, and he called the toll-free number. Eventually the researcher was able to locate and interview 24 informants, including a transsexual lesbian, a sex priestess, an incest survivor, and a "swinging" couple. Her experience suggests that qualitative researchers need imagination and perseverance when building their samples.

viewers may inadvertently communicate their attitudes through loaded questions, nonverbal cues, or tone of voice. The effect of this on the validity of a respondent's answers is difficult to gauge. Finally, intensive interviewing presents problems in data analysis. A researcher given the same body of data taken from an interview may wind up with interpretations significantly different from the original investigator.

### Procedures

The problem definition, respondent recruiting, and data collection and analysis procedures for intensive interviews are similar to those used in personal interviews. The primary differences with intensive interviews are listed here:

- Co-op payments are usually higher, generally $100–$1,000.
- The amount of data collected is tremendous. Analysis may take several weeks to several months.
- Interviewees may become extremely tired and bored. Interviews must be scheduled several hours apart, which lengthens the data collection effort.
- Because of the time required, it is very difficult to arrange intensive interviews. This is especially true for respondents who are professionals.
- Small samples do not allow for generalization to the target population.

Berg (1995) provides further details concerning the in-depth interview technique.

### Examples of Intensive Interviews

Graber (1988) conducted intensive interviews with 21 registered voters about their use of information media. The respondents were drawn randomly from the voter registration list and then contacted by the researchers. The final sample was selected to represent a fourfold typology based on the respondents' interest in politics and access to the media. Interviews averaged 2 hours in length, and each respondent was interviewed for a total of 20 hours.

Swenson (1989) recruited respondents for her study of TV news viewers by placing classified ads in the local newspapers. After finding eight individuals who fit the study criteria, the researcher conducted five interview sessions averaging 2–3 hours in length with each respondent.

Priest (1992), as previously mentioned, personally interviewed people who had revealed highly intimate information about themselves on the "Donahue" TV show. Each of her 24 semistructured interviews lasted about 2 hours, and respondents were provided with a toll-free number they could call if they later wished to make further comments on or add to their interview.

Pardun and Krugman (1994) reported the results of a study that examined the influence of the architectural style of the home on television viewing. Two-hour interviews were conducted with a purposive sample of 20 families, 10 living in traditional homes and 10 in transitional homes. In addition, photos were taken of each room that contained a TV set. The results suggested that a home's architecture influences the style of viewing that takes place.

In her study of ethical sensitivity in TV news, Lind (1997) did intensive interviews with 27 television news viewers in Chicago. She found that it was more accurate to describe ethical sensitivity in terms of type rather than level.

## ▪ Case Studies

The case study method is another common qualitative research technique. Simply put, a case study uses as many data sources as possible to systematically investigate individuals, groups, organizations, or events. Case studies are conducted when a researcher needs to understand or explain a phenomenon. They are frequently used in medicine, anthropology, clinical psychology, management science, and history. Sigmund Freud wrote case studies of his patients; economists wrote case studies of the cable TV industry for the FCC; and the list goes on and on.

On a more formal level, Yin (1994) defines a case study as an empirical inquiry that uses multiple sources of evidence to investigate a contemporary phenomenon within its real-life context, in which the boundaries between the phenomenon and its context are not clearly evident. This definition highlights how a case study differs from other research strategies. For example, an experiment separates a phenomenon from its real-life context. The laboratory environment controls the context. The survey technique tries to define the phenomenon under study narrowly enough to limit the number of variables to be examined. Case study research includes both single cases and multiple cases. Comparative case study research, frequently used in political science, is an example of the multiple case study technique.

Merriam (1988) lists four essential characteristics of case study research:

1. *Particularistic.* This means that the case study focuses on a particular situation, event, program, or phenomenon, making it a good method for studying practical, real-life problems.
2. *Descriptive.* The final product of a case study is a detailed description of the topic under study.
3. *Heuristic.* A case study helps people to understand what's being studied. New

interpretations, new perspectives, new meaning, and fresh insights are all goals of a case study.

4. *Inductive.* Most case studies depend on inductive reasoning. Principles and generalizations emerge from an examination of the data. Many case studies attempt to discover new relationships rather than verify existing hypotheses.

### Advantages of Case Studies

The case study method is most valuable when the researcher wants to obtain a wealth of information about the research topic. Case studies provide tremendous detail. Many times researchers want such detail when they do not know exactly what they are looking for. The case study is particularly advantageous to the researcher who is trying to find clues and ideas for further research (Simon, 1985). This is not to suggest, however, that case studies are to be used only at the exploratory stage of research. The method can also be used to gather descriptive and explanatory data.

The case study technique can suggest why something has occurred. For example, in many cities in the mid-1980s, cable companies asked to be released from certain promises made when negotiating for a franchise. To learn why this occurred, a multiple case study approach, examining several cities, could have been used. Other research techniques, such as the survey, might not be able to reveal all the possible reasons behind this phenomenon. Ideally, case studies should be used in combination with theory to achieve maximum understanding.

The case study method also affords the researcher the ability to deal with a wide spectrum of evidence. Documents, historical artifacts, systematic interviews, direct observations, and even traditional surveys can all be incorporated into a case study. In fact, the more data sources that can be brought to bear in a case, the more likely it is that the study will be valid.

### Disadvantages of Case Studies

There are three main criticisms. The first has to do with a general lack of scientific rigor in many case studies. Yin (1994) points out that "too many times, the case study researcher has been sloppy, and has allowed equivocal evidence or biased views to influence the. . . findings and conclusions" (p. 21). It is easy to do a sloppy case study; rigorous case studies require a good deal of time and effort.

The second criticism is that the case study is not amenable to generalization. If the main goal of the researcher is to make statistically based normative statements about the frequency of occurrence of a phenomenon in a defined population, some other method may be more appropriate. This is not to say that the results of all case studies are idiosyncratic and unique. In fact, if generalizing theoretic propositions is the main goal, then the case study method is perfectly suited to the task.

Finally, like participant observation, case studies are often time-consuming and may occasionally produce massive quantities of data that are hard to summarize. Consequently, fellow researchers are forced to wait years for the results of the research, which too often are poorly presented. Some authors, however, are experimenting with nontraditional methods of reporting to overcome this last criticism (see Peters & Waterman, 1982).

### Conducting a Case Study

The precise method of conducting a case study has not been as well documented as the more traditional techniques of the survey and the experiment. Nonetheless, there appear to be five distinct stages in carrying out a case study: design, pilot study, data collection, data analysis, and report writing.

***Design.*** The first concern in case study design is what to ask. The case study is most appropriate for questions that begin with "how" or "why." A research question that is clear and precise focuses the remainder of the efforts in a case study. A second design concern is what to analyze. What constitutes a "case"? In many instances, a case is an individual, several individuals, or an event or events. If information is gathered about each relevant individual, the results are reported in the single or multiple case study format; in other instances, however, the precise boundaries of the case are harder to pinpoint. A case might be a specific decision, a particular organization at a certain time, a program, or some other discrete event. One rough guide for determining what to use as the unit of analysis is the available research literature. Since researchers want to compare their findings with the results of previous research, it is sometimes a good idea not to stray too far from what was done in past research.

***Pilot Study.*** Before the pilot study is conducted, the case study researcher must construct a study protocol. This document describes the procedures to be used in the study and also includes the data-gathering instrument or instruments. A good case study protocol contains the procedures necessary for gaining access to a particular person or organization and the methods for accessing records. It also contains the schedule for data collection and addresses logistical problems. For example, the protocol should note whether a copy machine is available in the field to duplicate records, whether office space is available to the researchers, and what supplies are needed. The protocol should also list the questions central to the inquiry and the possible sources of information to be tapped in answering these questions. If interviews are to be used in the case study, the protocol should specify the questions to be asked.

Once the protocol has been developed, the researcher is ready to begin the pilot study. A pilot study is used to refine both the research design and the field procedures. Variables that were not foreseen during the design phase can crop up during the pilot study, and problems with the protocol or with study logistics can also be uncovered. The pilot study also allows the researchers to try different data-gathering approaches and to observe different activities from several trial perspectives. The results of the pilot study are used to revise and polish the study protocol.

***Data Collection.*** At least four sources of data can be used in case studies. Documents, which represent a rich data source, may take the form of letters, memos, minutes, agendas, historical records, brochures, pamphlets, posters, and so on. A second source is the interview. Some case studies make use of survey research methods and ask respondents to fill out questionnaires; others may use intensive interviewing.

Observation/participation is the third data collection technique. The general comments made about this technique earlier in this chapter apply to the case study method as well. The fourth source of evidence used in case studies is the physical artifact—a tool, a piece of furniture, or even a computer printout. Although artifacts are commonly used as a data source in anthropology and history, they are seldom used in mass media case study research. (They are, however, frequently used in legal research concerning the media.)

Most case study researchers recommend using multiple sources of data, thus permitting triangulation of the phenomenon under study (Rubin, 1984). In addition, multiple sources help the case study researcher improve the reliability and validity of the study. Not surprisingly, a study of the case study method found that the ones that used multiple sources of evidence were rated higher than those that relied on a single source (Yin, Bateman & Moore, 1983).

***Data Analysis.*** Unlike more quantitative research techniques, there are no specific formulas or "cookbook" techniques to guide the researcher in analyzing the data. Consequently, this stage is probably the most difficult in the case study method. Although it is impossible to generalize to all case study situations, Yin (1994) suggests three broad analytic strategies: pattern matching, explanation building, and time series.

In the *pattern-matching strategy,* an empirically based pattern is compared with one or more predicted patterns. For instance, suppose a newspaper is about to initiate a new management tool: regular meetings between top management and reporters, excluding editors. Based on organizational theory, a researcher might predict certain outcomes—namely, more stress between editors and reporters, increased productivity, and weakened supervisory links. If analysis of the case study data indicates that these results do in fact occur, some conclusions about the management change can be made. If the predicted pattern does not match the actual one, the initial study propositions have to be questioned.

In the analytic strategy of *explanation building,* the researcher tries to construct an explanation about the case by making statements about the cause or causes of the phenomenon under study. This method can take several forms. Typically, however, an investigator drafts an initial theoretical statement about some process or outcome, compares the findings of an initial case study against the statement, revises the statement, analyzes a second comparable case, and repeats this process as many times as necessary. Note that this technique is similar to the general approach of analytical induction discussed earlier. For example, to explain why some new communication technologies are failing, a researcher might suggest lack of managerial expertise as an initial proposition. But an investigator who examined the subscription television industry might find that lack of management expertise is only part of the problem, that inadequate market research is also a factor. Armed with the revised version of the explanatory statement, the researcher next examines the direct broadcast satellite industry to see whether this explanation needs to be further refined, and so on, until a full and satisfactory answer is achieved.

In *time series analysis,* the investigator tries to compare a series of data points to some theoretic trend that was predicted before the research, or to some alternative trend. If, for instance, several cities have experienced newspaper strikes, a case study investigator might generate predictions about the changes in information-seeking behaviors of residents in these communities and conduct a case study to see whether these predictions are supported.

***Report Writing.*** The case study report can take several forms. The report can follow the traditional research study format—problem, methods, findings, and discussion—or it can use a nontraditional technique. Some case studies are best suited to a chronological arrangement, whereas comparative case studies can be reported from that perspective. No matter what form is chosen, the researcher must consider the intended audience of the report. A case study report for policy makers is written in a style different from one to be published in a scholarly journal.

## Examples of Case Studies

Kaplan and Houlberg's (1990) case study involved television advertising for condoms on San Francisco's KRON-TV. The researchers conducted personal interviews with the executives involved in the decision to air the commercials, examined transcripts of the accepted ad, inspected station policy documents, and scrutinized local and national newspaper accounts of the event. Walsh-Childers (1994) conducted a case study of the effect on state health policy of an Alabama newspaper's series on infant mortality. She analyzed the relevant news reports and conducted interviews with editors, reporters, and health care officials as part of her analysis.

Ramirez and colleagues (1997) focused on "Mirame," a substance abuse prevention program designed for Mexican-American youth. The research team examined how the satellite-delivered TV program was developed and implemented and its impact in the target community. Abelman, Atkin, and Rand (1997) performed a case study that examined how the uses and gratifications of television are affected when local stations change network affiliations. Viewers who watched TV out of habit showed little interest in network affiliation. On the other hand, goal-oriented viewers, those who watched with a purpose, were more sensitive to network changes. Hindman's (1998) case study examined how an inner-city newspaper dealt with the conflict between its mission as a mainstream paper and community pressure to become an alternative, advocacy publication.

***Qualitative Research and Ethnography.*** This discussion on qualitative research necessitates a brief explanation of terminology in relation to ethnography. The term *ethnographic research* is sometimes used as a synonym for *qualitative research* (Lindlof, 1991). Ethnography, however, is in fact a special kind of qualitative research. As first practiced by anthropologists and sociologists, ethnography was the process in which researchers spent long periods of time living with and observing other cultures in a natural setting. This immersion in the other culture helped the researcher understand another way of life as seen from the native perspective. Recently, however, the notion of ethnography has been adapted to other areas: political science, education, social work, and communication. These disciplines were less interested in describing the way of life of an entire culture and more concerned with analyzing smaller units: subgroups, organizations, institutions, professions, audiences, and so on. To reduce confusion, Berg (1997) suggests referring to the traditional study of entire cultures as *macro-ethnography* and to the study of smaller units of analysis as *micro-ethnography.* The latter approach is the one most often used by mass communication researchers.

Regardless of whether it is focusing on an entire culture or on a cultural subunit, ethnography is characterized by four qualities:

1. It puts the researcher in the middle of the topic under study; the researcher goes to the data rather than the other way around.
2. It emphasizes studying an issue or topic from the participants' frame of reference.
3. It involves spending a considerable amount of time in the field.
4. It uses a variety of research techniques including observation, interviewing, diary keeping, analysis of existing documents, photography, videotaping, and so on.

Item 4 seems to distinguish ethnographic research from other forms of qualitative research; indeed, ethnographic research relies upon an assortment of data collection techniques.

Although other qualitative research projects can be conducted adequately using only one method, ethnographic research generally uses several of the four common qualitative techniques discussed in this chapter; field observations, intensive interviewing, focus groups, and case studies. For additional examples of case studies, search the net for "case studies media."

## ▪ ▪ ▪ Summary

Mass media research can be influenced by the research paradigm that directs the researcher. This chapter discussed the differences between the positivist approach, which generally favors quantitative methods, and the interpretive approach, which favors qualitative methods. We described four main qualitative techniques: field observations, focus groups, intensive interviews, and case studies.

*Field observation* is the study of a phenomenon in natural settings. The researcher may be a detached observer or a participant in the process under study. The main advantage of this technique is its flexibility; it can be used to develop hypotheses, to gather preliminary data, or to study groups that would otherwise be inaccessible. Its biggest disadvantage is the difficulty in achieving external validity.

The *focus group,* or group interviewing, is used to gather preliminary information for a research study or to gather qualitative data concerning a research question. The advantages of the focus group method are the ease of data collection and the depth of information that can be gathered. Among the disadvantages, the quality of information gathered during focus groups depends heavily on the group moderators' skill, and focus groups can only complement other research because they provide qualitative, not quantitative, data.

*Intensive interviewing* is used to gather extremely detailed information from a small sample of respondents. The wealth of data that can be gathered with this method is its primary advantage. Because intensive interviewing is usually done with small, nonrandom samples, however, generalizability is sometimes a disadvantage. Interviewer bias can also be a problem.

The *case study* method draws from as many data sources as possible to investigate an event. Case studies are particularly helpful when a researcher desires to explain or understand some phenomenon. Some problems with case studies are that they can lack scientific rigor, they can be time-consuming to conduct, and the data they provide can be difficult to generalize from and to summarize.

### Questions and Problems for Further Investigation

1. Develop a research topic that is appropriate for a study by each of these methods:

   Intensive interview

   Field observation

   Case study
2. Suggest three specific research topics that are best studied by the technique of covert participation. Are any ethical problems involved?
3. Select a research topic that is suitable for study using the focus group method; then assemble six or eight of your classmates or friends and conduct a sample interview. Select an appropriate method for analyzing the data.
4. Examine recent journals in the mass media research field and identify instances where the case study method was used. For each example, specify the sources of data used in the study, how the data were analyzed, and how the study was reported.
5. What can a positivist researcher learn from an interpretive researcher? What can the interpretive research learn from the positivist research?
6. Some researchers claim that, excluding data collection, there are no fundamental differences between qualitative and quantitative research. What is your opinion about this perspective?
7. If you are using *InfoTrac College Edition,* you can discover the many disciplines that use qualitative research. Perform an advanced search using the title option (ti). Find articles with the word "qualitative" in the title. Count how many different research areas are represented.

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Chapter 7

# Content Analysis

- *Definition of Content Analysis*
- *Uses of Content Analysis*
- *Limitations of Content Analysis*
- *Steps in Content Analysis*
- *Reliability*
- *Validity*
- *Examples of Content Analysis*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

This chapter discusses content analysis, a specific research approach used frequently in all areas of the media. The method is popular with mass media researchers because it is an efficient way to investigate the content of the media, such as the number and types of commercials or advertisements in broadcasting or the print media. The beginning researcher will find content analysis a valuable tool in answering many mass media questions. (Search the Internet for "content analysis" to find more than 10,500 references.)

Modern content analysis can be traced back to World War II, when Allied intelligence units painstakingly monitored the number and types of popular songs played on European radio stations. By comparing the music played on German stations with that on other stations in occupied Europe, the Allies were able to measure with some degree of certainty the changes in troop concentration on the continent. In the Pacific theater, communications between Japan and various island bases were carefully tabulated; an increase in message volume to and from a particular base usually indicated some new operation involving that base.

At about the same time, content analysis was used in attempts to verify the authorship of historical documents. These studies (Yule, 1944) were concerned primarily with counting words in documents of questionable authenticity and comparing their frequencies with the same words in documents whose authors were known. More recently, this technique was used to attribute the authorship of 12 disputed "Federalist Papers" to James Madison (Martindale & McKenzie, 1995). These literary detective cases demonstrated the usefulness of quantification in content analysis.

After the war, researchers used content analysis to study propaganda in newspapers and radio. In 1952 Bernard Berelson published *Content Analysis in Communication Research,* which signaled that the technique had gained recognition as a tool for media scholars.

In 1968 Tannenbaum and Greenberg reported that content analysis of newspapers was the largest single subject of master's theses in mass communication. A later publication (Comstock, 1975) listed more than 225 content analyses of television programming. Concern over the portrayal of violence on television and the treatment of women and minority groups in print and television advertising and in music videos further popularized the content analysis technique among mass media researchers. From 1977 to 1985, 21% of the quantitative studies published in the *Journal of Broadcasting and Electronic Media* were content analyses (Moffett & Dominick, 1987). A study by Cooper, Potter, and Dupagne (1994) found that 25% of all quantitative studies in mass communication from 1965 to 1989 were content analyses. Riffe and Freitag (1997) found that about 25% of the 1,977 full-length research articles published in *Journalism and Mass Communication Quarterly* from 1971 to 1995 were content analyses. This popularity shows no signs of decreasing. *Communication Abstracts* listed more than 60 content analytic studies for 1996 and 1997, indicating that it is still a favored research technique.

Content analysis has figured prominently in broadcasting and cable regulation. In 1994, in response to congressional pressure, the four major TV networks commissioned a $1.5-million research project that included a content analysis of network entertainment programs. The results of the content analysis, released in 1995, found that only 10 network shows were rated as highly violent (Littleton, 1995). A 3-year content analysis sponsored by the National Cable Television Association found that pay cable programs contained the most violence (Brown, 1998).

These analyses figured in the passage of the Telecommunications Act of 1996, which required that newly manufactured TV sets be equipped with a V-chip that blocks violent and sexually explicit programming. The bill gave the broadcasting and cable industries a year in which to devise a measurement system, presumably based on some method of content analysis, that assigns ratings to programs that can trigger the V-chip. After much discussion, the industry came up with an age-based system that cautioned parents when TV content is unsuitable for younger children. After several public interest groups voiced complaints, the age-based system was modified to include information about the specific content (sexual situations, mature language, violence, etc.) that is considered problematical.

## ▪ Definition of Content Analysis

There are many definitions of *content analysis*. Walizer and Wienir (1978) define it as any systematic procedure devised to examine the content of recorded information; Krippendorf (1980) defines it as a research technique for making replicable and valid references from data to their context. Kerlinger's (1986) definition is fairly typical: Content analysis is a method of studying and analyzing communication in a systematic, objective, and quantitative manner for the purpose of measuring variables.

Kerlinger's definition involves three concepts that require elaboration. First, content analysis is *systematic*. This means that the content to be analyzed is selected according to explicit and consistently applied rules: Sample selection must follow proper procedures, and each item must have an equal chance of being included in the analysis. Moreover, the evaluation process must be systematic: All content under consideration is to be treated in exactly the same manner. There must be uniformity in the coding and analysis procedures and in the length of time coders are exposed to the material. Systematic evaluation simply means that one and only one set of guidelines is used for evaluation throughout the study. Alternating procedures in an analysis is a sure way to confound the results.

Second, content analysis is *objective;* that is, the researcher's personal idiosyncrasies and biases should not enter into the findings. If replicated by another researcher, the analysis should yield the same results. Operational definitions and rules for the classification of variables should be sufficiently explicit and comprehensive that other researchers who repeat the process will arrive at the same decisions. Unless a clear set of criteria and procedures is established that fully explains the sampling and categorization methods, the researcher does not meet the requirement of objectivity and the reliability of the results may be called into question. Perfect objectivity, however, is seldom achieved in a content analysis. The specification of the unit of analysis and the precise makeup and definition of relevant categories are areas in which individual researchers must exercise subjective choice. (Reliability, as it applies to content analysis, is discussed at length later in the chapter.)

Third, content analysis is *quantitative*. The goal of content analysis is the accurate representation of a body of messages. Quantification is important in fulfilling that objective, because it aids researchers in the quest for precision. The statement "Seventy percent of all prime-time programs contain at least one act of violence" is more precise than "Most shows are violent." Additionally, quantification allows researchers to summarize results and to report them succinctly. If measurements are to be made over intervals of time, comparisons of the numerical data from one time period to another can help simplify and standardize the evaluation procedure. Finally, quantification gives researchers additional statistical tools that can aid in interpretation and analysis.

Note, however, that quantification should not blind the researcher to other ways of assessing the potential impact or effects of the content. The fact that some item or behavior was the most frequently occurring element in a body of content does not necessarily make that element the most important. For example, a content analysis of the news coverage of the urban violence in Los Angeles in 1992 might disclose that 90% of the coverage showed nonviolent scenes. The other 10% that contained violence, however, might have been so powerful and so sensational that its impact on the audience was far greater than the nonviolent coverage.

## ▪ Uses of Content Analysis

Over the past decade, the symbols and messages contained in the mass media have become increasingly popular research topics in both the academic sector and the private sector. The American Broadcasting Company (ABC) conducts systematic comparative studies of the three networks' evening newscasts to determine how ABC's news coverage compares to its competitors'. The national Parent Teachers Association has offered do-it-yourself training in rough forms of content analysis so that local members can monitor television violence levels in their viewing areas. Citizens groups, such as the National Coalition on Television Violence, keep track of TV content. Public relations firms use content analysis to monitor the subject matter of company publications, and some labor unions now conduct content analyses of the mass media to examine their images. The *Media Monitor* publishes periodic studies of how the media treat social and political issues.

Although it is difficult to classify and categorize studies as varied and diverse as those using content analysis, the studies are generally done for one of five purposes. The following discussion of these aims illustrates some ways in which this technique can be applied.

### Describing Communication Content

Several recent studies have cataloged the characteristics of a given body of communication content at one or more points in time. These studies exemplify content analysis used in the traditional, descriptive manner: to identify what exists. For example, Glascock and LaRose (1993) described the sexual content of 82 dial-a-porn numbers. Similarly, Bogaert, Turkovich, and Hafer (1993) analyzed the sexual explicitness and age of the models in *Playboy* centerfolds from 1953 to 1990. Note that one of the advantages of content analysis is its potential to identify trends over long periods of time. Gross and Sheth (1989), for example, analyzed magazine ads from 1890 to 1988, and Siegelman and Bullock (1991) studied the newspaper coverage of election campaigns from 1888 to 1988.

These descriptive studies also can be used to study societal change. For example, changing public opinion on various controversial issues could be gauged with a longitudinal study (see Chapter 9) of letters to the editor or newspaper editorials. Statements about what values are judged to be important by a society could be inferred from a study of the nonfiction books on the bestseller list at different points in time. Greenberg and Collette (1997), for example, analyzed changes in the demographic makeup of new characters added to the broadcast networks' new programs from 1966 to 1992.

### Testing Hypotheses of Message Characteristics

A number of analyses attempt to relate certain characteristics of the source of a given body of message content to the characteristics of the messages that are produced. As Holsti (1969) points out, this category of content analysis has been used in many studies that test hypotheses of form: "If the source has characteristic *A*, then messages containing elements *x* and *y* will be produced; if the source has characteristic *B*, then messages with elements *w* and *z* will be produced." Busby and Leichty (1993), for example, found that traditional women's magazines were more likely to portray women in decorative roles than were nontraditional magazines. Kenney and Simpson (1993) content analyzed the coverage of the 1988 presidential race and found that the *Washington Post's* coverage was balanced and neutral but the *Washington Times'* coverage favored the Republicans. Hollifield (1997) compared coverage of the proposal for a National Information Infrastructure by the communication industry trade press, the general trade press, and newspapers. She found that the trade press was less likely to cover the social implications of policy proposals. Finally, Liebler and Smith (1997) discovered that male and female network news correspondents both used male sources more often than female sources in their reporting.

### Comparing Media Content to the "Real World"

Many content analyses are reality checks in which the portrayal of a certain group, phenomenon, trait, or characteristic is assessed against a standard taken from real life. The congruence of the media presentation and the actual situation is then discussed. Probably the earliest study of this type was by Davis (1951), who found that crime coverage in Colorado newspapers bore no relationship to changes in state crime rates. The National Commission on the Causes and Prevention of Violence used content analysis data collected by Gerbner (1969) to compare the world of television violence with real-life violence. Lester (1994) analyzed African-American photo coverage in four major U.S. newspapers from 1937 to 1990 and found that although the overall percentage of photos containing African-Americans increased, it was still less than national or statewide population percentages. Gilens (1996) compared news media coverage of the poor with census data and concluded that the elderly poor and the working poor were underrepresented while unemployed, working-age adults were overrepresented. Finally, Taylor and Bang (1997) compared the portrayal of three minority groups in magazine ads with their incidence in the general population and found that Latino-Americans were the most underrepresented group in U.S. magazine advertising.

### Assessing the Image of Particular Groups in Society

Ever-growing numbers of content analyses have focused on exploring the media image of certain minority or otherwise notable groups. In many instances these studies are conducted to assess changes in media policy toward these groups, to make inferences about the media's responsiveness to demands for better coverage, or to document social trends. For example, as part of a license renewal challenge, Hennessee and Nicholson (1972) performed an extensive analysis of the image presented of women by a New York television station, and Greenberg (1983) completed a lengthy content analysis of the image of Mexican-Americans in the mass media. More recently, Barber and Gandy (1990) studied the representation of African-American U.S. newsmakers in daily newspapers, and Greenwald (1990) analyzed the coverage of women in the business sections of two metropolitan newspapers. She found that women were the main subjects in only 5 of 180 stories. Taylor and Stern (1997) traced the portrayals of Asian-Americans in television ads during the mid-1990s and reported that only 10% of the ads featured an Asian-American model. Dupagne, Potter, and Couper (1993) and Roy and Harwood (1997) found that the elderly were underrepresented but portrayed positively in TV commercials.

### Establishing a Starting Point for Studies of Media Effects

The use of content analysis as a starting point for subsequent studies is relatively new. The best known example is **cultivation analysis**, in which the dominant message and themes in media content are documented by systematic procedures and a separate study of the audience is conducted to see whether these messages are fostering similar attitudes among heavy media users. Gerbner, Gross, Signorielli, Morgan, and Jackson-Beeck (1979) discovered that heavy viewers of television tend to be more fearful of the world around them. In other words, television content—in this case, large doses of crime and violence—may cultivate attitudes more consistent with its messages than with reality. Other work that has used a similar framework includes Morgan and Shanahan's (1991) analysis of television programming and the cultivation of political attitudes in Argentina, and Pfau, Mullen, Deidrich, and Garrow's (1995) study of public perception of attorneys and the viewing of prime-time television programs featuring lawyers. Cultivation analysis is discussed further in Chapter 17.

## ▪ Limitations of Content Analysis

Content analysis alone cannot serve as a basis for making statements about the effects of content on an audience. A study of Saturday morning cartoon programs on television might reveal that 80% of these programs contain commercials for sugared cereal, but this finding alone does not allow researchers to claim that children who watch these programs will want to purchase sugared cereals. To make such an assertion, an additional study of the viewers is necessary (as in cultivation analysis). Content analysis cannot serve as the sole basis for claims about media effects.

Also, the findings of a particular content analysis are limited to the framework of the categories and the definitions used in that analysis. Different researchers may use varying definitions and category systems to measure a single concept. In mass media research, this problem is most evident in studies of televised violence. Some researchers rule out comic or slapstick violence in their studies, whereas others consider it an important dimension. Obviously, great care should be exercised in comparing the results of different content analysis studies. Researchers who

*Coder Perception Versus Audience Perception*

One problem with using content analysis as a starting point for studies of audience effects is the possibility of falsely assuming that what trained coders see in a body of content is the same as what audience members perceive. For example, a study of the cultivation effects of TV content on viewers' attitudes toward sexual practices might start with an analysis of the sexual content of specific television programs. Coders might be trained to count how many provocatively dressed characters appear; how many instances of kissing, embracing, caressing, and other forms of sexual behavior occur; and so on. When the coders are finished with this aspect of the study, they could rank-order a list of TV programs with regard to their sexual content. Audience viewings of these shows could then be correlated with audience attitudes toward sexual matters. The trouble is that the researchers do not know whether the audience defines the term *sexual content* in the same way the coders do. For example, many in the audience might not define all forms of kissing as sexual. Or perhaps programs such as MTV's "Loveline" or "The New Newlywed Game," where sexual activity is only talked about and implied rather than acted out, are also influential in shaping audience attitudes. Since these shows would probably score low on most of the measures used by coders to gauge sexual content, the influence of these shows might be overlooked.

use different tools of measurement naturally arrive at different conclusions.

Another potential limitation of content analysis is a lack of messages relevant to the research. Many topics or characters receive little exposure in the mass media. For example, a study of how Asians are portrayed in U.S. television commercials would be difficult because such characters are rarely seen (of course, this fact in itself might be a significant finding). A researcher interested in this topic must be prepared to examine a large body of media content to find sufficient quantities for analysis.

Finally, content analysis is frequently time-consuming and expensive. The task of examining and categorizing large volumes of content is often laborious and tedious. Plowing through 100 copies of the *New York Times* or 50 issues of *Newsweek* takes time and patience. In addition, if television content is selected for analysis, there must be some means of preserving the programs for detailed examination. Typically, researchers videotape programs for analysis, but this requires access to one or more VCRs and large supplies of videotape—materials not all researchers can afford.

## ▪ Steps in Content Analysis

In general, a content analysis is conducted in several discrete stages. Although the steps are listed here in sequence, they need not be followed in the order given. In fact, the initial stages of analysis can easily be combined. Nonetheless, the following steps may be used as a rough outline:

1. Formulate the research question or hypothesis.
2. Define the population in question.
3. Select an appropriate sample from the population.
4. Select and define a unit of analysis.
5. Construct the categories of content to be analyzed.
6. Establish a quantification system.

7. Train coders and conduct a pilot study.
8. Code the content according to established definitions.
9. Analyze the collected data.
10. Draw conclusions and search for indications.

### Formulating a Research Question

One problem to avoid in content analysis is the "counting for the sake of counting" syndrome. The ultimate goal of the analysis must be clearly articulated to avoid aimless exercises in data collection that have little utility for mass media research. For example, after counting the punctuation marks that are used in the *New York Times* and *Esquire,* one might make a statement such as "*Esquire* used 45% more commas but 23% fewer semicolons than the *New York Times.*" The value of such information for mass media theory or policy making is dubious. Content analysis should not be conducted simply because the material exists and can be tabulated.

As with other methods of mass media research, content analyses should be guided by well-formulated research questions or hypotheses. A basic review of the literature is a required step. The sources for hypotheses are the same as for other areas of media research. It is possible to generate a research question based on existing theory, prior research, or practical problems, or as a response to changing social conditions. For example, a research question might ask whether the growing visibility of the women's movement has produced a change in the way women are depicted in advertisements. Or a content analysis might be conducted to determine whether the public affairs programming of group-owned television stations differs from that of other stations. Well-defined research questions or hypotheses lead to the development of accurate and sensitive content categories, which in turn helps to produce data that are more valuable.

### Defining the Universe

This stage is not as grandiose as it sounds. To "define the universe" is to specify the boundaries of the body of content to be considered, which requires an appropriate operational definition of the relevant population. If researchers are interested in analyzing the content of popular songs, they must define what is meant by a "popular song": All songs listed in *Billboard's* "Hot 100" chart or on the back page of *Radio & Records*? The top 50 songs? The top 10? They must also ask what time period will be considered: The past 6 months? This month only? A researcher who intends to study the image of minority groups on television must first define what the term *television* means. Does it include broadcast and cable networks? Pay television? Videocassettes? Is it evening programming, or does it also include daytime shows? Will the study examine news content or confine itself to dramatic offerings?

Basically, two dimensions are used to determine the appropriate universe for a content analysis—the topic area and the time period. The topic area should be logically consistent with the research question and related to the goals of the study. For example, if a researcher plans a study of U.S. involvement in Bosnia, should the sample period extend back to the time when Bosnia was part of Yugoslavia? Finally, the time period to be examined should be sufficiently long so that the phenomenon under study has ample chance to occur.

By clearly specifying the topic area and the time period, the researcher is meeting a basic requirement of content analysis: a concise statement that spells out the parameters of the investigation. For example:

> This study considers TV commercials broadcast in prime time in the New York City area from September 1, 1997, to October 1, 1999.

Or

This study considers the news content on the front pages of the *Washington Post* and the *New York Times,* excluding Sundays, from January 1 to December 31 of the past year.

### Selecting a Sample

Once the universe has been defined, a sample is selected. Although many of the guidelines and procedures discussed in Chapter 5 are applicable here, the sampling of content involves some special considerations. On one hand, some analyses are concerned with a relatively finite amount of data, and it may be possible to conduct a census of the content. For example, Skill and Robinson (1994) analyzed a census of all television series that featured families from 1950 to 1989, a total of 497 different series, and Greenberg and Collette (1997) performed a census of all new major characters added to the broadcast networks' program lineup from 1966 to 1992, a total of 1,757 characters. On the other hand, in the more typical situation, the researcher has such a vast amount of content available that a census is not practical. Thus a sample must be selected.

Most content analysis in mass media involves multistage sampling. This process typically consists of two stages (although it may entail three). The first stage is usually to take a sampling of content sources. For example, a researcher interested in the treatment of the environmental movement by American newspapers would first need to sample from among the 1,650 or so newspapers published each day. The researcher may decide to focus primarily on the way big-city dailies covered the story and opt to analyze only the leading circulation newspapers in the 10 largest American cities. To take another example, a researcher interested in the changing portrayal of elderly people in magazine advertisements would first need to sample from among the thousands of publications available. In this instance, the researcher might select only the top 10, 15, or 25 mass-circulation magazines. Of course, it is also possible to sample randomly if the task of analyzing all the titles is too overwhelming. A further possibility is to use the technique of stratified sampling discussed in Chapter 5. A researcher studying the environmental movement might wish to stratify the sample by circulation size and sample from within the strata composed of big-city newspapers, medium-city newspapers, and small-city newspapers. The magazine researcher might stratify by type of magazine: news, women's interests, men's interests, and so on. A researcher interested in television content might stratify by network or by program type.

Once the sources have been identified, the second step is to select the dates. In many studies, the time period from which the issues are to be selected is determined by the goal of the project. If the goal is to assess the nature of news coverage of the 2000 election campaign, the sampling period is fairly well defined by the actual duration of the story. If the research question is about changes in the media image of President Bill Clinton following allegations of improper fund raising, content should be sampled before, at the time of, and after the allegations. But within this period, what editions of newspapers and magazines and which television programs should be selected for analysis? It would be a tremendous amount of work to analyze each issue of *Time, Newsweek,* and *U.S. News & World Report* over a 5-year period. It is possible to sample from within that time period and obtain a representative group of issues. A simple random sample of the calendar dates involved is one possibility: After a random start, every *n*th issue of a publication is selected for the sample. This method cannot be used without planning, however. For instance, if the goal is 50 edition dates and an interval of 7 is used, the sample might include 50 Saturday editions (periodicity). Since news content is not distributed randomly over the days of the week, such a sample will not be representative.

Another technique for sampling edition dates is stratification by week of the month and by day of the week. A sampling rule that no more than two days from one week can be chosen is one way to ensure a balanced distribution across the month. Another procedure is to construct a *composite week* for each month in the sample. For example, a study might use a sample of one Monday (drawn at random from the four or five possible Mondays in the month), one Tuesday (drawn from the available Tuesdays), and so on, until all weekdays have been included. How many edition dates should be selected? Obviously, this depends on the topic under study. If an investigator is trying to describe the portrayal of Mexican-Americans on prime-time television, several dates have to be sampled to ensure a representative analysis. If there is an interest in analyzing the geographic sources of news stories, a smaller number of dates is needed because almost every story is relevant. The number of dates should be a function of the incidence of the phenomenon in question: The lower the incidence, the more dates must be sampled.

There are some rough guidelines for sampling in the media. Stempel (1952) drew separate samples of 6, 12, 18, 24, and 48 issues of a newspaper and compared the average content of each sample size in a single subject category against the total for the entire year. He found that each of the five sample sizes was adequate and that increasing the sample beyond 12 issues did not significantly improve sampling accuracy. More recently, Riffe, Aust, and Lacy (1993) demonstrated that a composite week sampling technique was superior to both a random sample and a consecutive day sample when dealing with newspaper content. Similarly, Riffe, Lacy, and Drager (1996) studied the optimum sample sizes for an analysis of weekly newsmagazines, while Lacy, Robinson, and Riffe (1995) did the same for weekly newspapers. They found that a monthly stratified sample of 12 issues was the most efficient sample for both magazines and newspapers. The next most efficient method was a simple random sample of 14 issues.

In television, Gerbner, Gross, Jackson-Beeck, Jeffries-Fox, and Signorielli (1977) demonstrated that, at least for the purpose of measuring violent behavior, a sample of one week of fall programming and various sample dates drawn throughout the year produced comparable results. Riffe, Lacy, Nagovan, and Burkum (1996) examined sample sizes for content analysis of broadcast news and found that two days per month chosen at random proved to be the most efficient method. As a general rule, however, the larger the sample, the better—within reason, of course. If too few dates are selected for analysis, the possibility of an unrepresentative sample is increased. Larger samples, if chosen randomly, usually run less risk of being atypical.

There may be times, however, when purposive sampling is useful. As Stempel (1989) points out, a researcher might learn more about newspaper coverage of South Africa by examining a small sample of carefully selected papers (for example, those that subscribe to the international/national wire services or have correspondents in South Africa) than by studying a random sample of 100 newspapers. Riffe and Freitag (1997) confirm the importance of purposive sampling in content analysis. They found that 68% of all the content analyses in *Journalism Quarterly* from 1971 to 1995 used a purposive sample.

Another problem that can arise during the sampling phase is systematic bias in the content itself. For example, a study of the amount of sports news in a daily paper might yield inflated results if the sampling was done only in April, when three or more professional sports are simultaneously in season. A study of marriage announcements in the Sunday *New York Times* for the month of June from 1932 to 1942 revealed no announce-

Figure 7.1 *Multistage Sampling in a Hypothetical Analysis Study*

*Research Question:* Have there been changes in the types of products advertised in men's magazines from 1980 to 1999?

*Sampling Stage 1: Selection of Titles*
Men's magazines are defined as those magazines whose circulation figures show that 80% or more of their readers are men. These magazines will be divided into two groups: large and medium circulation.

Large circulation: reaches more than 1,000,000 men.

Medium circulation: reaches between 500,000 and 999,999 men.

From all the magazines that fall into these two groups, three will be selected at random from each division, for a total of six titles.

*Sampling Stage 2: Selection of Dates*
Three issues from each year will be chosen at random from clusters of four months. One magazine will be selected from the January, February, March, and April issues, and so on. This procedure will be followed for each magazine, yielding a final sample of 30 issues per magazine, or a total of 180 issues.

*Sampling Stage 3: Selection of Content*
Every other display ad will be tabulated, regardless of its size.

ment of a marriage in a synagogue (Hatch & Hatch, 1947). It was later pointed out that the month of June usually falls within a period during which traditional Jewish marriages are prohibited. Researchers familiar with their topics can generally discover and guard against this type of distortion.

Once the sources and the dates have been determined, there may be a third stage of sampling. A researcher might wish to confine his or her attention to the specific content within an edition. For example, an analysis of the front page of a newspaper is valid for a study of general reporting trends but is probably inadequate for a study of social news coverage. Figure 7.1 provides an example of multistage sampling in content analysis.

## Selecting a Unit of Analysis

The next step is to select the unit of analysis, which is the smallest element of a content analysis but also one of the most important. In written content, the unit of analysis might be a single word or symbol, a theme (a single assertion about one subject), or an entire article or story. In television and film analyses, units of analysis can be characters, acts, or entire programs. Specific rules and definitions are required for determining these units to ensure closer agreement among coders and fewer judgment calls.

Certain units of analysis are simpler to count than others. It is easier to determine the number of stories on the "CBS Evening News" that deal with international news than the number of acts of violence in a week of network television because a story is a more readily distinguishable unit of analysis. The beginning and ending of a news story are fairly easy to discern, but suppose that a researcher trying to catalog violent content is faced with a long fistfight among three characters? Is the whole sequence one act of violence, or is every blow considered an act?

Table 7.1 *Operational Definitions of Units of Analysis*

| Researcher(s) | Topic | Universe | Sample | Unit of Analysis |
|---|---|---|---|---|
| Leslie (1995) | Advertising in *Ebony* magazine, 1957–1989 | All issues of *Ebony*, 1957–1989 | Randomly chosen magazines from the 1950s, 1970s, and 1980s | All full and one-quarter page ads |
| Lowry and Shidler (1995) | Network TV news bias in the 1992 campaign | All weeknight newscasts on Aug. 24–Oct. 30, 1992, on ABC, CBS, NBC, and CNN | 99 newscasts chosen at random | Statements made on air by news source |
| Oliver (1994) | Portrayal of crime and aggression in reality-based TV police shows | All episodes of five reality-based police shows in 1991–1992 | 76 programs recorded in Fall 1991–January 1992 | Characters portrayed as either a police officer or a criminal suspect |
| Smith (1994) | Gender differences in children's ads | Network children's programming in 1991 | All ads broadcast in one week of Feb. 1991 on ABC, Fox, CBS, and Nickelodeon | Gender-positioned ads |
| Vest (1992) | Gender representation in prime time pilots | TV pilots appearing during 1986–1987 season | Shooting scripts provided by producers | Each character with a name and speaking role |

What if a fourth character joins in? Does it then become a different act?

Operational definitions of the unit of analysis should be clear-cut and thorough; the criteria for inclusion should be apparent and easily observed. These goals cannot be met without effort and some trial and error. As a preliminary step, researchers must form a rough draft of a definition and then sample representative content to look for problems. This procedure usually results in further refinement and modification of the operational definition. Table 7.1 presents typical operational definitions of units of analysis taken from mass media research.

### Constructing Content Categories

At the heart of any content analysis is the category system used to classify media content. The precise makeup of this system, of course, varies with the topic under study. As Berelson (1952, p. 147) points out, "Particular studies have been productive to the extent that the categories were clearly formulated and well-adapted to the problem and the content."

To be serviceable, all category systems should be mutually exclusive, exhaustive, and reliable. A category system is mutually exclusive if a unit of analysis can be placed in one and only one category. If the researcher discovers that certain units fall simultaneously into two categories, then the definitions of those categories must be revised. For example, suppose researchers attempt to describe the ethnic makeup of prime-time television characters using the following category system: (1) African-American, (2) Jewish, (3) white, (4) Native American, and (5) other. Obviously, a Jewish person falls into two categories at once, thus violating the exclusivity rule. Or, to take another example, a researcher might start with these categories in an attempt to describe the types of programming on network television: (1) situation comedies, (2) children's shows, (3) movies, (4) documentaries, (5) action/adventure programs, (6) quiz and talk shows, and (7) general drama. This list might look acceptable at first glance, but a program such as "NYPD Blue" raises questions. Does it belong in the action/adventure category or in the general drama category? Definitions must be highly specific to ensure accurate categorization.

In addition to exclusivity, content analysis categories must have the property of exhaustivity: There must be an existing slot into which every unit of analysis can be placed. If investigators suddenly find a unit of analysis that does not logically fit into a predefined category, they have a problem with their category system. Taken as a whole, the category system should account for every unit of analysis. Achieving exhaustivity is usually not difficult in mass media content analysis. If one or two unusual instances are detected, they can be put into a category labeled "other" or "miscellaneous." (If too many items fall into this category, however, a reexamination of the original category definitions is called for; a study with 10% or more of its content in the "other" category is probably overlooking some relevant content characteristic.) An additional way to assure exhaustivity is to dichotomize or trichotomize the content: Attempts at problem solving might be defined as aggressive and nonaggressive, or statements might be placed in positive, neutral, and negative categories. The most practical way to determine whether a proposed categorization system is exhaustive is to pretest it on a sample of content. If unanticipated items appear, the original scheme requires changes before the primary analysis can begin.

The categorization system should also be reliable; that is, different coders should agree in the great majority of instances about the proper category for each unit of analysis. This agreement is usually quantified in content analysis and is called intercoder reliability. Precise category definitions generally increase reliability, whereas sloppily defined categories tend to lower it. Pretesting the category system for reliability is highly recommended before researchers begin to process the main body of content. Reliability is crucial in content analysis, as discussed in more detail later in this chapter.

Researchers may face the question of how many categories to include in constructing category systems. Common sense, pretesting, and practice with the coding system are valuable guides to aid the researcher in steering between the two extremes of developing a system with too few categories (so that essential differences are obscured) and defining too many categories (so that only a small percentage falls into each, thus limiting generalizations). As an illustration of too few categories, consider Wurtzel's (1975) study of programming on public access television. One of the preliminary categories was "informational," and the data indicated that more than 70% of the content fell into this classification. As a result, Wurtzel subdivided the category into seven informational headings (ethnic, community, health, consumer, and so on). An example of the opposite extreme is the attempt made by Dominick, Richman, and Wurtzel (1979) to describe the types of problems encountered by characters in prime-time television shows popular with children. They originally developed seven categories, including problems that dealt with romance, problems between friends, and other emotional problems arising out of relationships (with siblings, coworkers, or others). Preliminary analysis, however, indicated that only a small fraction of the problems fell into the "friendship" and "other emotional" slots. Consequently, these three categories were combined into a single classification labeled "problems dealing with romance, sentiment, and other emotions." As a general rule, many researchers suggest that too many initial categories are preferable to too few, since it is usually easier to combine several categories than it is to subdivide a large one after the units have been coded.

### Establishing a Quantification System

Quantification in content analysis can involve all four of the levels of data measurement discussed in Chapter 3, although usually only nominal, interval, and ratio data are used. At the nominal level, researchers simply count the frequency of occurrence of the units in each category. Thus Signorielli, McLeod, and Healy (1994) analyzed commercials on MTV and found that 6.5% of the male characters were coded as wearing somewhat sexy clothing and none were coded as being dressed in very sexy outfits; among the female characters, however, the corresponding percentages were 24% and 29%. The topics of conversation on daytime television, the themes of newspaper editorials, and the occupation of prime-time television characters can all be quantified by means of nominal measurement.

At the interval level, it is possible to develop scales for coders to use to rate certain attributes of characters or situations. For example, in a study dealing with the images of women in commercials, each character might be rated by coders on several scales like these:

Independent __ : __ : __ : __ : __ Dependent
Dominant __ : __ : __ : __ : __ Submissive

Scales such as these add depth and texture to a content analysis and are perhaps more interesting than the surface data obtained through nominal measurement. However, rating scales inject subjectivity into the analysis and may jeopardize intercoder reliability unless careful training is undertaken. Chang (1975), for example, constructed an interval scale based on the degree of movie critics' like or dislike of certain films.

At the ratio level, measurements in mass media research are generally applied to space and time. In the print media, column-inch measurements are used to analyze editorials, advertisements, and stories about particular events or phenomena. In television and radio, ratio-level measurements are made concerning time: the number of commercial minutes, the types of programs on the air, the amount of the program day devoted to programs of various types, and so on. Interval and ratio data permit the researcher to use some powerful statistical techniques. For example, Gurian (1993) counted the number of column inches of news coverage devoted to the 1988 presidential primaries and developed a regression equation (see Chapter 13) to explain variations in coverage.

### Training Coders and Doing a Pilot Study

Placing a unit of analysis into a content category is called coding. It is the most time-consuming and least glamorous part of a content analysis. Individuals who do the coding are called coders. The number of coders involved in a content analysis is typically small; a brief examination of a sampling of recent content analyses indicated that typically two to six coders are used.

Careful training of coders is an integral step in any content analysis and usually results in a more reliable analysis. Although the investigator may have a firm grasp of the operational definitions and the category schemes, coders may not share this close knowledge. Consequently, they must become thoroughly familiar with the study's mechanics and peculiarities. To this end, researchers should plan several lengthy training sessions in which sample content is examined and coded. These sessions are used to revise definitions, clarify category boundaries, and revamp coding sheets until the coders are comfortable with the materials and procedure. Detailed instruction sheets should also be provided to coders.

Next, a pilot study is done to check intercoder reliability. The pilot study should be conducted with a fresh set of coders who are given some initial training to impart familiarity with the instructions and the methods of the study. Some argue that fresh coders are preferred for this task because intercoder reliability (among coders who have worked for long periods of time developing the coding scheme) might be artificially high. As Lorr and McNair (1966, p. 133) suggest, "Interrater agreement for a new set of judges given a reasonable but practical amount of training . . . would represent a more realistic index of reliability."

### Coding the Content

To facilitate coding, standardized sheets are generally used. These sheets allow coders to classify the data by simply placing check marks or slashes in predetermined spaces. Figure 7.2 is an example of a standardized coding sheet, and Figure 7.3 is the coder instruction sheet that accompanies it. If data are to be tabulated by hand, the coding sheets should be constructed to allow for rapid tabulation. Some studies code data on 4-by-6-inch index cards, with information recorded across the top of the card. This enables researchers to quickly sort the information into categories. Templates are available to speed the measurement of newspaper space. Researchers who work with television generally videotape the programs and allow coders to stop and start the tape at their own pace while coding data.

When a computer is used in tabulating data, the data are usually transferred directly to a spreadsheet or data file or perhaps to mark-sense forms or optical scan sheets (answer sheets scored by computer). These forms save time and reduce data errors.

Computers are useful not only in the data-tabulation phase of a content analysis but also in the actual coding process. Computers perform with unerring accuracy any coding task in which the classification rules are unambiguous. Computers can do simple tasks rapidly, such as recognizing words or even syllables as they occur in a sample of text. Dyer, Miller, and Boone (1991), for example, instructed a computer to recognize the name "Exxon" whenever it appeared in wire service copy. Simonton (1990) used a computer to analyze 154 of Shakespeare's sonnets to detect what lexical choices were related to the aesthetic success of the sonnet. The computer recorded the number of words, the number of different words, and the unique words, and it categorized the imagery used. Only a few years ago, this approach was laborious and tiring because the material had to be input by hand into a computer. Recent developments in computer technology, however, have eased this problem. Many documents and publications in on-line databases such as Vu/Text or Nexis can be searched for key topics and phrases in a matter of seconds. This ease of searching comes with a price, however. As Kaufman, Dykers, and Caldwell (1993) discovered, an on-line content analysis conducted with Nexis and Vu/Text produced different results

Figure 7.2 *Standardized Coding Sheet for Studying TV Cartoons*

Character Description Code Sheet

Program name ______________________________

A. Character number ____________________

B. Character name or description ______________________________

| | | |
|---|---|---|
| C. Role | 1-Major | 3-Other (individual) |
| | 2-Minor | 4-Other (group) |
| D. Species | | |
| 1-Human | 4-Robot | 7-Other (specify): |
| 2-Animal | 5-Animated object | |
| 3-Monster/Ghost | 6-Indeterminate | ____________ |
| E. Sex | | |
| 1-Male  2-Female | 3-Indeterminate | 4-Mixed (group) |
| F. Race | | |
| 1-White | 4-Robot | 7-Other (specify): |
| 2-African-American | 5-Native American | |
| 3-Animal | 6-Indeterminate | ____________ |
| G. Age | | |
| 1-Child | 3-Adult | 5-Indeterminate |
| 2-Teenager | 4-Mature adult | 6-Mixed (group) |

from a conventional hand-count content analysis of the same sources.

Several software programs are available to aid researchers. Catpac, for example, is a content analysis program developed for those who study qualitative data—such as responses to open-ended questions, focus group transcripts, or text from a database. The program reads every word in a text file and detects patterns of word usage and association. WinMAX97 is a similar program whose data can be exported to statistical programs such as SPSS. The Observer Video-Pro is a program that aids in the computerized analysis of video material using predetermined codes for actors, behaviors, or events. A list of other available content analysis software can be found at *http://www.gsu.edu/~wwwcom/content/csoftware_menu.html* and others are listed in a search for "content analysis computers."

### Analyzing the Data

The descriptive statistics discussed in Chapters 11–13, such as percentages, means,

Figure 7.3 *Coder Instruction Sheet That Accompanies Form Shown in Figure 7.2*

**Character Description Code Sheet Instructions**

Code all characters that appear on the screen for at least 90 seconds and/or speak more than 15 words (include cartoon narrator when applicable). Complete one sheet for each character to be coded.

A. Character number, code two-digit program number first (listed on page 12 of this instruction book), followed by two-digit character number randomly assigned to each character (starting with 01).

B. Character name: list all formal names, nicknames, or dual identity names (code dual identity behavior as one character's actions). List description of character if name is not identifiable.

C. Role

1-*Major*: major characters share the majority of dialogue during the program, play the largest role in the dramatic action, and appear on the screen for the longest period of time during the program.

2-*Minor*: all codeable characters that are not identified as major characters.

3-*Other* (*individual*): one character that does not meet coding requirements but is involved in a behavioral act that is coded.

4-*Other* (*group*): two or more characters that are simultaneously involved in a behavioral act but do not meet coding requirements.

D. Species

1-*Human*: any character resembling man, even ghost or apparition if it appears in human form (e.g., the Ghostbusters)

2-*Animal*: any character resembling bird, fish, beast, or insect; may or may not be capable of human speech (e.g., muppets, smurfs, Teddy Ruxpin)

3-*Monster/Ghost*: any supernatural creature (e.g., my pet monster, ghosts)

4-*Robot*: mechanical creature (e.g., transformers)

5-*Animated object*: any inanimate object (e.g., car, telephone) that acts like a sentient being (speaks, thinks, etc.). Do not include objects that "speak" through programmed mechanical means (e.g., recorded voice playback through computer).

6-*Indeterminate*

7-*Other*: if species is mixed within group, code as mixed here and specify which of the species are represented.

| | | | |
|---|---|---|---|
| E. 1-Male | 2-Female | 3-Indeterminate: use this category sparingly (if animal has low masculine voice, code as male) | 4-Mixed (group only) |

*Note:* The remainder of the instructions continue in this format.

modes, and medians, are appropriate for content analysis. If hypothesis tests are planned, then common inferential statistics (whereby results are generalized to the population) are acceptable. The chi-square test is the most commonly used because content analysis data tend to be nominal in form; however, if the data meet the requirements of interval or ratio levels, then a *t*-test, ANOVA, or Pearson's *r* may be appropriate. Krippendorf (1980) discusses other statistical analyses, such as discriminant analysis, cluster analysis, and contextual analysis.

### Interpreting the Results

If an investigator is testing specific hypotheses concerning the relationships between variables, the interpretation will be fairly evident. If the study is descriptive, however, questions may arise about the meaning or importance of the results. Researchers are often faced with a "fully/only" dilemma. Suppose, for example, that a content analysis of children's television programs reveals that 30% of the commercials are for snacks and candy. What is the researcher to conclude? Is this a high amount or a low amount? Should the researcher report, "*Fully* 30% of the commercials fell into this category," or should the same percentage be presented as "*Only* 30% of the commercials fell into this category"? Clearly, the investigator needs some benchmark for comparison; 30% may indeed be a high figure when compared to commercials for other products or for those shown during adult programs.

In a study done by one of the authors, the amount of network news time devoted to the various states was tabulated. It was determined that California and New York receive 19% and 18%, respectively, of non-Washington, DC, national news coverage. By themselves, these numbers are interesting, but their significance is somewhat unclear. In an attempt to aid interpretation, each state's relative news time was compared to its population, and an "attention index" was created by subtracting the ratio of each state's population to the national population from its percentage of news coverage. This provided a listing of states that were either "overcovered" or "undercovered" (Dominick, 1977). To aid in their interpretation, Whitney, Fritzler, Jones, Mazzarella, and Rakow (1989) created a sophisticated "attention ratio" in their replication of this study.

## ▪ Reliability

The concept of reliability is crucial to content analysis. If a content analysis is to be objective, its measures and procedures must be reliable. A study is reliable when repeated measurement of the same material results in similar decisions or conclusions. Intercoder reliability refers to levels of agreement among independent coders who code the same content using the same coding instrument. If the results fail to achieve reliability, something is amiss with the coders, the coding instructions, the category definitions, the unit of analysis, or some combination of these. To achieve acceptable levels of reliability, the following steps are recommended:

1. *Define category boundaries with maximum detail.* A group of vague or ambiguously defined categories makes reliability extremely difficult to achieve. Coders should receive examples of units of analysis and a brief explanation of each to fully understand the procedure.
2. *Train the coders.* Before the data are collected, training sessions in using the coding instrument and the category system must be conducted. These sessions help eliminate methodological problems. During the sessions, the group as a whole should code sample material; afterward, they should discuss the results and the purpose of the study. Disagreements should be analyzed as they occur. The end result of the training ses-

sions is a "bible" of detailed instructions and coding examples, and each coder should receive a copy.

3. *Conduct a pilot study.* Researchers should select a subsample of the content universe under consideration and let independent coders categorize it. These data are useful for two reasons: Poorly defined categories can be detected, and chronically dissenting coders can be identified. To illustrate these problems, consider Tables 7.2 and 7.3.

In Table 7.2, the definitions for Categories I and IV appear to be satisfactory. All four coders placed Units 1, 3, 7, and 11 in the first category; in Category IV, Item 14 is classified consistently by three of the four coders and Items 4 and 9 by all four coders. The confusion apparently lies in the boundaries between Categories II and III. Three coders put Items 2, 6, and/or 13 in Category II, and three placed some or all of these numbers in Category III. The definitions of these two categories require reexamination and perhaps revision because of this ambiguity.

Table 7.3 illustrates the problem of the chronic dissenter. Although Coders A and B agree 7 of 8 times, Coders B and C agree only 2 of 8 times and Coders A and C agree only once. Obviously, Coder C is going to be a problem. As a rule, the investigator would carefully reexplain to this coder the rules used in categorization and examine the reasons for his or her consistent deviation. If the problem persists, it may be necessary to dismiss the coder from the analysis.

When the initial test of reliability yields satisfactory results, the main body of data is coded. After the coding is complete, it is recommended that a subsample of the data, probably between 10% and 25%, be reanalyzed by independent coders to calculate an overall intercoder reliability coefficient. Lacy and Riffe (1996) note that a reliability check based on a probability sample may contain sampling error. They present a formula for calculating the size of the intercoder reliability sample that takes this error into account.

Intercoder reliability can be calculated by several methods. Holsti (1969) reports this formula for determining the reliability of nominal data in terms of percentage of agreement:

$$\text{Reliability} = \frac{2M}{N_1 + N_2}$$

where $M$ is the number of coding decisions on which two coders agree, and $N_1$ and $N_2$ are the total number of coding decisions by the first and second coder, respectively. Thus,

Table 7.2 *Detecting Poorly Defined Categories from Pilot Study Data**

| | Categories | | | |
|---|---|---|---|---|
| Coders | I | II | III | IV |
| A | 1,3,7,11 | 2,5,6,8,12,13 | 10 | 4,9,14 |
| B | 1,3,7,11 | 5,8,10,12 | 2,6,13 | 4,9,14 |
| C | 1,3,7,11 | 2,8,12,13 | 5,6,10 | 4,9,14 |
| D | 1,3,7,11 | 5,6 | 2,8,10,12,13,14 | 4,9 |

*Arabic numerals refer to items.

Table 7.3 *Identifying a Chronic Dissenter from Pilot Study Data**

| Items | Coders A | Coders B | Coders C |
|---|---|---|---|
| 1 | I | I | II |
| 2 | III | III | I |
| 3 | II | II | II |
| 4 | IV | IV | III |
| 5 | I | II | II |
| 6 | IV | IV | I |
| 7 | I | I | III |
| 8 | II | II | I |

*Roman numerals refer to categories.

if two coders judge a subsample of 50 units and agree on 35 of them, the calculation is

$$\text{Reliability} = \frac{2(35)}{50 + 50} = .70$$

This method is straightforward and easy to apply, but it is criticized because it does not take into account some coder agreement that occurs strictly by chance, an amount that is a function of the number of categories in the analysis. For example, a two-category system has 50% reliability simply by chance, a five-category system generates a 20% agreement by chance, and so on. To take this into account, Scott (1955) developed the *pi* index, which corrects for the number of categories used and also for the probable frequency of use:

$$\text{Reliability} = \frac{\begin{matrix}\text{\% observed} \\ \text{agreement}\end{matrix} - \begin{matrix}\text{\% expected} \\ \text{agreement}\end{matrix}}{1 - \text{\% expected agreement}}$$

A hypothetical example demonstrates the use of this index. Suppose that two coders are assigning magazine advertisements to the five categories shown and obtain the following matrix of agreement:

| | Categories | Coder A 1 | 2 | 3 | 4 | 5 | Marginal Totals |
|---|---|---|---|---|---|---|---|
| | 1 | 42 | 2 | 1 | 3 | 0 | 48 |
| | 2 | 1 | 12 | 2 | 0 | 0 | 15 |
| Coder B | 3 | 0 | 0 | 10 | 0 | 2 | 12 |
| | 4 | 0 | 2 | 1 | 8 | 1 | 12 |
| | 5 | 2 | 0 | 1 | 2 | 8 | 13 |
| Marginal Totals | | 45 | 16 | 15 | 13 | 11 | 100 |

The percentage of observed agreement is found by adding the numbers in the diagonals (42 + 12 + 10 + 8 + 8 = 80) and dividing by $N$ (80/100 = .80). The percentage of agreement expected by chance is a little more complicated. It is found by multiplying the marginal totals for each cell of the diagonal, dividing by the total $N$, summing across the cells, and converting the result to a percentage. For example, for the cell in row 1 and column 1: $45 \times 48/100 = 21.6$, or .216. For the cell in row 2 and column 2: $16 \times 15/100 = 2.4$, or .024, and so on for all the five cells along the diagonal of the matrix. This calculation yields an expected proportion of .288. Now we can calculate Scott's pi:

$$\text{Reliability} = \frac{.80 - .288}{1 - .288} = .719$$

This same technique can be used to calculate reliability when there are more than two coders. In this instance, the statistic is called Cohen's kappa (Cohen, 1960; Fleiss, 1971), and the formula is slightly modified:

$$\text{Kappa} = \frac{\text{\% observed} - \text{\% expected}}{N \times M - \text{\% expected}}$$

where $N$ is the total number of objects coded and $M$ is the number of coders.

Table 7.4 *False Equivalence As a Reliability Measure When r Is Used*

| Situation I | | | Situation II | | |
|---|---|---|---|---|---|
| Items | Coder 1 | Coder 2 | Items | Coder 1 | Coder 2 |
| 1 | 1 | 1 | 1 | 1 | 4 |
| 2 | 2 | 2 | 2 | 2 | 5 |
| 3 | 3 | 3 | 3 | 3 | 6 |
| 4 | 3 | 3 | 4 | 3 | 6 |
| 5 | 4 | 4 | 5 | 4 | 7 |
| 6 | 5 | 5 | 6 | 5 | 8 |
| 7 | 6 | 6 | 7 | 6 | 9 |
| 8 | 6 | 6 | 8 | 6 | 9 |
| 9 | 7 | 7 | 9 | 7 | 10 |
| 10 | 7 | 7 | 10 | 7 | 10 |
| | $r = 1.00$ | | | $r = 1.00$ | |

Estimating reliability with interval data requires care. Several studies have used the correlation method called the Pearson $r$, a method that investigates the relationship between two items. The Pearson $r$ can range from $-1.00$ to $+1.00$. In estimates of reliability in content analysis, however, if this measure has a high value, it may indicate either that the coders were in agreement or that their ratings were associated in some systematic manner.

For example, suppose an interval scale ranging from 1 to 10 is used to score the degree of favorableness of a news item to some person or topic. (A score of 1 represents very positive; 10 represents very negative.) Assume that two coders are independently scoring the same 10 items. Table 7.4 shows two possible outcomes. In Situation I, the coders agree on every item, and $r$ equals 1.00. In Situation II, the coders disagree on every item by three scale positions, yet $r$ still equals 1.00. Clearly, the uses of this estimate are not equally reliable in the two situations.

Krippendorf (1980) circumvents this dilemma by presenting what might be termed an "all-purpose reliability measure," *alpha*, which can be used for nominal, ordinal, interval, and ratio scales and for more than one coder. Though somewhat difficult to calculate, alpha is the equivalent of Scott's *pi* at the nominal level with two coders and represents an improvement over $r$ in the interval situation.

What is an acceptable level of intercoder reliability? The answer depends on the research context and the type of information coded. In some instances, little coder judgment is needed to place units into categories (for example, counting the number of words per sentence in a newspaper story or tabulating the number of times a network correspondent contributes a story to the evening news), and coding becomes a mechanical or clerical task. In this case, one expects a fairly high degree of reliability, perhaps approaching 100%, since coder disagreements probably result from only carelessness or fatigue. If a certain amount of interpretation is involved, however, reliability estimates are typically lower. In general, the greater the amount of judgmental leeway given to coders, the lower the reliability coefficients are. As a rule of thumb, most published content analyses typically report a minimum reliability coefficient of about 90% or above when using Holsti's formula, and about .75 or above when using *pi* or *alpha*.

Note that the previous discussion assumed that at least two independent coders categorized the same content. In some situations, however, *intracoder* reliability also might be assessed. These circumstances occur most frequently when only a few coders are used because extensive training must be given to ensure the detection of subtle message elements. To test intracoder reliability, the same individual codes a set of data twice, at different times, and the reliability statistics are computed using the two sets of results.

## ▪ Validity

In addition to being reliable, a content analysis must yield valid results. As indicated in Chapter 3, *validity* is usually defined as the degree to which an instrument actually measures what it sets out to measure. This raises special concerns in content analysis. In the first place, validity is intimately connected with the procedures used in the analysis. If the sampling design is faulty, if categories overlap, or if reliability is low, the results of the study probably possess little validity. Additionally, the adequacy of the definitions used in a content analysis bears directly on the question of validity. For example, a great deal of content analysis has focused on the depiction of televised violence; different investigators have offered different definitions of what constitutes a violent act. The question of validity emerges when one tries to decide whether each of the various definitions actually encompasses what one might logically refer to as violence. The debate between Gerbner and the television networks vividly illustrates this problem. The definition of violence propounded by Gerbner and his associates in 1977 included accidents, acts of nature, or violence that might occur in a fantasy or a humorous setting. However, network analysts do not consider these phenomena to be acts of violence (Blank, 1977). Both Gerbner and the networks offered arguments in support of their decisions. Which analysis is more valid? The answer depends in part on the plausibility of the rationale that underlies the definitions.

This discussion relates closely to a technique traditionally called *face validity*. This validation technique assumes that an instrument adequately measures what it purports to measure if the categories are rigidly and satisfactorily defined and if the procedures of the analysis have been adequately conducted. Most descriptive content analyses rely on face validity, but other techniques are available.

The use of *concurrent validity* in content analysis is exemplified in a study by Clarke and Blankenburg (1972). These investigators attempted a longitudinal study of violence in TV shows dating back to 1952. Unfortunately, few copies of the early programs were available, and the authors were forced to use program summaries in *TV Guide*. To establish that such summaries would indeed disclose the presence of violence, the authors compared the results of a subsample of current programs coded from these synopses to the results obtained from a direct viewing of the same programs. The results were sufficiently related to convince the authors that their measurement technique was valid. However, this method of checking validity is only as good as the criterion measurement: If the direct-viewing technique is itself invalid, then

Table 7.5 *Summaries of Content Analysis Studies*

| Researcher(s) | Purpose of Study | Sample | Units of Analysis | Representative Categories | Statistics |
|---|---|---|---|---|---|
| Kahn and Goldberg (1991) | To examine differences in coverage of male and female U.S. Senate candidates | Newspaper coverage of 26 Senate races in 17 states | Any item mentioning either candidate | Paragraphs of coverage per candidate, type of coverage | *t*-tests |
| Molitor and Sapolsky (1993) | To examine violence and victimization in "slasher" films | 10 most successful "slasher" films in 1980, 1985, and 1989 | Violent, sexually violent, or sexual behavior | Violence outcome, duration of fear, subjective camera shots | *F*-test |
| Olson (1994) | To describe health issues in daytime serials | 105 hours of network daytime soap opera programming in 1989–1990 | Scenes containing explicit or implicit sexual behavior | Suggestiveness, erotic touching, aggressive sexual contact | Percentages |
| Reid, King, and Kreshel (1995) | To describe portrayals of Black and White models in cigarette and alcohol ads | Cigarette and alcohol ads published in 11 consumer magazines during one year | All 1/2-page or larger cigarette or alcohol ads | Ad themes, activity of models | Percentages, $\chi^2$ |

there is little value in showing that synopsis coding is related to it.

Only a few studies have attempted to document *construct validity*. One instance involves the use of sensationalism in news stories. This construct has been measured by semantic differentials and factor analysis in an attempt to isolate its underlying dimensions, and it is related to relevant message characteristics (Tannenbaum, 1962; Tannenbaum & Lynch, 1960). Another technique that investigators occasionally use is *predictive validity*. For example, certain content attributes from wire stories might allow a researcher to predict which items a newspaper will carry.

In summary, several different methods are used in content analysis to assess validity. The most common is face validity, which is appropriate for some studies. It is recommended, however, that the content analyst also examine other methods to establish the validity of a given study.

## ▪ Examples of Content Analysis

Table 7.5, which summarizes four content analyses, lists the purpose of the analysis, the sample, the unit of analysis, illustrative categories, and the type of statistic used for each study.

## ▪ ▪ ▪ Summary

Content analysis is a popular technique in mass media research. Many of the steps followed in laboratory and survey studies are also involved in content analysis; in particular, sampling procedures need to be objective and detailed, and operational definitions are mandatory.

Coders must be carefully trained to gather accurate data. Interpreting a content analysis, however, requires more caution: No claims about the impact of the content can be drawn from an analysis of the message in the absence of a study that examines the audience. A content analysis should demonstrate acceptable intercoder reliability and validity.

### Questions and Problems for Further Investigation

1. Define a unit of analysis that could be used in each of these content analyses:
   a. Problem solving on television
   b. News emphasis in a daily newspaper and a weekly newspaper
   c. Changes in the values expressed by popular songs
   d. The role of women in editorial cartoons
   e. Content of personal web pages on the Internet
2. Using the topics in question 1, define a sample selection procedure appropriate for each.
3. Generate two content analyses that could be used as preliminary tests for an audience study.
4. Conduct a brief content analysis of one of the topics listed next. (Train a second individual in the use of the category system that you develop, and have this person independently code a subsample of the content.)

   Similarities and differences between local newscasts on two television stations

   Changes in the subject matter of movies from 1990 to 1998

   The treatment of the elderly on network television
5. Using the topic you selected in question 4, compute a reliability coefficient for the items that were scored by both coders.
6. If you are using *InfoTrac College Edition*, conduct a search for articles that examined violent content on television. What operational definition of "violence" was used by each researcher? Were they similar?

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# Chapter 8

# Survey Research

- Descriptive and Analytical Surveys
- Advantages and Disadvantages of Survey Research
- Constructing Questions
- Questionnaire Design
- Pretesting
- Gathering Survey Data
- Achieving a Reasonable Response Rate
- General Problems in Survey Research

Summary

Questions and Problems for Further Investigation

References and Suggested Readings

Audience and consumer surveys are now commonplace in all areas of life. This is immediately evident by searching the Internet for "audience surveys" or "consumer surveys." Decision makers in businesses, consumer and activist groups, politics, and the media use survey results as part of their daily routine. The increased use of surveys has created changes in the way they are conducted and reported. More attention is now given to sample selection, questionnaire design, and error rates. This means that surveys require careful planning and execution; mass media studies using survey research must take into account a wide variety of decisions and problems. This chapter is designed to acquaint the beginning researcher with the basic steps of survey methodology. For additional information, search the Internet for "survey methods."

## Descriptive and Analytical Surveys

Researchers use at least two major types of surveys: descriptive and analytical. A descriptive survey attempts to picture or document current conditions or attitudes—that is, to describe what exists at the moment. For example, the Department of Labor regularly conducts surveys on the rate of unemployment in the United States. Professional pollsters survey the electorate to learn its opinions of candidates or issues. Broadcast stations and networks continually survey their audiences to determine programming tastes, changing values, and lifestyle variations that might affect programming. In descriptive surveys of this type, researchers are interested in discovering the current situation in a given area.

Analytical surveys attempt to describe and explain why certain situations exist. In this approach, two or more variables are usually examined to test research hypotheses. The results allow researchers to examine the interrelationships among variables and to draw explanatory inferences. For example, television station owners survey the market to determine how lifestyles affect viewing habits or to determine whether viewers' lifestyles can be used to predict the success of syndicated programming. On a broader scale, television networks conduct yearly surveys to determine how the public's tastes and desires are changing and how these attitudes relate to viewers' perceptions of the three commercial networks.

## Advantages and Disadvantages of Survey Research

Surveys have certain well-defined advantages. First, they can be used to investigate problems in realistic settings. Newspaper reading, television viewing, and consumer behavior patterns can be examined where they happen rather than in a laboratory or screening room under artificial conditions.

Second, the cost of surveys is reasonable considering the amount of information gathered. In addition, researchers can control expenses by selecting from four major types of surveys: mail, telephone, personal interview, and group administration.

A third advantage is that a large amount of data can be collected with relative ease from a variety of people. The survey technique allows researchers to examine many variables (demographic and lifestyle information, attitudes, motives, intentions, and so on) and to use multivariate statistics to analyze the data. Also, geographic boundaries do not limit most surveys.

Finally, data helpful to survey research already exist. Data archives, government documents, census materials, radio and television rating books, and voter registration lists can be used as *primary* sources (main sources of data) or as *secondary* sources (supportive data) of information. With archive data, it is possible to conduct an entire survey study without ever developing a questionnaire or contacting a single respondent.

Survey research, however, is not a perfect research methodology. The first and most important disadvantage is that independent variables cannot be manipulated the way they are in laboratory experiments. Without control over independent variables, the researcher cannot be certain whether the relationships between independent variables and dependent variables are causal or noncausal. That is, a survey may establish that *A* and *B* are related, but it is impossible to determine solely from the survey results that *A* causes *B*. Causality is difficult to establish because many intervening and extraneous variables are involved. Time series studies can sometimes help correct this problem.

A second disadvantage is that inappropriate wording or placement of questions within a questionnaire can bias results. The questions must be worded and placed unambiguously to elicit the desired information. This problem is discussed later in the chapter.

A third disadvantage of survey research, especially in telephone studies, is the potential problem of talking to the wrong people. For example, a respondent may claim to be 18 to 24 years old but may in fact be well over 30 years old.

Finally, some survey research is becoming difficult to conduct. This is especially true with telephone surveys, where answering machines and respondents unwilling to participate are lowering the incidence rates. Telemarketers (telephone salespeople) are destroying mass media research; more and more people refuse to participate in legitimate studies for fear of attempts by the interviewer to try to sell something.

Despite these problems, however, surveys can produce reliable and useful information. They are especially useful for collecting information on audiences and readership.

## ▪ Constructing Questions

There are two basic considerations in the construction of good survey questions: (1) the questions must clearly and unambiguously communicate the desired information to the respondent; and (2) the questions should be worded to allow accurate transmission of respondents' answers to researchers.

Questionnaire design depends on the choice of data collection technique. Questions written for a mail survey must be easy to read and understand because respondents are unable to obtain explanations. Telephone surveys cannot use questions with long lists of response options; the respondent may forget the first few responses by the time the last ones are read. Questions written for group administration must be concise and easy for the respondents to answer. In a personal interview, an interviewer must tread lightly with sensitive and personal questions because his or her physical presence might make the respondent less willing to answer. (These procedures are discussed in greater detail later in this chapter.)

The design of a questionnaire must always reflect the basic purpose of the research. A complex research topic such as media use during a political campaign requires more detailed questions than does a survey to determine a favorite radio station or magazine. Nonetheless, there are several general guidelines to follow regarding wording of questions and question order and length. In addition, search the Internet for "constructing questions" for numerous examples and software programs about the topic.

### *Types of Questions*

Surveys can consist of two basic types of questions: open-ended and closed-ended. An **open-ended question** requires respondents to generate their own answers. Here is an example:

> What could your favorite radio station change so that you would listen more often?
>
> ______________________________
>
> ______________________________
>
> What type of television program do you prefer to watch?
>
> ______________________________
>
> ______________________________
>
> Why do you subscribe to the *Daily Record?*
>
> ______________________________
>
> ______________________________

Open-ended questions give respondents freedom in answering questions and an opportunity to provide in-depth responses. Furthermore, they give researchers the opportunity to ask, "Why did you say that?" or "Could you explain your answer in more detail?" The flexibility to follow up on, or probe, certain questions enables the interviewers to gather information about the respondents' feelings and the motives behind their answers.

Also, open-ended questions allow for answers that researchers did not foresee in designing the questionnaire—answers that may suggest possible relationships with other answers or variables. For example, in response to the question, "Which radio stations do you have programmed on the buttons in the vehicle you drive most often?" the manager of a local radio station might expect to receive a list of the local radio stations. However, a subject may give an unexpected response, such as, "I have no idea. I thought the stations were programmed by the car dealer." This forces the manager to reconsider his or her perceptions of radio listeners.

Finally, open-ended questions are particularly useful in a pilot version of a study. Researchers may not know what types of responses to expect from subjects, so open-ended questions are used to allow subjects to answer in any way they wish. From the list of responses provided by the subjects, the researcher may select the most often mentioned items and include them in multiple-choice or forced-choice questions. Using open-ended questions in a pilot study generally saves time and resources, since all possible responses are more likely to be included on the final measurement instrument, avoiding the need to reconduct the analysis.

The major disadvantage associated with open-ended questions is the amount of time needed to collect and analyze the responses. Open-ended responses require that interviewers spend time writing down answers. In addition, because there are so many types of responses, a content analysis of each open-ended question must be completed to produce data that can be tabulated (see Chapter 7). A content analysis groups common responses into categories, essentially making the question closed-ended. The content analysis results are then used to produce a codebook to code the open-ended responses. A codebook is a menu or list of quantified responses. For example, "I hate television" may be coded as a 5 for input into the computer.

In the case of **closed-ended questions**, respondents select an answer from a list provided by the researcher. These questions are popular because they provide greater uniformity of response and the answers are easily quantified. The major disadvantage is that researchers often fail to include some important responses. Respondents may have an answer different from those that are supplied. One way to solve the problem is to include an "Other" response followed by a blank space to give respondents an opportunity to supply their own answer. The "Other" responses are then handled just like an open-ended question; a content analysis of the responses is completed to develop a codebook. A pilot study or pretest of a questionnaire usually solves most problems with closed-ended questions.

***Problems in Interpreting Open-ended Questions.*** Open-ended questions often cause a great deal of frustration. In many cases, respondents' answers are bizarre. Sometimes respondents do not understand a question and provide answers that are not relevant to anything. Sometimes interviewers have difficulty understanding respondents, or they may have problems spelling what the respondents say. In these cases, researchers must interpret the answers and determine which code is appropriate.

The following examples are actual comments (called "verbatims") from telephone surveys and self-administered surveys conducted by the senior author. They show that even the best-planned survey questionnaire can produce a wide range of responses. The survey question asked, "How do you describe the programming on your favorite radio station?"

- The station is OK, but it's geared to Jerry Atrics.
- I only listen to the station because my poodle likes it.
- It sounds like it is run by people who don't know what they're doing.
- I don't listen to that station because I live on Chinese time.
- It's great. It has the best floormat in the city.
- The station is good, but sometimes it makes me want to vomit.
- It's my favorite, but I really don't like it since my mother does.
- My parrot is just learning to talk, and the station teaches him a lot of words.
- My kids hate it, so I turn it up real loud.
- It sounds great with my car trunk open.
- There is no way for me to answer that question before I eat dinner.

And then there was a woman who, when asked what her spouse does for a living, wrote "Arrow Space Engeneer." Research is not always easy to conduct, especially when trying to decipher comments made by respondents.

## General Guidelines

Before we examine specific types of questions appropriate in survey research, here are some general dos and don'ts about writing questions:

1. *Make questions clear.* This should go without saying, but many researchers become so closely associated with a problem that they can no longer put themselves in the respondents' position. What might be perfectly clear to researchers might not be nearly so clear to persons answering the question. For example, after finding out which radio stations a respondent has been listening to more lately, the researcher might ask, "Why have you been listening to WXXX more lately?" and expect to receive an answer such as "I like the music a lot more." But the respondents might say, "It's the only station my radio can pick up." The question would be much clearer to a respondent if asked in this form: "Which radio station, or stations, if any, do you *enjoy* listening to more lately as

compared to a few months ago?" Questionnaire items must be phrased precisely so that respondents know what is being asked.

Making questions clear also requires avoiding difficult or specialized words, acronyms, and stilted language. In general, the level of vocabulary commonly found in newspapers or popular magazines is appropriate for a survey. Questions should be phrased in everyday speech, and social science jargon and technical words should be eliminated. For example, "If you didn't have a premium channel, would you consider PPV?" might be better phrased, "If you didn't have a pay channel like *Home Box Office* or *Showtime,* would you consider a service where you pay a small amount for individual movies or specials you watch?"

The item "Should the city council approve the construction of an interactive cable TV system?" assumes that respondents know what "interactive cable TV systems" are. A preferable option is "An interactive cable television system is one in which viewers can send messages back to the cable company as well as receive normal television. Do you think the city council should approve such a system for this community?"

The clarity of a questionnaire item can be affected by double or hidden meanings in the words that are not apparent to investigators. For example, the question "How many television shows do you think are a little too violent—most, some, few, or none?" contains such a problem. Some respondents who feel that all TV shows are extremely violent will answer "none" based on the question's wording. These subjects reason that all shows are more than "a little too violent"; therefore the most appropriate answer to the question is "none." (Deleting the phrase "a little" from the question helps avoid this pitfall.) In addition, the question inadvertently establishes the idea that at least some shows are violent. The question should read, "How many television shows, if any, do you think are too violent—most, some, few, or none?" Questions should be written so they are fair to all types of respondents.

2. *Keep questions short.* To be precise and unambiguous, researchers sometimes write long and complicated questions. Yet respondents who are in a hurry to complete a questionnaire are unlikely to take the time to figure out the precise intent of the person who drafted the items. Short, concise items that will not be misunderstood are best. A good question should not contain more than two short sentences.

3. *Remember the purposes of the research.* It is important to include in a questionnaire only items that relate directly to what is being studied. For example, if the occupational level of the respondents is not relevant to the purpose of the survey, the questionnaire should not ask about it. Beginning researchers often add questions for the sake of developing a longer questionnaire, or because the information "will be interesting to find out."

4. *Do not ask double-barreled questions.* A **double-barreled question** is one that asks two or more questions in the same sentence. Whenever the word *and* appears in a question, the sentence structure should be examined to see whether more than one question is being asked. Consider "The ABC network has programs that are funny and sexually explicit. Do you agree or disagree?" Since a program may be funny but not necessarily sexually explicit, a respondent could agree with the second part of the question even though he or she disagrees with the first part. This question should be divided into two items.

5. *Avoid biased words or terms.* Consider the following item: "In your free time, would you rather read a book or just watch television?" The word *just* in this example injects a pro-book bias into the question because it implies that there is something less desirable about watching television. In like manner, "Where did you hear the news about the

president's new economic program?" is mildly biased against newspapers; the word *hear* suggests that "radio," "television," or "other people" is a more appropriate answer. Items that start with "Do you agree or disagree with so-and-so's proposal to . . . " almost always bias a question. If the name "Adolf Hitler" is inserted for "so-and-so," the item becomes overwhelmingly negative. Inserting "the president" creates a potential for both positive bias and negative bias. Any time a specific person or source is mentioned in a question, the possibility of bias arises.

6. *Avoid leading questions.* A leading question is one that suggests a certain response (either literally or by implication) or contains a hidden premise. For example, "Like most Americans, do you read a newspaper every day?" suggests that the respondent should answer in the affirmative or run the risk of being unlike most Americans. The question "Do you still use marijuana?" contains a hidden premise. This type of question is called a *double bind:* Regardless of how the respondent answers, an affirmative response to the hidden premise is implied—in this case, that he or she has used marijuana at some point.

7. *Do not use questions that ask for highly detailed information.* The question "In the past 30 days, how many hours of television have you viewed with your family?" is unrealistic. Few respondents could answer it. A more realistic approach is to ask, "How many hours did you spend watching television with your family yesterday?" A researcher interested in a 30-day period should ask respondents to keep a log or diary of family viewing habits.

8. *Avoid potentially embarrassing questions unless they are absolutely necessary.* Most surveys need to collect data of a confidential or personal nature, but an overly personal question may cause embarrassment and inhibit respondents from answering honestly. One common area with high potential for embarrassment is income. Many individuals are reluctant to tell their income to strangers doing a survey. A straightforward "What is your annual income?" often prompts the reply "None of your business." It is more prudent to preface a reading of the following list with the question, "Which of these categories includes your household's total annual income?"

_____ More than $50,000
_____ $25,000–$50,000
_____ $20,000–$24,999
_____ $15,000–$19,999
_____ $10,000–$14,999
_____ Under $10,000

The categories are broad enough to allow respondents some privacy, but narrow enough for statistical analysis. Moreover, the bottom category, "Under $10,000," is artificially low so that individuals who fall into the $10,000–$14,999 slot will not be embarrassed by giving the lowest choice. (In 1997, the average household income in the United States was $18,100.) The income classifications depend on the purpose of the questionnaire and the geographic and demographic distribution of the subjects. The $50,000 upper level in the example is much too low in several parts of the country.

Other potentially sensitive areas are people's sex lives, drug use, religion, business practices, and trustworthiness. In all these areas, care should be taken to ensure respondents' confidentiality and anonymity, when possible.

The simplest type of closed-ended question is one that provides a *dichotomous response,* usually "agree/disagree" or "yes/no." For example:

Local television stations should have longer weather reports in the late evening news.

_____ Agree
_____ Disagree
_____ No opinion

Although such questions provide little sensitivity to different degrees of conviction, they are the easiest to tabulate of all question forms. Whether they provide enough sensitivity or information about the purpose of the research project are questions the researcher must seriously consider.

The *multiple-choice question* allows respondents to choose an answer from several options. Here is an example:

In general, television commercials tell the truth . . .

_____ All of the time
_____ Most of the time
_____ Some of the time
_____ Rarely
_____ Never

Multiple-choice questions should include all possible responses. A question that excludes any significant response usually creates problems. For example:

What is your favorite television network?

_____ ABC
_____ CBS
_____ NBC

Subjects who prefer PBS, Turner, UPN, WB, Fox, or any other network cannot answer the question as presented.

Additionally, multiple-choice responses must be mutually exclusive: There should be only one response option per question for each respondent. For instance:

How many years have you been working in the newspaper industry?

_____ Less than 1 year
_____ 1–5 years
_____ 5–10 years

Which blank would a person with exactly 5 years of experience check? One way to correct this problem is to reword the responses, such as in the following item:

How many years have you been working in the newspaper industry?

_____ Less than 1 year
_____ Between 1 and 5 years
_____ More than 5 years

*Rating scales* are also used widely in mass media research (see Chapter 3). They can be arranged horizontally or vertically:

There are too many commercials on TV.

| | |
|---|---|
| _____ Strongly agree | (coded as a 5 for analysis) |
| _____ Agree | (coded as a 4) |
| _____ Neutral | (coded as a 3) |
| _____ Disagree | (coded as a 2) |
| _____ Strongly disagree | (coded as a 1) |

What is your opinion of the local news on Channel 9?

Fair ____ ____ ____ ____ ____ Unfair
(5) (4) (3) (2) (1)

*Semantic differential scales* are another form of rating scale frequently used to rate persons, concepts, or objects (see Chapter 3).

These scales use bipolar adjectives with seven scale points:

How do you perceive the term *public television?*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Uninteresting | ____ | ____ | ____ | ____ | ____ | ____ | ____ | Interesting |
| Good | ____ | ____ | ____ | ____ | ____ | ____ | ____ | Bad |
| Dull | ____ | ____ | ____ | ____ | ____ | ____ | ____ | Exciting |
| Happy | ____ | ____ | ____ | ____ | ____ | ____ | ____ | Sad |

Researchers are often interested in the relative perception of several concepts or items. In such cases, the *rank-ordering* technique is appropriate:

Here are several common occupations. Please rank them in terms of their prestige. Put a 1 next to the profession that has the most prestige, a 2 next to the one with the second most, and so on.

____ Newspaper reporter
____ Banker
____ Dentist
____ Lawyer
____ Police officer
____ Politician
____ Newspaper writer
____ Teacher
____ Television news reporter

Asking respondents to rank more than a dozen objects is not recommended because the process can become tedious and the discriminations exceedingly fine. Furthermore, ranking data imposes limitations on the statistical analysis that can be performed.

The **checklist question** is often used in pilot studies to refine questions for the final project. For example:

What things do you look for in a new television set? (Check as many as apply.)

____ Automatic fine-tuning
____ Picture within a picture (the ability to view more than one channel at a time)
____ Remote control
____ Cable ready
____ Portable
____ Stereo sound
____ Other

In this case, the most frequently checked answers may be used to develop a multiple-choice question; the unchecked responses are dropped.

**Forced-choice questions** are frequently used in media studies designed to gather information about lifestyles, and they are always listed in pairs. Forced-choice questionnaires are usually very long—sometimes containing dozens of questions—and repeat questions (in a different form) on the same topic. The answers for each topic are analyzed for patterns, and a respondent's interest in that topic is scored. A typical forced-choice questionnaire might contain the following pairs:

Select one statement from each of the following pairs of statements:

____ Advertising of any kind is a waste of time and money.
____ I learn a lot from all types of advertising.

_____ The government should regulate television program content.

_____ The government should not regulate television program content.

_____ I listen to the radio every day.

_____ I only listen to the radio when I'm alone.

Respondents generally complain that neither of the responses to a forced-choice question is satisfactory, but they have to select one or the other. From a series of questions on the same topic (violence, lifestyles, career goals), a pattern of behavior or attitude usually develops.

*Fill-in-the-blank* questions are used infrequently by survey researchers; however, some studies are particularly suited for them. In advertising copy testing, for example, they are often used to test subjects' recall of a commercial. After seeing, hearing, or reading a commercial, subjects receive a script of the commercial in which a number of words have been randomly omitted (often every fifth or seventh word). Subjects are required to fill in the missing words to complete the commercial. Fill-in-the-blank questions also can be used in information tests—for example, "The local news anchors on Channel 4 are _____" or "The headline story on the front page was about _____."

Tables, graphs, and figures are also used in survey research. Some ingenious questioning devices have been developed to help respondents more accurately describe how they think and feel. For example, the University of Michigan Survey Research Center developed the **feeling thermometer,** with which subjects can rate an idea or object. The thermometer, which is patterned after a normal mercury thermometer, offers an easy way for respondents to rate their degree of like or dislike in terms of "hot" or "cold" (see Figure 8.1). For example:

> How would you rate the coverage your local newspaper provided on the recent school board campaign? (Place an X near the number on the thermometer that most accurately reflects your feelings; 100 indicates strong approval, and 0 reflects strong disapproval.)

For other examples of the use of the "feeling thermometer," search the Internet. Note the diverse use of the procedure.

Some questionnaires designed for children use other methods to collect information. Since young children have difficulty assigning numbers to values, one logical alternative is to use pictures. For example, the interviewer might read the question "How do you feel about Saturday morning cartoons on television?" and present the faces in Figure 8.2 to elicit a response from a 5-year-old. Zillmann and Bryant (1975) present a similar approach with their "Yucky" scale.

## ▪ Questionnaire Design

The approach used in asking questions as well as the physical appearance (in a self-administered questionnaire) can affect the response rate. Time and effort invested in developing a good questionnaire always pay off with more usable data. The following section offers some useful suggestions. [*Note:* Many of the suggestions about questionnaire design and layout discussed here are intended for paper questionnaires, not CATI (**computer-aided telephone interviewing**), which precludes problems such as skip patterns and rotation of questions. However, all researchers must understand all of the idiosyncrasies of questionnaire design in order to work with paper questionnaires or review a CATI-designed questionnaire.]

### Introduction

One way to increase the response rate in any survey is to prepare a persuasive introduction

Figure 8.1 *A "Feeling Thermometer" for Recording a Subject's Degree of Like or Dislike*

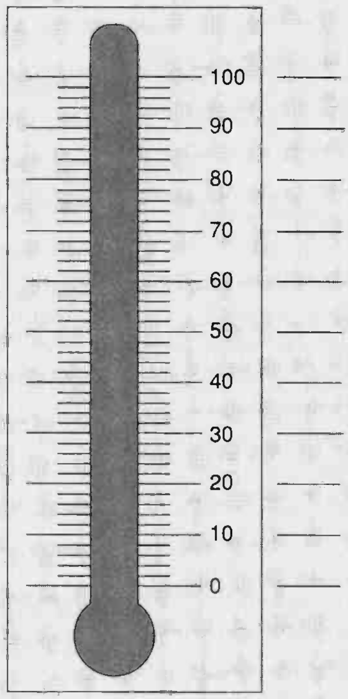
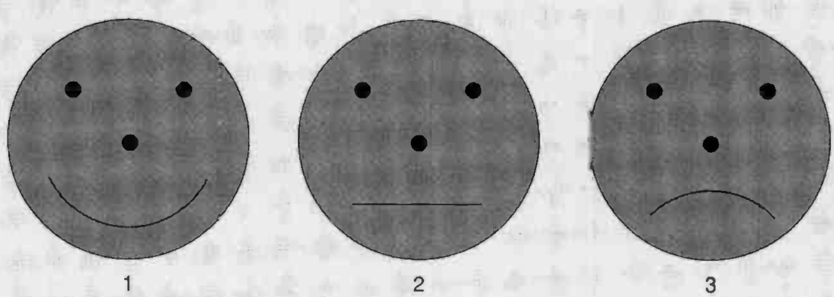



Figure 8.2 *A Simple Picture Scale for Use with Young Children*



to the survey. Backstrom and Hursh-Cesar (1986) suggest six characteristics of a successful introduction to a questionnaire; namely, the introduction should be short, realistically worded, nonthreatening, serious, neutral, and pleasant but firm.

Generally speaking, there is no need to explain the purpose or value of a survey to respondents, or to tell them how long the survey will take to complete. In a telephone survey, telling the respondents that "the survey will take only a few minutes" gives them the opportunity to say they do not have that long to talk. The introduction should be short so that the respondent can begin writing answers or the interviewer can start asking questions. This is an effective introduction for a telephone survey conducted by a field service:

> Hi, we're conducting an opinion survey about radio in the Chicago area and I'd like to ask you a few questions. My name is _____ with [INSERT COMPANY NAME]. We're not trying to sell anything, and this is not a contest or promotion. We're interested only in your opinions. Please tell me which of these age groups you belong to—under 18, 18 to 24, 25 to 34, 35 to 44, 45 to 54, or over 54? [TERMINATE IF UNDER 18 OR OVER 54.]

With some modifications, the same introduction is appropriate for a self-administered questionnaire. The introduction would include the first, third, and fourth sentences along with a final sentence that says, "Please answer the questions as completely and honestly as possible."

The goal of the introduction in telephone surveys is to get into the interview as quickly as possible so the respondent does not have a chance to say "no" and hang up. This may sound overly aggressive, but it works. (Note, however, that many IRBs would not approve such an approach and would require that a statement such as "May I continue?" be included before going on with the interview.) The introduction in self-administered questionnaires should be as simple as possible.

Regardless of the survey approach used, a well-constructed introduction usually generates higher response rates than a simple "Please answer the following questions. . . ."

### Instructions

All instructions necessary to complete the questionnaire should be clearly stated for respondents or interviewers. These instructions vary depending on the type of survey conducted (search the Internet for "questionnaire instructions" for a variety of suggestions). Mail surveys and self-administered questionnaires usually require the most specific instructions because respondents are not able to ask questions about the survey. Respondents and interviewers should understand whether the correct response consists of circling or checking an item, placing items in a specific order, or skipping an item.

Procedural instructions for respondents are often highlighted with a different typeface, capital letters, or some graphic device, perhaps arrows or lines. The following is an example from a mail survey:

> Do you have a favorite radio station that you listen to most of the time?
>
> _____Yes _____No

| If yes, please briefly explain why on the lines below. |
|---|

> ______________________________
>
> ______________________________
>
> ______________________________

Some questionnaires require respondents to rank a list of items. In this case, the instructions must clearly describe which response represents the highest value:

> Please rate the following magazines in order of importance to you. Place a 1 next

to the magazine you prefer most, a 2 next to the magazine in second place, and so on up to 5.

_____*Better Homes and Gardens*

_____*Consumer Reports*

_____*Hot Rod Bikes*

_____*Popular Science*

_____*American Iron Magazine*

Fowler (1993) offers these suggestions for putting together a self-administered questionnaire:

- Make the questionnaire self-explanatory.
- Limit the questions to closed-ended items. Checking a box or circling an answer should be the only task required.
- Use only a limited number of question forms.
- Lay out and type the questionnaire in a clear and uncluttered way.
- Limit the amount of instructions. Respondents can be confused easily by elaborate instructions.

Fowler's second suggestion is too strict. Respondents of most ages are usually able to answer open-ended questions with the same ease (or complication) as closed-ended questions. Whether open-ended or closed-ended, all questions should be tested in a pretest to determine whether the directions for answering them are clear.

Instructions for interviewers are usually typed in capital letters and enclosed in parentheses, brackets, or boxes. For example, instructions for a telephone survey might look like this:

We'd like to start by asking you some things about television. First, what are your favorite TV shows? [RECORD]

1. ____________ 2. ____________

3. ____________ 4. ____________

| RECORD ALL NAMES OF TV SHOWS. PROBE WITH "ARE THERE ANY MORE?" TO GET AT LEAST THREE SHOWS. |
|---|

**Screener questions, or filter questions,** are used to eliminate unwanted respondents or to include only respondents who have specific characteristics or who answer questions in a specific manner. These questions often require respondents or interviewers to skip one or more questions. Skips must be clearly specified (recall that a CATI-designed questionnaire will automatically skip to the next question). Here is an example:

In a typical week, do you listen to radio stations on the AM dial?

_____Yes [ASK Q.16]

_____No [SKIP TO Q.17]

A survey using this question might be designed to question only respondents who listen to AM radio. The screener question immediately determines whether the subject falls into this group. If the respondent says "no," the interviewer (or respondent if the survey is self-administered) may skip a certain number of questions or terminate the survey immediately.

When interviewers are used, as is the case in telephone and one-on-one interviews, the questionnaires must have easy-to-follow instructions (including how many responses to take for open-ended questions), simple skip patterns, and enough space to record answers (if survey responses are written). Telephone questionnaires must include everything an interviewer will say, including introductions, explanations, definitions, transitions, and pronunciations. The last point is particularly important because interviewers should sound like they know the topic. For example, the name of the rock singer Sade should have a phonetic spelling in parentheses ("Sha-Day") following its first appearance in the questionnaire. Otherwise an interviewer is sure to say something like, "Do you think music by the singer 'Say-dee' should be played on your favorite radio station?"

All instructions should be clear and simple. A confusing questionnaire impairs the effectiveness of the interviewer, lowers the number of respondents who complete the test, and in the long run increases costs.

### Question Order

All surveys flow better when the early questions are simple and easy to answer. Researchers often include one or two "warm-up" questions about the topic under investigation so respondents become accustomed to answering questions and begin thinking about the survey topic. Preliminary questions can also serve as motivation to create interest in the questionnaire. Demographic data, personal questions, and other sensitive items should be placed at the end of the questionnaire to allow the interviewer to establish a rapport with each respondent or, for a self-administered questionnaire, to allay any suspicions. Although some respondents may still refuse to answer personal items or may hang up the telephone, at least the main body of data is already collected. Age and gender information are usually included in the first part of a questionnaire, so at least some respondent identification is possible.

The questionnaire should be organized in a logical sequence, proceeding from the general to the specific. Questions on similar topics should be grouped together, and the transitions between question sections should be clear and logical.

Poor question order may bias a respondent's answers. For example, suppose that, after several questions about the presence of violence in society, the respondent is asked to rank the major problems facing the country today from the following list:

_____Corrupt government
_____War
_____Communism
_____Violence on TV
_____High prices

Violence on TV might receive a higher ranking than it would if the ranking question had been asked before the series of questions on violence. Or, to take another example, suppose a public relations researcher is attempting to discover the public's attitudes toward a large oil company. If the questionnaire that begins with attitudinal questions concerning oil spills and inflated profits asks respondents to rate certain oil companies, it is likely that the ratings of all the companies will be lower because of general impressions created by the earlier questions.

There is no easy solution to the problem of question "contamination." Obviously, some questions have to be asked before others. Perhaps the best approach for researchers is to be sensitive to the problem and check for it in a pretest. If they think question order A, B, C may have biasing effects, then they should test another version using the order C, B, A. Completely neutral positioning is not always possible, however, and when bias may enter because of how responses are ordered, the list of items should be rotated. The command [ROTATE] after a question indicates that the interviewer must alter the order of responses for each subject (performed automatically by a CATI-designed questionnaire). Different question orders can be printed on self-administered questionnaires.

### Layout

The physical design of the questionnaire is another important factor in survey research. A badly typed, poorly reproduced questionnaire is not likely to attract many responses in a mail survey. Nor does a cramped questionnaire with 40 questions to a page create a positive attitude in respondents. Response categories should be adequately spaced and presented in a nonconfusing manner. For example, the following format might lead to problems:

> There are too many commercials on television.
>
> Do you strongly agree _____ Agree _____ Have no opinion _____ Disagree _____ Strongly disagree?

A more effective and less confusing method is to provide a vertical ordering of the response choices:

> There are too many commercials on television.
>
> _____Strongly agree
>
> _____Agree
>
> _____No opinion
>
> _____Disagree
>
> _____Strongly disagree

Some researchers recommend avoiding blanks altogether because respondents and interviewers tend to make large check marks or Xs that cover more than one blank, making interpretation difficult. If blanks are perceived as a problem, boxes to check or numbers to circle are satisfactory. In any case, the response form should be consistent throughout the questionnaire. Format changes generally create confusion for both respondents and interviewers. Finally, each question must have enough space for answers. This is especially true for open-ended questions. Nothing is more discouraging to respondents and interviewers than to be confronted with a presentation like this:

> What would you change on your favorite radio station? ______________________
>
> ______________________________
>
> Why do you go to the movies? __________
>
> ______________________________
>
> Who are your favorite movie stars? _____
>
> ______________________________
>
> What are your favorite television shows?
>
> ______________________________
>
> ______________________________

If a research budget limits the amount of paper for questionnaires, subjects can be asked to add further comments on the back of the survey.

### Questionnaire Length

Questionnaire length is an important concern in any survey because it is directly related to the completion rate. Long questionnaires cause fatigue, respondent mortality, and low completion rates. Shorter questionnaires guarantee higher completion rates. Search the Internet for "questionnaire length" for many excellent discussions on the topic, especially *www.busreslab.com/tips/tip5.htm.*

Unfortunately, there are no strict guidelines to help in deciding how long a questionnaire should be. The length depends on a variety of factors:

- Amount of money in the research budget
- Purpose of the survey
- Type of problems or questions to be investigated
- Age of respondents involved in the survey
- Type and complexity of questions in the questionnaire
- Location in the country where the study is conducted
- Specific setting of the testing situation
- Time of year
- Time of day
- Type of interviewer (professional or amateur)

In most cases, questionnaire length is determined by trial and error. A survey that has significantly less than 100% respondent completion is too long. Our experience during the past 20 years has shown the following time limits as *maximum:*

| Type of Survey | Maximum Time Limit |
|---|---|
| Self-administered mail | 60 min. |
| Self-administered in a group situation supervised by a researcher | 60 min. |
| One-on-one interviews | 60 min. |
| Telephone | 20 min. |
| Shopping center intercept | 10 min. |

Telephone interviewing can be a difficult approach to use because it takes talent to keep respondents answering questions on the telephone. Professional interviewers can usually hold respondents' attention for about 20 minutes. There is a severe dropoff in incidence after that (due to *breakoffs,* where the respondent hangs up).

Two hints to researchers can make the questionnaire development process go much more smoothly: (1) read the questionnaire out loud or call up a friend and conduct the interview—errors are easier to detect; and (2) if possible, put the questionnaire aside for a day or two and come back to it—sometimes researchers become too deeply involved in questionnaire development and overlook a simple problem.

## ▪ Pretesting

Without a doubt, the best way to discover whether a research instrument is adequately designed is to pretest it—that is, conduct a ministudy with a small sample to determine whether the study approach is correct and to help refine the questions. Areas of misunderstanding or confusion can be easily corrected without wasting time or money.

There are several ways to pretest a questionnaire. When an acceptable draft of the questionnaire is completed, a focus group can be used to discuss the questionnaire with potential respondents (see Chapter 6). However, this is usually too expensive. The best pretest in telephone surveys is for interviewers to call 10–20 people and do a run-through. Any problems quickly emerge. Self-administered questionnaires should be pretested with the type of respondent who will participate in the actual study. Once again, any problems should be noted immediately.

In any type of pretesting situation, it is appropriate to discuss the project with respondents after they complete the questionnaire. They can be asked whether they understood the questions, whether the questions were simple to answer, and so on. Respondents are almost always willing to help researchers.

## ▪ Gathering Survey Data

Once a questionnaire is developed and one or more pretests or pilot studies have been conducted, the next step is to gather data from an appropriate group of respondents. The four basic methods for doing this are mail survey, telephone survey, personal interview, and group administration. Researchers can also use variations and combinations of these four methods, such as disk-by-mail surveys and mall interviews. Each procedure has definite advantages and disadvantages that must be considered before a choice is made. The remainder of this chapter highlights the characteristics of each method.

### Mail Surveys

Mail surveys involve mailing self-administered questionnaires to a sample of respondents. Stamped reply envelopes are enclosed to encourage respondents to mail their completed questionnaires back to the researcher. Mail surveys are popular in some types of businesses because they can secure a great deal of data with a minimum expenditure of time and money. At the outset, however, researchers should be aware that respondents are often busy people with many demands on their time. Consequently, many people do not share the researcher's enthusiasm for questionnaires and often simply throw them away.

The general stages of a mail survey are discussed next. Although the steps are listed in numerical sequence, many of them are often done in a different order or even simultaneously.

1. *Select a sample.* Sampling is generally done from a prepared frame that contains the names and addresses of potential respondents (see Chapter 5). The most common sampling frame is the mailing list, a compilation of names and addresses in narrowly defined groupings that commercial sampling firms can prepare.
2. *Construct the questionnaire.* As discussed earlier, mail survey questionnaires must be concise and specific because no interviewer is present to correct misunderstandings, answer questions, or give directions.
3. *Write a cover letter.* A brief note explaining the purpose and importance of the questionnaire usually increases the response rate.
4. *Assemble the package.* The questionnaire, cover letter, and return envelope are stuffed into mailing envelopes. Researchers sometimes choose to use bulk mail with first-class return envelopes. An alternative method is to send questionnaires via first-class mail and use business reply envelopes for responses. This method allows researchers to pay postage only for the questionnaires actually returned. Postal options always depend on the research budget.
5. *Mail the surveys.* Bulk mail regulations require sorting envelopes into zip code areas.
6. *Closely monitor the return rates.*
7. *Send follow-up mailings.* The first follow-up should be sent 2 weeks after the initial mailing, and a second (if necessary) 2 weeks after the first. The follow-up letter can be sent to the entire sample or to only the subjects who fail to answer.
8. *Tabulate and analyze the data.*

**Advantages.** Mail surveys cover a wide geographic area for a rather reasonable cost. They are often the only way to gather information from people who live in hard-to-reach areas of the country (or in other countries). Mail surveys also allow for selective sampling through the use of specialized mailing lists. In addition to those mentioned, lists are available that include only people with annual incomes exceeding $50,000, consumers who have bought a car within the past year, subscribers to a particular magazine, or residents of a specific zip code area. If researchers need to collect information from a highly specialized audience, mail surveys are excellent.

Another advantage of the mail survey is that it provides anonymity; some respondents are more likely to answer sensitive questions candidly. Questionnaires can be completed at home or in the office, which affords respondents a sense of privacy. People can answer questions at their own pace, and they have an opportunity to look up facts or check past information. Mail surveys also eliminate interviewer bias because there is no personal contact.

Probably the biggest advantage of this method is its relatively low cost. Mail surveys do not require a large staff of trained workers. The only costs are for printing, mailing lists, envelopes, and postage. If the cost per completed questionnaire were computed, it is likely that the mail survey would prove to be the most inexpensive of all the survey methods. Researchers who are willing to spend the necessary time and money on a mail survey can usually ensure an above-average return rate.

***Disadvantages.*** First, mail questionnaires must be self-explanatory. No interviewer is present to answer questions or to clear up misunderstandings. Mail surveys are also the slowest form of data collection. Returns start to trickle in a week or so after the initial mailing and continue to arrive for several weeks thereafter. It may even be months before some responses are returned. Many researchers simply set a cutoff date, after which returns are not included in the analysis.

Another problem with mail surveys is that researchers never know exactly who answers the questions. Assistants, for example, may complete a survey sent to corporate executives. Furthermore, replies are often received only from people who are interested in the survey, and this injects bias into the results. Most researchers agree, however, that the biggest disadvantage of the mail survey is the low return rate. A typical survey (depending on area and type of survey) will achieve a response rate of 10%–40%. This low return casts doubt on the reliability of the findings.

***Increasing Response Rates.*** Survey researchers have investigated a number of ways to improve return rates, but there are no hard and fast guarantees. In a *meta-analysis* (in which the findings of several studies are treated as independent observations and combined to calculate an overall or average effect) of numerous studies concerning mail surveys, Fox, Crask, and Kim (1989) found that, on the average, response rates can be increased in a variety of ways. In descending order of importance, the following procedures increase mail survey response rates: university sponsorship, stamped return postage as opposed to business reply, written prenotification of the survey sent to the respondent, postcard follow-up, first-class outgoing postage, questionnaire color (green paper as opposed to white), notification of cutoff date, and stamped outgoing postage rather than metered stamping.

In addition, The Eagle Group in 1995 found these ideas to be very successful in increasing response rates in mail surveys (as much as 50%):

- A drawing of some type that offers a prize of a color TV, stereo, or CD player
- Telephone calling cards with 30 minutes of time (activated when the questionnaire is returned)
- A $10 bill

An Internet search of "mail surveys" provides hundreds of excellent articles and discussions on the methodology.

### Telephone Surveys

Telephone surveys and personal interviews use trained interviewers who ask questions orally and record the responses. The respondents generally do not see the actual questionnaire. Since telephone and personal interviewing techniques have certain similarities, much of what follows applies to both.

Telephone surveys fill a middle ground between mail surveys and personal interviews. They offer more control and higher response rates than most mail surveys, but they are limited in the types of questions that can be used. Telephone interviews are generally more expensive than mail surveys but less expensive than face-to-face interviews. Because of these factors, telephone surveys seem to represent a compromise between the other two techniques, and this may account for their enormous popularity in mass media research.

Interviewers are extremely important to both telephone surveys and personal surveys. An interviewer ideally should function as a neutral medium through which the respondents' answers are communicated to the researcher. The interviewer's presence and manner of speaking should not influence respondents' answers in any way. Adequate training and instruction can minimize the bias that the interviewer might inject into the data. For example, if the interviewer shows disdain or shock over an answer, it is unlikely that the respondent will continue to answer questions in a totally honest manner. Showing agreement with certain responses might prompt similar answers to other questions. Skipping questions, carelessly asking questions, and being impatient with the respondent might also cause problems.

As an aid to minimizing interviewer bias, the National Association of Broadcasters has published the following recommendations for interviewers:*

- Read the questions exactly as worded. Ask them in the exact order listed. Skip questions only when the instructions on the questionnaire tell you to. There are no exceptions to this.
- Never suggest an answer, try to explain a question, or imply what kind of reply is wanted. Don't prompt in any way.
- If a question is not understood, say "Let me read it again," and repeat it slowly and clearly. If it is still not understood, report a "no answer."
- Report answers and comments exactly as given, writing them out fully. If an answer seems vague or incomplete, probe with neutral questions, such as "Will you explain that?" or "How do you mean that?" Sometimes just waiting a bit will tell the respondent you want more information.
- Act interested, alert, and appreciative of the respondent's cooperation, but never comment on his or her replies. Never express approval, disapproval, or surprise. Even an "Oh" can cause a respondent to hesitate or refuse to answer further questions. Never talk up or down to a respondent.
- Follow all instructions carefully, whether you agree with them or not.
- Thank each respondent. Leave a good impression for the next interviewer.
- Discuss any communication problems immediately with the researcher in charge.

*From *A Broadcast Research Primer*, 1976, pp. 37–38. Reprinted with permission (edited).

A general procedure for conducting a telephone survey follows. Again, the steps are presented in numerical order, but it is possible to address many tasks simultaneously.

1. *Select a sample.* Telephone surveys require researchers to specify clearly the geographic area to be covered and to identify the type of respondent to be interviewed in each household contacted. Many surveys are restricted to people over 18, heads of households, and so forth. The sampling procedure used depends on the purpose of the study (see Chapter 6).

2. *Construct the questionnaire.* Telephone surveys require straightforward and uncomplicated response options. Ranking a long list of items is especially difficult over the telephone, and this should be avoided. In addition, the length of the survey should not exceed 10 minutes for nonprofessional interviewers. Longer interviews require professionals who are capable of keeping people on the telephone.

3. *Prepare an interviewer instruction manual.* This document should cover the basic mechanics of the survey (what numbers to call, when to call, how to record times, and so on). It should also specify which household member to interview and provide general guidelines on how to ask the questions and how to record the responses.

4. *Train the interviewers.* Interviewers need to practice going through the questionnaire to become familiar with all the items, response options, and instructions. It is best to train interviewers in a group using interview

simulations that allow each person to practice asking questions. It is advisable to pretest interviewers as well as the questionnaire.

5. *Collect the data.* Data collection is most efficient when conducted from one central location (assuming enough telephone lines are available). Problems that develop are easier to remedy, and important questions raised by one interviewer can easily be communicated to the rest of the group. A central location also makes it easier for researchers to check (validate) the interviewers' work. The completion rate should be monitored during this stage.

6. *Make necessary callbacks.* Additional calls (usually no more than two) should be made to respondents whose lines were busy or who did not answer during the first session. Callbacks on a different day or evening tend to have a greater chance of reaching someone willing to be interviewed.

Backstrom and Hursh-Cesar (1986, p. 134) offer the following advice about callbacks:

> About 95% of all telephone interviews are successfully completed within three calls. However, we have rules for the number of callbacks to make if the first call results in a busy signal or a no answer. . . . We generally permit only three calls—one original and two callbacks—but if any of these calls produce busy signals or [future interview] appointments, we allow up to five calls total. . . .

Backstrom and Hursh-Cesar's comment that about 95% of the interviews are successfully completed with three calls is a bit optimistic. Generally speaking, three callbacks produce a contact about 75% of the time. In some cases, to achieve 95%, as Backstrom and Hursh-Cesar said, six or more callbacks are required.

When the first call produces a busy signal, the rule is to wait one-half hour before calling again. If the first call produced a "no answer," wait 2 to 3 hours before calling again, assuming it is still a reasonable hour to call. If evening calls produce no answer, call the following day.

In addition, interviewers should keep track of the *disposition* or status of their sample numbers. Figure 8.3 shows a sample disposition sheet.

7. *Verify the results.* When all questionnaires have been completed, a small subsample of each interviewer's respondents should be called again to check that the information they provided was accurately recorded. Respondents should be told during the initial survey that they may receive an additional call at a later date. This tends to eliminate any confusion when subjects receive a second call. A typical procedure is to ask the subject's first name in the interview so that it can be used later. The interviewer should ask, "Were you called a few days ago and asked questions about television viewing?" The verification can begin from there and need consist of only two or three of the original questions (preferably open-ended and sensitive questions, since interviewers are most likely to omit these).

8. *Tabulate the data.* Along with the normal data analysis, telephone researchers generally compute response rates for the following items: completed interviews, initial refusals, unqualified respondents, busy signals, language barriers, no answers, terminates, breakoffs, and disconnects.

**Advantages.** The cost of telephone surveys tends to be reasonable. The sampling involves minimal expense, and there are no significant transportation costs. Callbacks are simple and economical. The variety of telephone plans from AT&T, MCI, Sprint, and others enable researchers to conduct telephone surveys from any location.

Compared to mail surveys, telephone surveys can include more detailed questions, and, as stated earlier, interviewers can clarify misunderstandings that might arise during the administration of the questionnaire.

Figure 8.3 *Sample Telephone Interview Disposition Sheet*

Phone number ____________________

| Call | #1 ____ | #2 ____ | #3 ____ | #4 ____ | #5 ____ |
|---|---|---|---|---|---|
| | Date ____ | Date ____ | Date ____ | Date ____ | Date ____ |
| | Time ____ | Time ____ | Time ____ | Time ____ | Time ____ |

Code

1 Completed interview

2 Answering machine

3 Busy

4 No answer

5 Refusal

6 Appointment to call again
(when ______________________ )

7 Nonworking number (out of order, disconnected, nonexistent)

8 Nonresidential number

9 Reached but respondent not available (out of town, hospital, etc.)

10 Reached but not interviewed (ineligible household, speech or physical problem, age disqualification)

The response rates of telephone surveys about the media (once a qualified respondent is contacted) are generally high, especially when multiple callbacks are used. In addition, phone surveys are much faster than mail. A large staff of interviewers can collect the data from the designated sample in a relatively short time. In summary, telephone surveys tend to be fast, easy, and relatively inexpensive.

***Disadvantages.*** First of all, researchers must recognize that much of what is called survey "research" by telephone is not research at all but an attempt to sell people something. Unfortunately, many companies disguise their sales pitch as a "survey." This has made respondents suspicious and even prompts some to terminate an interview before it has started. Additionally, it is impossible to include questions that involve visual demonstrations. A researcher cannot, for example, hold up a picture of a product and ask whether the respondent remembers seeing it advertised. A potentially severe problem is that not everyone in a community is listed in the telephone directory, the most often used sampling frame. Not everyone has a telephone, and many people have unlisted phone numbers; also, some numbers are listed incorrectly, and others are too new to be listed. These problems would not be serious if the people with no telephones or with unlisted numbers were just like those listed in the phone book. Unfortunately, researchers generally have no way of checking for such similarities or differences, so it is possible that a sample obtained from a telephone directory may be significantly different from the population. (See Chapter 5 concerning random digit dialing.)

Finally, telephone surveys require a large number of "dialings" and contacts in order to successfully interview the number of respondents required for a study. To demonstrate this, the accompanying table shows a summary of the telephone call "disposition sheets" from 75 randomly selected telephone studies conducted by The Eagle Group in Denver in 1995. The studies included respondents between the ages of 18 and 54 and investigated topics such as radio listening, television viewing, automotive purchases, and other nonmedia topics.

| Call Breakdown | Number | Percent of Total |
|---|---|---|
| Noncontact | 231,694 | 48.5% |
| Ineligible | 65,621 | 13.7% |
| Initial refusal | 57,221 | 11.9% |
| Disconnect/business | 51,431 | 10.8% |
| Answering machine | 48,666 | 10.2% |
| Qualified refusal | 12,526 | 2.6% |
| Language barrier | 949 | 0.2% |
| Completed | 9,562 | 2.0% |
| Total | 477,670 | 100.0% |

The data show what a professional interviewer faces during a working day. Of nearly half a million dialings, only 2% were completed interviews; thus, of every 100 dialings made, only 2 will achieve success. There aren't many other jobs with a "success rate" this low.

### Personal Interviews

Personal interviews usually involve inviting a respondent to a field service location or a research office (called a *one-on-one interview*). Sometimes interviews are conducted at a person's place of work or at home. There are two basic types of interviews—structured and unstructured. In a **structured interview**, standardized questions are asked in a predetermined order; relatively little freedom is given to interviewers. In an **unstructured interview**, broad questions are asked, which allows interviewers freedom in determining what further questions to ask to obtain the required information. Structured interviews are easy to tabulate and analyze but do not achieve the depth or expanse of unstructured interviews. Conversely, the unstructured type elicits more detail but takes a great deal of time to score and analyze.

The steps in constructing a personal interview survey are similar to those for a telephone survey. The following list discusses instances in which the personal interview differs substantially from the telephone method:

1. *Select a sample.* Drawing a sample for a personal interview is essentially the same as selecting a sample in any other research method. In one-on-one interviews, respondents are selected based on a predetermined set of screening requirements. In door-to-door interviews, a multistage sample is used to select first a general area, then a block or a neighborhood, and finally a random household from which a person will be chosen (see Figure 5.2 on page 91).

2. *Construct the questionnaire.* Personal interviews are flexible: Detailed questions are easy to ask, and the time taken to complete the survey can be greatly extended. (Many personal interviews last 30–60 minutes.) Researchers can also make use of visual exhibits, lists, and photographs to ask questions, and respondents can be asked to sort photos or materials into categories, or to point to their answers on printed cards. Respondents can have privacy and anonymity by marking ballots, which can then be slipped into envelopes and sealed.

3. *Prepare an interviewer instruction guide.* The detail needed in an instruction guide depends on the type of interview. One-on-one interviewer guides are not very detailed

because there is only one location, respondents are prerecruited by a field service, and interviewing times are prearranged. Door-to-door interviewer guides contain information about the household to select, the respondent to select, and an alternative action to take in the event the target respondent is not at home. Interviewer guides often have instructions on how to conduct the interview, how to dress, how to record data, and how to ask questions.

4. *Train the interviewers.* Training is important because the questionnaires in a personal interview are longer and more detailed. Interviewers should receive instructions on establishing a rapport with subjects, on administrative details (for example, time and length of interviews and interviewer salaries), and on asking follow-up questions. Several practice sessions are necessary to ensure that the project's goal is met and that interviewers follow the established guidelines.

5. *Collect the data.* Personal interviews are both labor- and cost-intensive. These problems are why most researchers prefer to use telephone or mail surveys. A personal interview project can take several days to several weeks to complete because turnaround is slow. One interviewer can complete only a handful of surveys each day. In addition, costs for salaries and expenses escalate quickly. It is not uncommon for some research companies to charge as much as $1,000 per respondent in a one-on-one situation.

Interviewers gather data either by writing down answers or by audiotaping or videotaping the respondents' answers. Both methods are slow, and detailed transcriptions and editing are often necessary.

6. *Make necessary callbacks.* Each callback requires an interviewer to return to a household originally selected or to the location used for the original interview. Additional salary, expenses, and time are required.

7. *Verify the results.* As with telephone surveys, a subsample of each interviewer's completed questionnaires is selected for verification. Respondents can be called on the phone or reinterviewed in person.

8. *Tabulate the data.* Data tabulation procedures for personal interviews are essentially the same as with any other research method. A codebook must be designed, questionnaires coded, and data input into a computer.

***Advantages.*** Many advantages of the personal interview technique have already been mentioned. It is the most flexible means of obtaining information because the face-to-face situation lends itself easily to questioning in greater depth and detail. Also, some information can be observed by the interviewer during the interview without adding to the length of the questionnaire. Additionally, the interviewer can develop a rapport with the respondents and may be able to elicit replies to sensitive questions that would remain unanswered in a mail or telephone survey. The identity of the respondent is known or can be controlled in the personal interview survey. Whereas in a mail survey all members of a family might confer on an answer, this can usually be avoided in a face-to-face interview. Finally, once an interview has begun, it is harder for respondents to terminate the interview before all the questions have been asked. In a telephone survey, the respondent can simply hang up the telephone.

***Disadvantages.*** As mentioned, time and costs are the major drawbacks to the personal interview technique. Another major disadvantage is the problem of interviewer bias. The physical appearance, age, race, gender, dress, nonverbal behavior, and comments of the interviewer may prompt respondents to answer questions untruthfully. Moreover, the organization necessary for recruiting, training, and administering a field staff of interviewers is much greater than that required for other data collection procedures. If large numbers of interviewers are needed, it is usually necessary to employ field supervisors to coordinate their work, which makes the survey even more expensive. Finally, if personal interviews are conducted during the day, most of the respondents will not be employed outside the home. If it is desirable to interview respondents who have jobs outside the home, interviews must be scheduled on the weekends or during the evening.

One alternative now used in personal interviews is a self-administered interview that respondents answer on a personal computer. Respondents are usually invited to the research company or field service to participate in the project by answering questions presented to them on the computer.

A hybrid of personal interviewing is intensive, or in-depth, interviewing, which is discussed in Chapter 6.

### Mall Interviews

Although mall interviews are essentially a form of the personal interviews just discussed, their recent popularity and widespread use warrant individual consideration.

During the late 1980s, mall intercepts became one of the most popular research approaches among marketing and consumer researchers. Schleifer (1986) found that of all the people who participated in a survey in 1984, 33% were mall intercepts. In addition, *Marketing News* (1983) stated that 90% of the market researchers it surveyed in the United States use mall intercepts. Both figures have risen since those studies were conducted.

Although mall intercepts use convenience samples and sampling error cannot be determined, the method has become the standard for many researchers. It is rare to enter a shopping mall without seeing a man or a woman with a clipboard trying to interview a shopper. The method has become commonplace, and some shoppers resent the intrusion. In fact, shoppers often take paths to avoid the interviewers they can so easily detect.

The procedures involved in conducting mall intercepts are the same as those for personal interviews. The only major difference is that it is necessary to locate the field service that conducts research in the particular mall of interest. Field services pay license fees to mall owners to allow them to conduct research on the premises. Not just any field service can conduct research in any mall.

One recent trend in mall intercept research is the use of a personal computer for data collection. As with one-on-one interviews conducted in a field service, the respondents simply answer questions posed to them on the computer monitor.

***Advantages.*** Mall intercepts are a quick and inexpensive way to collect personal data.

***Disadvantages.*** Most of the disadvantages of mall intercepts have been discussed in other sections of this book. The three major problems are that convenience sampling restricts the generalizability of the results (not all people in a given area shop at the same mall); the interviews must be short (no more than about 10 minutes); and there is no control over data collection (researchers are at the mercy of the field service to conduct a proper interview).

### Disk-By-Mail Surveys

During the late 1980s, a high-tech form of mail surveys appeared that offers great promise. The procedure is called **disk-by-mail surveys, or DBM.** The name of the survey approach essentially explains the procedure: Respondents are sent computer disks that contain a self-administered questionnaire, and they are asked to complete it by using a personal computer. This method obviously involves several new areas to consider when conducting a research project.

DBM surveys are essentially the same as a typical self-administered mail survey. The normal steps involved in problem definition, questionnaire design, and pretesting are used. However, researchers must address several unique considerations when using DBM.

***Type of Study.*** Most DBM surveys are conducted with professionals or other business-related samples. The reason is simple: Only about 40% of American households have personal computers. Sample selection could be time-consuming and costly; however, computer ownership will certainly increase in the future, and in-home DBM surveys may become commonplace. For the time being, DBM surveys are conducted with professionals who generally have access to personal computers in their workplace.

***Sample Selection.*** Locating qualified respondents for DBM surveys is the same as for any other research project, except that in addition to the other screener questions, there must be one about the availability of a personal computer.

***Computer Hardware.*** A typical self-administered mail survey requires only that the respondent have a writing instrument. DBM surveys complicate the process in several ways. First, computers can use one of several different operating systems (DOS), or languages that run the computer. Fortunately, the IBM and Apple systems are the most widely used. The problem with having two operating systems can be solved by preparing two different DBM disks, or by asking one of the groups of users to try to locate the other type of computer to complete the survey.

A second problem with the DBM method is whether to use a color or monochrome display to present the questionnaire. Not all color monitors are equal, and the color appearance may be drastically different from one monitor to another. A monochrome display is best to avoid problems.

The size of the disk drive presents a third problem. The screener must include questions about the size of the respondent's disk drive (that is, 5¼-inch or 3½-inch) to ensure that the respondent receives the correct type of disk.

Another problem, and not necessarily the last, is the physical risk to the floppy disks. Disks may be accidentally erased; they are also fragile and may be damaged in the disk-duplication process, in shipment, or by the respondent. Thus replacement disks may have to be sent to some respondents.

***Support.*** Because computer problems may occur or respondents may be unable to complete the survey, most DBM surveys offer respondents a toll-free number to call for assistance. This service adds further costs to the project.

***Reliability and Validity.*** Significant questions are raised about these two areas in relation to DBM surveys. Who actually completes the surveys? Are responses more or less accurate than those provided to interviewers or in typical mail interviews? How does the novelty of the approach affect respondents?

As mentioned earlier, DBM surveys are a totally new approach in research and the Internet contains numerous articles and descriptions. For example, see *www.researchspectrum.com/data-disk.html.*

### Internet Surveys

During the late 1990s, researchers naturally capitalized on the popularity of the Internet, and collecting questionnaire data via the Internet is now commonplace. The process is very simple: A respondent is recruited by telephone, letter, or e-mail and is sent a questionnaire to complete. When finished, the respondent simply transmits the questionnaire back to the research company or the business that is conducting the study.

***Advantages.*** Internet research is generally inexpensive and is very easy to conduct because the researchers never have to leave their office. Respondents can be shown almost any type of visual aid or played almost any type of audio material. The data can be collected very quickly.

***Disadvantages.*** The primary disadvantage of Internet research is that there is no way (as yet) to ensure that the person recruited for the study is actually the person who completes the questionnaire. For example, an adult may be recruited for a study, but the adult may ask a child in the house to answer the questions. Internet research, like any electronic gathering procedure, has no control over data-gathering procedures. This lack of control may have a profound negative effect on the results gathered and the decisions made.

Another major problem is that the sample universe includes only those people who have access to a computer and access to the Internet. If the question or problem under investigation is general in nature, every respondent does not have an equal chance of being included. Be very careful with Internet research.

For the most current information about Internet surveys, search the web under the term "Internet surveys." Also see Chapter 18.

### Group Administration

Group administration combines some of the features of mail surveys and personal interviews. In the group-administered survey, a group of respondents is gathered together (prerecruited by a field service) and given individual copies of a questionnaire or asked to participate in a group interview (a large focus group). The session can take place in a natural setting, but it is usually held at a field service location or a hotel ballroom. For example, respondents may be recruited to complete questionnaires about radio or television stations; students in a classroom may complete questionnaires about their newspaper reading habits; or an audience may be asked to answer questions after viewing a sneak preview of a new film.

The interviewer in charge of the session may or may not read questions to respondents. Reading questions aloud may help respondents who have reading problems, but this is not always necessary. (It is possible to screen respondents for reading or language skills.) The best approach is for several interviewers to be present in the room so that individual problems can be resolved without disturbing the other respondents.

Some group-administered sessions include audio and video materials for respondents to analyze. The session allows respondents to proceed at their own pace, and in most cases interviewers allow respondents to ask questions, although this is not a requirement.

***Advantages.*** The group administration technique has certain advantages. For example, a group-administered questionnaire can be longer than the typical questionnaire used in a mail survey. Since the respondents are usually assembled for the sole purpose of completing the questionnaire, the response rates are almost always quite high. The opportunity for researchers to answer questions and handle problems that might arise generally means that fewer items are left blank or answered incorrectly.

***Disadvantages.*** On the negative side, if a group-administered survey leads to the perception that some authority sanctions the study, respondents may become suspicious or uneasy. For example, if a group of teachers is brought together to fill out a questionnaire, some might think that the survey has the approval of the local school administration and that the results will be made available to their superiors. Also, the group environment makes interaction possible among the respondents; this can make the situation more difficult for the researcher to control. In addition, not all surveys can use samples that can be tested together in a group. Surveys often require responses from a wide variety of people, and mixing respondents together may bias the results.

Finally, group administration can be expensive. Costs usually include recruiting fees, co-op payments, hotel rental, refreshments, and salaries for interviewers. These are the typical costs for group sessions:

| | |
|---|---|
| CPI | \$25–\$1,000 per person |
| Co-op | \$25–\$150 per person |
| Hotel | \$200–\$1,000 per night |
| Refreshments | \$0–\$50 per person |
| Audio/video materials and rental | \$0–thousands of dollars |
| Hosts | \$0–\$100 per host |
| Parking fees | \$0–\$10 per person |
| Interviewers/ assistants | \$0–thousands of dollars |
| Travel expenses for researchers | \$0–thousands of dollars |

## ▪ Achieving a Reasonable Response Rate

No matter what type of survey is conducted, it is virtually impossible to obtain a 100% response rate. Researchers have more control with some types of surveys (such as the personal interview) and less with others (such as the mail survey). But no matter what the situation, not all respondents will be available for interviews and not all will cooperate. Consequently, the researcher must try to achieve the highest response rate possible under the circumstances.

What constitutes an acceptable response rate? Obviously, the higher the response rate, the better: As more respondents are sampled, response bias is less likely. But is there a minimum rate that should be achieved? Not everyone agrees on an answer to this question, but some helpful data are available. Several studies have calculated the average response rates for surveys of various kinds. A comparison with these figures can at least tell a researcher whether a given response rate is above or below the norm. For example, Dillman (1978) noted that response rates for face-to-face interviews have dropped sharply in recent years. In the 1960s, the average rate was 80%–85%. More recently, the completion rates of general population samples interviewed by the face-to-face technique are about 60%–65%. Yu and Cooper (1983) studied the completion rates reported in 93 social science journal articles from 1965 to 1981. They found the completion rate for personal interviews to be 82% and for telephone surveys about 72%. Mail surveys had an average completion rate of about 47%. (Note that many of the personal interviews included in the Yu and Cooper study were done in the 1960s and early 1970s. This should be kept in mind when comparing their figures to Dillman's.)

Regardless of the response rate, the researcher is responsible for examining any possible biases in response patterns. Were females more likely to respond than males? Older people more likely to respond than younger ones? Whites more likely than minorities? A significant lack of response from a particular group might weaken the strength of any inferences from the data to the population under study. To be on the safe side, the researcher should attempt to gather information from other sources about the people who did not respond; by comparing such additional data with those from respondents, the researcher may be able to determine whether underrepresentation introduced any bias into the results.

Using common sense will help increase the response rate. In telephone surveys, respondents should be called when they are likely to be at home and receptive to interviewing. Do not call when people are likely to be eating or sleeping. In a one-on-one situation, the interviewer should be appropriately attired. In addition, the researcher should spend time tracking down some of the nonrespondents and asking them why they refused to be interviewed or why they did not fill out the questionnaire. Responses such as "The interviewer was insensitive and pushy," "The questionnaire was delivered with postage due," and "The survey sounded like a ploy to sell something" can be illuminating.

Along with common sense, certain elements of the research design can have a significant impact on response rates. Yu and Cooper (1983), in their survey of 93 published studies, made these discoveries:

- Monetary incentives increased the response rate, with larger incentives being the most effective. Nonmonetary incentives (for example, ballpoint pens) were also helpful.
- Preliminary notification, personalization of the questionnaire, a follow-up letter, and assertive "foot in the door" personal interview techniques all significantly increased the response rate.
- A cover letter, the assurance of anonymity, and a statement of a deadline did not significantly increase the response rate.
- Stressing the social utility of the study and appealing to the respondent to help out the researcher did not affect response rates.

## General Problems in Survey Research

Although surveys are valuable tools in mass media research, several obstacles are frequently encountered. Experience in survey research confirms the following points:

1. Subjects or respondents are often unable to recall information about themselves or their activities. This inability may be caused by memory failure, nervousness related to being involved in a research study, confusion about the questions asked, or some other intervening factor. Questions that are glaringly simple to researchers may create severe problems for respondents.

For example, radio station managers often want to ask respondents which radio stations they have set on their vehicles' radio pushbuttons. The managers are surprised to discover the number of people who not only do not know which stations are programmed on their radio buttons, but do not know how many buttons are on their radio.

2. Due to a respondent's feelings of inadequacy or lack of knowledge about a particular topic, he or she may often provide "prestigious" answers rather than admit to not knowing something. This is called prestige bias. For example, as mentioned earlier in the book, some respondents claim to watch public TV and listen to public radio when, in fact, they do not.

3. Subjects may purposely deceive researchers by giving incorrect answers to questions. Almost nothing can be done about respondents who knowingly lie. A large sample may discount this type of response. However, there is no acceptable and valid method to determine whether a respondent's answers are truthful; the answers must be accepted as they are given, although one way is to ask the same question two or three times throughout the survey (using different question approaches).

4. Respondents often give elaborate answers to simple questions because they try to "figure out" what the purpose of a study is and what the researcher is doing. People are naturally curious, but they become even more curious when they are the focus of a scientific research project.

5. Surveys are often complicated by the inability of respondents to explain their true feelings, perceptions, and beliefs—not because they do not have any, but because they cannot put them into words. The question

"Why do you like to watch soap operas?" may be particularly difficult for some people. They may watch them every day, but respond by saying only "Because I like them." Probing respondents for further information may help, but not in every case.

Conducting survey research can be an exciting process. It is fun to find out why people think in certain ways or what they do in certain situations. But researchers must continually remain aware of obstacles that may hinder data collection, and they must deal with these problems. The United States is the most surveyed country in the world, and many citizens now refuse to take part in any type of research project. Researchers must convince respondents and subjects that their help is important in making decisions and solving problems.

The face of survey research is continually changing. One-on-one and door-to-door interviews are now very difficult to carry out. This means there is a greater emphasis on mail surveys, mall intercepts, and electronic data-gathering procedures. In telephone surveys, for example, computer-assisted telephone interviewing (CATI) is now common.

CATI uses video display terminals operated by interviewers to present questions and accept respondent answers, thus eliminating the need for the traditional pencil-and-paper questionnaires. The computer displays the proper questions in the proper order, so there is no possibility of the interviewer making an error by asking the wrong questions or skipping the right ones. The process makes data coding easier because the interviewer enters the respondent's answers through the keyboard. Groves and Mathiowetz (1984) and Wimmer (1995) found that there is little difference in results with CATI and non-CATI techniques. The response rates, reactions of the interviewers and respondents, and quality of data were virtually equivalent. CATI interviews tended to take slightly more time, but this was balanced by the presence of fewer interviewer errors due to skipping questions. As new software is developed in this area, it seems likely that a greater proportion of surveys will use the CATI technique.

Other new techniques include computer-generated, voice-synthesized surveys in which respondents answer by pushing Touch-Tone telephone buttons; 800 telephone numbers for recruited respondents to call to answer questions asked by an interviewer or computer; and various types of touch-sensitive TV screens that present questionnaires to respondents. Survey research approaches change almost every day.

## ■ ■ ■ Summary

Survey research is an important and useful method of data collection. The survey is also one of the most widely used methods of media research, primarily because of its flexibility. Surveys, however, involve a number of steps. Researchers must decide whether to use a descriptive or analytical approach; define the purpose of the study; review the available literature in the area; select the survey approach, questionnaire design, and sample; analyze and interpret the data; and finally decide whether to publish or disseminate the results. These steps are not necessarily taken in that order, but all must be considered in conducting a survey.

To ensure that all the steps in the survey process are in harmony, researchers should conduct one or more pilot studies to detect any errors in the approach. Pilot studies save time, money, and frustration because an error that could void an entire analysis sometimes surfaces at this stage.

Questionnaire design is also a major step in any survey. This chapter included examples to show how a question or an interviewing approach may elicit a specific response. The goal in questionnaire design is to avoid bias in answers. Question wording, length, style, and order may affect a respondent's answers. Extreme care must be taken when developing questions to ensure that they are neutral. To achieve a reasonable response rate, researchers should consider including an incentive, notifying survey subjects beforehand, and personalizing the questionnaire. Also, researchers should mention the response rate when they report the results of the survey.

Finally, researchers must select the most appropriate survey approach from among four basic types: mail, telephone, personal interview, and group administration. Each approach has advantages and disadvantages that must be weighed. The type of survey used will depend on the purpose of the study, the amount of time available to the researcher, and the funds available for the study. In the future, survey researchers may depend less on the face-to-face survey and more on computer-assisted telephone interviewing.

## Questions and Problems for Further Investigation

1. Develop five questions or hypotheses that can be tested by survey research. What approaches can be used to collect data on these topics?
2. Nonresponse is a problem in all survey research. In addition, many people refuse to participate in surveys at all. Write a cover letter for a survey on television viewing habits.
3. Define a target group and design questions to collect information on the following topics:
   a. Political party affiliation
   b. Attitudes toward television soap operas
   c. Attitudes toward newspaper editorials
   d. Attitudes toward the frequency of television commercials
   e. Public television viewing habits
4. Locate one or more survey studies in journals on mass media research. Answer the following questions in relation to the article(s):
   a. What was the purpose of the survey?
   b. How were the data collected?
   c. What type of information was produced?
   d. Did the data answer a particular research question or hypothesis?
   e. Were any problems evident with the survey and its approach?
5. Design a survey to collect data on a topic of your choice. Be sure to address these points:
   a. What is the purpose of the survey? What is its goal?
   b. What research questions or hypotheses are tested?
   c. Are any operational definitions required?
   d. Develop at least 10 questions relevant to the problem.
   e. Describe the approach to be used to collect data.
   f. Design a cover letter or an interview schedule for the study.
   g. Conduct a pretest to test the questionnaire.
6. Although it originated in England, the survey technique is most often used in the United States. What about survey research in other nations and other cultures? If you are using *InfoTrac College Edition,* you can find on-line articles from the October 1998 issue of the *American Behavioral Scientist* that describe some of the challenges of doing survey research in other countries.

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Chapter 9

# Longitudinal Research


- *Development*
- *Types of Longitudinal Studies*
- *Special Panel Designs*
- *Analyzing Causation in Panel Data*
- *Longitudinal Design in Experiments*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

Most of the research discussed to this point has been cross-sectional. In cross-sectional research, data are collected from a representative sample at only one point in time. Longitudinal research, in contrast, involves the collection of data at different points in time. Although longitudinal investigations are relatively rare in mass communication research, several longitudinal studies have been among the most influential and provocative in the field.

Of the 14 studies Lowery and DeFleur (1995) consider to be milestones in the evolution of mass media research, four involve the longitudinal approach: Lazarsfeld, Berelson, and Gaudet's *The People's Choice* (1944), which introduced the two-step flow model; Katz and Lazarsfeld's *Personal Influence* (1955), which examined the role of opinion leaders; the *Surgeon General's Report on Television and Social Behavior,* particularly as used in the study by Lefkowitz, Eron, Walder, and Huesmann (1972), which found evidence that viewing violence on television caused subsequent aggressive behavior; and the 10-year update of the Lefkowitz et al. report (Pearl, Bouthilet & Lazar, 1982), which cited the longitudinal studies that affirmed the link between TV violence and aggression. Other longitudinal studies also figure prominently in the field, including the elaborate panel study done for NBC by Milavsky, Kessler, Stipp, and Rubens (1982), the cross-national comparisons cited in Huesmann and Eron (1986), and the studies of mass media in elections as summarized by Peterson (1980). Thus, although it is not widely used, the longitudinal method can produce results that are both theoretically and socially important. See the Internet for nearly 2,000 references for "longitudinal research."

## ■ Development

Longitudinal studies have a long history in the behavioral sciences. In psychology in particular, they have been used to trace the development of children and the clinical progress of patients. In medicine, longitudinal studies have been used widely to study the impact of disease and treatment methods. The pioneering work in political science was done by sociologists studying the 1924 election campaign. Somewhat later, Newcomb (1943) conducted repeated interviews of Bennington College students from 1935 to 1939 to examine the impact of a liberal college environment on respondents who came from conservative families.

In the mass communication area, the first major longitudinal study was done by Lazarsfeld, Berelson, and Gaudet (1944) during the 1940 presidential election. Lazarsfeld pioneered the use of the panel technique in which the same individuals are interviewed several times. Lazarsfeld also developed the 16-fold table, one of the earliest statistical techniques to attempt to derive causation from longitudinal survey data. Another form of longitudinal research, **trend studies** (in which different people are asked the same question at different points in time) began showing up in mass media research in the 1960s. One of the most publicized trend studies was the continuing survey of media credibility done by the Roper organization. Trend studies by Gallup and Harris, among others, also gained notoriety during this time.

More recently, the notion of cohort analysis, a method of research developed by demographers, has become popular. Cohort analysis involves the study of specific populations, usually all those born during a given period, as they change over time. Other significant developments in longitudinal research have taken place as more sophisticated techniques for analyzing longitudinal data were developed. More technical information about advanced computational strategies for longitudinal data is contained in Magnusson, Bergman, Rudinger, and Torestad (1991) and in Uncles (1988).

Cross-lagged correlation was widely discussed during the 1960s and 1970s. Cross-lagged correlations are done when information about two variables is gathered from the same sample at two different times. The correlations between variables at the same point in time are compared with the correlations at different points in time. Three other forms of analysis using advanced statistical techniques have had relevance in longitudinal studies: path analysis, log-linear models, and structural equations. Path analysis is used to chart directions in panel data. Log-linear models are used with categorical panel data and involve the analysis of multivariate contingency tables. LISREL (LInear Structural RELations), a model developed by Joreskog (1973), is another statistical technique that has broad application in longitudinal analysis.

## ▪ Types of Longitudinal Studies

The three main types of longitudinal studies are trend study, cohort analysis, and panel study. Each is discussed in this section.

### Trend Studies

The trend study is probably the most common type of longitudinal study in mass media research. Recall that a trend study samples different groups of people at different times from the same population. Trend studies are common around presidential election time. Suppose that 3 months before an election a sample of adults is drawn; 57% report that they intend to vote for Candidate A and 43% for Candidate B. A month later a different sample drawn from the same population shows a change: 55% report that they are going to vote for A and 45% for B. This is a simple example of a trend study. Trend studies provide information about net changes at an aggregate level. In the example, we know that in the period under consideration, Candidate A lost 2% of his support. We do not know how many people changed from B to A or from A to B, nor do we know how many stayed with their original choice. We know only that the net result was a 2-point loss for A. To determine both the gross change and the net change, a panel study is necessary.

**Advantages.** Trend studies are valuable in describing long-term changes in a population. They can establish a pattern over time to detect shifts and changes in some event. Broadcast researchers, for example, compile trend studies that chart fluctuations in viewing levels for the major networks. Another advantage of trend studies is that they can be based on a comparison of survey data originally constructed for other purposes. Of course in utilizing such data, the researcher needs to recognize any differences in question wording, context, sampling, or analysis techniques that might differ from one survey to the next. Hyman (1987) provides extensive guidance on the secondary analysis of survey data. The growing movement to preserve data archives and the ability of computer networks, such as the Internet, to make retrieval and sharing much easier will help this technique gain in popularity. The Winter 1990 edition of *Public Opinion Quarterly* lists 19 data archives in the United States and other countries that are available for use by researchers. *The Gale Guide to Internet Databases* and *The Internet Compendium* list on-line databases that might be useful for mass media researchers.

Secondary analysis saves time, money, and personnel; it also makes it possible for researchers to understand long-term change. In fact, mass media researchers might want to consider what socially significant data concerning media behaviors should be collected and archived at regular intervals. Economists have developed regular trend indicators to gauge the health of the economy, but mass communication scholars have developed almost no analogous social indicators of the media or audiences.

***Disadvantages.*** Trend analysis is only as good as the underlying data. If data are unreliable, false trends will show up in the results. Moreover, to be most valuable, trend analysis must be based on consistent measures. Changes in the way indexes are constructed or the way questions are asked produce results that are not comparable over time.

***Examples of Trend Studies.*** Both university and commercial research firms have asked some of the same questions for many national and statewide trend studies. For example, in the United States, a question about satisfaction with the president's performance has been asked hundreds of times dating back to the administration of Harry Truman. *Public Opinion Quarterly* has a regular section entitled "The Polls" that allows researchers to construct trend data on selected topics. In recent issues the following trend data have appeared: (1) a 6-year sampling of public opinion about intervention in Bosnia, (2) a 20-year sampling of attitudes toward police, and (3) a 30-year compilation of public attitudes about homosexuality. Of specific interest in the field of mass media research are the trend data on changing patterns of media credibility, compiled for more than three decades by the Roper organization (summarized in Mayer, 1993). Among other well-known trend studies are the Violence Index constructed by Gerbner and his associates (Gerbner, Gross, Signorielli, Morgan & Jackson-Beeck, 1979) and the 6-year study of trends in network program shares of the audience and lead-in effects done by Davis and Walker (1990). Other examples are the trend study by Xiaoming (1994) that documents demographic trends in the television viewing habits of adults from the 1960s to the 1990s, Ader's (1995) use of Gallup poll results to document longitudinal trends in the environmental pollution agenda, and the Robinson and Levy study (1996) of the use of news media and general knowledge. In the professional area, the local market diary surveys in radio and television done by the Arbitron Company and A. C. Nielsen are examples of trend studies.

### Cohort Analysis

To the Romans, a "cohort" was 1 of the 10 divisions of a military legion. For research purposes, a *cohort* is any group of individuals who are linked in some way or who have experienced the same significant life event within a given period. Usually the "significant life event" is birth, in which case the group is termed a *birth cohort.* There are, however, many other kinds of cohorts, including marriage (for example, all those married between 1980 and 1985), divorce (for example, all those divorced between 1985 and 1990), education (the class of 1990), and others (all those who attended college during the Vietnam era).

Any study in which some characteristic of one or more cohorts is measured at two or more points in time is a **cohort analysis.** Cohort analysis attempts to identify a *cohort effect:* Are changes in the dependent variable due to aging, or are they present because the sample members belong to the same cohort? To illustrate, suppose that 50% of college seniors report that they regularly read news magazines, whereas only 10% of college freshmen in the same survey give this answer. How might the difference be accounted for? One explanation is that freshmen change their reading habits as they progress through college. Another is that this year's freshman class is composed of people with reading habits different from those who were enrolled 3 years earlier.

There are two ways to distinguish between these explanations. One way involves questioning the same students during their freshman year and again during their senior year and comparing their second set of responses to those of a group of current freshmen. (This is the familiar panel design, which is discussed in detail below.) Or a researcher can take two samples of the student population, at Time 1 and Time 2. Each survey has different participants—the same people are not questioned again, as in a panel study—but each sample represents the same group of people at different points in their college career. Although we have no direct information about which individuals changed their habits over time, we do have information on how the cohort of people who entered college at Time 1 had changed by the time they became seniors. If 15% of the freshmen at Time 1 read news magazines and if 40% of the seniors at Time 2 read them, we can deduce that students change their reading habits as they progress through college.

Typically a cohort analysis involves data in more than one cohort, and a standard table for presenting the data from multiple cohorts has been proposed by Glenn (1977). Table 9.1 is such a table. It displays news magazine readership for a number of birth cohorts. Note that the column variable (read down) is age, and the row variable (read across) is the year of data collection. Because the interval between any two periods of measurement (that is, surveys) corresponds to the age class intervals, cohorts can be followed over time. When the intervals are not equal, the progress of cohorts cannot be followed with precision.

Table 9.1 *Percentage Who Regularly Read News Magazines*

| | Year | | |
|---|---|---|---|
| Age | 1982 | 1986 | 1990 |
| 18–21 | 15 | 12 | 10 |
| 22–25 | 34 | 32 | 28 |
| 26–29 | 48 | 44 | 35 |

Three types of comparisons can be made from such a table. First, reading down a single column is analogous to a cross-sectional study and presents comparisons among different age cohorts at one point in time (intercohort differences). Second, trends at each age level that occur when cohorts replace one another can be seen by reading across the rows. Third, reading diagonally toward the right reveals changes in a single cohort from one time to another (an intracohort study). Thus Table 9.1 suggests that news magazine reading increases with age (reading down each column). In each successive time period, the percentage of younger readers has diminished (reading across the rows), and the increase in reading percentage as each cohort ages is about the same (reading diagonally to the right).

The variations in the percentages in the table can be categorized into three kinds of effects. (For the moment we assume that

Table 9.2 *Cohort Table Showing Pure Age Effect*

| | Year | | |
|---|---|---|---|
| Age | 1982 | 1986 | 1990 |
| 18–21 | 15 | 15 | 15 |
| 22–25 | 20 | 20 | 20 |
| 26–29 | 25 | 25 | 25 |
| Average | 20 | 20 | 20 |

Table 9.4 *Cohort Table Showing Pure Cohort Effect*

| | Year | | |
|---|---|---|---|
| Age | 1982 | 1986 | 1990 |
| 18–21 | 15 | 10 | 5 |
| 22–25 | 20 | 15 | 10 |
| 26–29 | 25 | 20 | 15 |
| Average | 20 | 15 | 10 |

Table 9.3 *Cohort Table Showing Pure Period Effect*

| | Year | | |
|---|---|---|---|
| Age | 1982 | 1986 | 1990 |
| 18–21 | 15 | 20 | 25 |
| 22–25 | 15 | 20 | 25 |
| 26–29 | 15 | 20 | 25 |
| Average | 15 | 20 | 25 |

there is no variation due to sampling error or to changing composition in each cohort as it ages.) First, influences are produced by the sheer fact of maturation, or growing older, called age effects. Second, there are the influences associated with members in a certain birth cohort, called cohort effects. Finally, influences are associated with each particular time period, called period effects.

To recognize these various influences at work, examine the hypothetical data in Tables 9.2, 9.3, and 9.4. Again, we assume that the dependent variable is the percentage of the sample who regularly read a news magazine. Table 9.2 demonstrates a "pure" age effect. Note that the rows are identical and the columns show the same pattern of variation. Apparently it does not matter when a person was born or in which period he or she lived. As the individual becomes older, news magazine readership increases. For ease of illustration, Table 9.2 shows a linear effect, but this is not necessarily the only effect possible. For example, readership might increase from the first age interval to the next but not increase from the second to the third.

Table 9.3 shows a "pure" period effect. There is no variation by age at any period; the columns are identical, and the variations from one period to the next are identical. Furthermore, the change in each cohort (read diagonally to the right) is the same as the average change in the total population. The data in this table suggest that year of birth and maturation have little to do with news magazine reading. In this hypothetical case, the time period seems to be most important. Knowing when the survey was done enables the researcher to predict the variation in news magazine reading.

A "pure" cohort effect is illustrated in Table 9.4. Here the cohort diagonals are constant, and the variation from younger to older respondents is in the opposite direction from the variation from earlier to later survey periods. In this table the key variable seems to be date of birth. Among those who were born between 1959 and 1962, news magazine readership was 15% regardless of their age or when they were surveyed.

Of course, these pure patterns rarely occur in actual data. Nonetheless an examination of Tables 9.2, 9.3, and 9.4 can help develop a sensitivity to the patterns one can detect in analyzing cohort data. In addition, the tables illustrate the logic behind the analysis. Glenn (1977) and Mason, Mason, Winsborough, and Poole (1973) also present tables showing pure effects.

***Advantages.*** Cohort analysis is an appealing and useful technique because it is highly flexible. It provides insight into the effects of maturation and social, cultural, and political change. In addition, it can be used with either original data or secondary data. In many instances, a cohort analysis can be less expensive than experiments or surveys.

***Disadvantages.*** The major disadvantage of cohort analysis is that the specific effects of age, cohort, and period are difficult to untangle through purely statistical analysis of a standard cohort table. In survey data, much of the variation in percentages among cells is due to sampling variability. There are no uniformly accepted tests of significance appropriate to a cohort table that allow researchers to estimate the probability that the observed differences are due to chance. Moreover, as a cohort grows older, many of its members die. If the remaining cohort members differ in regard to the variable under study, the variation in the cohort table may simply reflect this change. Finally, as Glenn (1977) points out, no matter how a cohort table is examined, three of the basic effects—namely, age, cohort, and period—are confounded. Age and cohort effects are confounded in the columns; age and period effects in the diagonals; and cohort and period effects in each row. Even the patterns of variations in the "pure" cohort Tables 9.2, 9.3, and 9.4 could be explained by a combination of influences.

Several authors have developed techniques to try to sort out these effects. Three of the most useful are Palmore's (1978) triad method, the constrained multiple regression model (Rentz, Reynolds & Stout, 1983), and the goodness-of-fit technique (Feinberg & Mason, 1980). If the researcher is willing to make certain assumptions, these methods can provide some tentative evidence about the probable influences of age, period, and cohort. Moreover, in many cases there is only one likely or plausible explanation for the variation. Nonetheless, a researcher should exercise caution in attributing causation to any variable in a cohort analysis. Theory and evidence from outside sources should be utilized in any interpretation. For example, in his study of the influences of television watching and newspaper reading on cohort differences in verbal ability, Glenn (1994) assumed that there were no period effects on changes in adult vocabulary during the duration of his study. As a result, he was able to demonstrate a cohort effect suggesting that decreases in verbal ability were associated with a decline in newspaper reading and an increase in TV viewing.

A second disadvantage of the technique is sample mortality. If a long period is involved or if the specific sample group is difficult to reach, the researcher may have some empty cells in the cohort table or some that contain too few members for meaningful analysis.

***Examples of cohort analysis.*** Cohort analysis is widely used in advertising and marketing research. For example, Rentz, Reynolds, and Stout (1983) conducted a cohort analysis of consumers born in four time periods: 1931–1940, 1941–1950, 1951–1960, and 1961–1970. Soft drink consumption was the dependent variable. Multiple regression analysis was used to help separate the three possible sources of variation. The results indicated a large cohort effect, suggesting that soft drink consumption does not decrease as successive cohorts age. Cohort analysis is also useful in the study of public opinion. Wilson (1996) conducted a cohort study that examined patterns of prejudice and found that the most recent cohorts of Americans showed no tendency to be less prejudiced than their predecessors. Rosengren and Windahl (1989) used cohort analysis as part of their in-depth longitudinal study of TV use by Swedish youngsters. Among other things, they found a slight cohort effect but noted that age seemed the prime determinant of habitual television viewing. Basil (1990) found a cohort effect in a person's choice of his or her primary news source. Older people relied more on newspapers than did younger cohorts. Jennings (1996) analyzed cohort data on political knowledge gathered from a sample of 12th-graders and their parents and found both period and cohort effects. Finally, in his cohort analysis of newspaper readership patterns, Stevenson (1994) discovered both an age and a cohort effect: Readership increased with age, but within each age cohort readership declined over the 10-year period covered by the study.

## Panel Studies

Panel studies measure the same sample of respondents at different points in time. Unlike trend studies, panel studies can reveal information about both net change and gross change in the dependent variable. For example, a study of voting intentions might reveal that between Time 1 and Time 2, 20% of the panel switched from Candidate A to Candidate B and 20% switched from Candidate B to Candidate A. Whereas a trend study would show a net change of zero because the gross changes simply canceled each other out, the panel study would show a high degree of volatility in voting intention.

Similar to trend and cohort studies, panel studies can make use of mail questionnaires, telephone interviews, personal interviews, or the Internet via web panels. Television networks, advertising agencies, and marketing research firms use panel studies to track changes in consumer behavior. Panel studies can reveal shifting attitudes and patterns of behavior that might go unnoticed with other research approaches; thus trends, new ideas, fads, and buying habits are among the variables investigated. For a panel study on the effectiveness of political commercials, for example, all members of the panel would be interviewed periodically during a campaign to determine whether and when each respondent makes a voting decision.

Depending on the purpose of the study, researchers can use either a continuous panel, consisting of members who report specific attitudes or behavior patterns on a regular basis, or an interval panel, whose members agree to complete a certain number of measurement instruments (usually questionnaires) only when the information is needed. Panel studies produce data suitable for sophisticated statistical analysis and enable researchers to predict cause-and-effect relationships.

***Advantages.*** Panel data are particularly useful in answering questions about the dynamics of change. For example, under what conditions do voters change political party affiliation? What are the respective roles of mass media and friends in changing political attitudes? Moreover, repeated contacts with the respondents may help reduce their suspicions, so that later interviews yield more information than the initial encounters. Of course, the other side to this benefit is the sensitization effect, discussed under "Disadvantages." Finally, panel studies help solve the problems normally encountered when defining a theory on the basis of a one-shot case study. Since the research progresses over a period of time, the researcher can allow for the influences of competing stimuli on the subject.

One of the most common causes of attrition in panel research is the inability to locate the original respondents for a follow-up study. The longer the time lag between the two waves of data collection, the more severe this problem becomes. A variety of tracking strategies are available, however, for persistent researchers who wish to overcome this problem. Call, Otto, and Spenner (1982) offer the following suggestions for finding those missing respondents:

Use the U.S. Postal Service to find forwarding addresses.
Check with the phone company for new phone numbers.
Question family and relatives for current location.
Ask neighbors for current information.
Interview former classmates.
Enlist the aid of a high school class reunion committee.
Check with former employees.
Examine records of college alumni associations.
Inquire at churches in the area.
Examine driver's license registration records.
Utilize military locator services.
Hire a professional tracking company (such as Equifax or Tracers Company of America).

***Disadvantages.*** On the negative side, panel members are often difficult to recruit because of an unwillingness to fill out questionnaires or submit to interviews several times. The number of initial refusals in a panel study fluctuates, depending on the amount of time required, the prestige of the organization directing the study, and the presence or absence of some type of compensation. One analysis of the refusal rates in 12 marketing panel studies found a range of 15%–80%, with a median of about 40% (Carman, 1974). Wimmer (1995) found that even a cash incentive may not increase a respondent's willingness to participate in a panel study.

Once the sample has been secured, the problem of mortality emerges. Some panel members will drop out for one reason or another. Because the strength of panel studies is that they interview the same people at different times, this advantage diminishes as the sample size decreases. Sullivan, Rumptz, Campbell, Eby, and Davidson (1996) present several helpful techniques that have been shown to minimize sample mortality:

- Offering a stipend or payment to panel members
- Establishing the credibility and value of the research project
- Gathering detailed information about panel member's friends, coworkers, and family who might know the whereabouts of the respondent
- Contacting the panel member between data collection waves
- Giving panel members a card with a phone number to call if they change addresses

Another serious problem is that respondents often become sensitized to measurement instruments after repeated interviewing, thus making the sample atypical (see Chapter 5). For example, panelists who know in advance that they will be interviewed about public TV watching might alter their viewing patterns to include more PBS programs (or fewer). Menard (1991) suggests that a revolving panel design might overcome the sensitization problem. In this design, after the first measurement period, some of the original members of the panel are replaced by new members. For example, if the researcher is concerned that increased PBS viewing is the result of sensitization, he or she could interview 100 viewers during Week 1 and then replace 50 of the original sample with new panel members in Week 2. The viewing data from those who had been interviewed twice could then be compared with the data from those who participated in a single interview.

Finally, respondent error is always a problem in situations that depend on self-administered measurement instruments. If panelists are asked to keep a diary over a certain period, some may not fill it out until immediately before it is due. And, of course, panel studies require much more time and can be quite expensive.

***Examples of Panel Studies.*** Perhaps the most famous example of the panel technique in mass media research is the collection of national television audience data by the A. C. Nielsen Company. Nielsen's sample consists of approximately 4,500 households located across the United States. These homes are equipped with people meters—devices that record when the television set is turned on, which channel is tuned in, and who is watching. (See Chapter 15 for more information about people meters.) Other panels are maintained by such commercial research organizations as Market Facts, Inc., National Family Opinion, Inc., and the Home Testing Institute.

A study by Bolton and Drew (1991) illustrated the advantage in using a panel study to understand the process of change in a specific area. In their longitudinal study of the impact of changes in telephone service, they found that changes in the evaluation of individual components of telephone service (for example, absence of static, quality of voice) were influenced quickly by a service change but that changes in the general evaluations of telephone service were noticeable only after 6 months. Outside the marketing area, a well-publicized panel study was carried out with the support of the National Broadcasting Company (Milavsky et al., 1982). The overall purpose of this study was to isolate any possible causal influence on aggression among young people from viewing violence on television. Three panel studies were conducted, with the most ambitious involving boys aged 7–12. In brief, the methodology in the study involved collecting data on aggression, TV viewing, and a host of sociological variables from children in Minneapolis, Minnesota, and Fort Worth, Texas, on six occasions. About 1,200 boys participated in the study. The time lags between each wave of data collection were deliberately varied so that the effects of TV viewing could be analyzed over different durations. Thus there was a 5-month lag between Waves 1 and 2, a 4-month lag between Waves 2 and 3, and a 3-month lag between Waves 3 and 4. The lag between Waves 1 and 6 constituted the longest elapsed time (3 years). As is the case in all panel studies, the NBC study suffered from attrition. The particular design, however, magnified the effects of attrition. When respondents left the sixth grade, they frequently left the panel. Consequently, only a small number of children (58 of the 1,200 who participated) were available for observing and analyzing the long-term effects of viewing violence on TV.

The participant losses reported by the NBC team illustrate the impact of year-to-year attrition on a sample of this age group. About 7% of the sample was lost in the first year, approximately 37% in the first 2 years, and 63% over all 3 years.

The study also illustrates how a panel design influences the statistical analysis. The most powerful statistical test would have incorporated data from all six waves and simultaneously examined all the possible causal relationships. This was impossible, however, because due to the initial study design and subsequent attrition, the sample size fell below minimum standards. Instead, the investigators worked with each of the 15 possible wave pairs in the sample. The main statistical tests used the analytical technique of partial regression coefficients to remove the impact of earlier aggression levels. In effect, the researchers sought to determine whether TV viewing at an earlier time added to the predictability of aggression at a later time, once the aggression levels present before the test began had been statistically discounted. After looking at all the resulting coefficients for all the possible wave pairs, the investigators concluded that there was no consistent statistically significant relationship between watching violent TV programs and later acts of aggression. Nonetheless, they did find a large number of small but consistently positive coefficients that suggested the possibility of a weak relationship that might not have been detected by conventional statistical methods. Upon further analysis, however, the researchers concluded that these associations were due to chance.

Since their initial publication, the NBC data have been the topic of at least three reanalyses and reinterpretations (Cook, Kendizierski & Thomas, 1983; Kenny, Milavsky, Kessler, Stipp & Rubens, 1984; Turner, Hesse & Peterson-Lewis, 1986). Concerns were raised over various aspects of the methodology and the appropriateness of conventional standards of statistical significance in light of the small samples and skewed aggression measures. It is likely that more reanalyses will follow. Nonetheless, this study has value for anyone interested in longitudinal research. Many of the problems encountered in panel studies and the compromises involved in doing a 3-year study are discussed in great detail.

The panel technique continues to be popular for studying the impact of TV violence. Singer, Singer, Desmond, Hirsch, and Nicol (1988) used this technique to examine the effects of family communication patterns, parental mediation, and TV viewing on children's perceptions of the world and their aggressive behavior. Ninety-one first- and second-graders were interviewed during the first phase of the study. One year later, 66 of the original sample were reinterviewed. Concerned about the effects of attrition, the researchers compared their final sample with the original on a wide range of demographic variables and found that attrition did not cause any significant differences between the two groups. Singer and colleagues found that family communication patterns during the first phase were strong predictors of children's cognitive scores but were only weakly related to emotional and behavioral variables. The influence of TV viewing on aggression was greatest among heavy viewers who were least exposed to parental mediation.

The Rosengren and Windahl study (1989) mentioned earlier arrived at a similar conclusion. During their panel study of Swedish schoolchildren, the investigators interviewed the main panel participants in 1976, 1978, and 1980. This study is remarkable for its low attrition rate: About 86% of those in the original 1976 survey were also in the 1980 survey. The researchers found that the relationship between TV violence and antisocial behavior was greatest among those children who were heavy viewers (more than 15 hours a week) of TV.

Potter (1992) used a three-wave panel study across 5 years to examine how adolescents' perceptions of television's reality changed over time. The design was such that no respondent was present in all three waves. Of the 287 original respondents in Wave 1, 196 were tested again in Wave 2. Of the 443 original respondents in Wave 2, 115 were also measured in Wave 3. Valkenburg and Van Der Voort (1995) conducted a 1-year panel study of Dutch children to investigate the influence of television on children's daydreaming. They found that children's daydreaming styles in Year 1 did not influence TV viewing behavior in Year 2 but that TV viewing in Year 1 did influence daydreaming in Year 2. Koolstra and Van Der Voort (1996) collected panel data from elementary school children at three successive 1-year intervals to assess the impact of TV on children's leisure time reading. About 20% of the sample was lost to attrition. Finally, Lindstrom (1997) reported the results of a panel study of Internet users. About 4,200 respondents were interviewed by telephone. Six months later, data were obtained from about 68% of the original sample. Of those that were not reinterviewed, 16% refused, 7% had nonworking numbers, the same number never answered the phone, and 2% were never contacted.

Search the Internet for "panel study" or "panel studies" for many examples of how the research approach is used.

## Special Panel Designs

Panel data can be expensive to obtain. Moreover, analysis cannot begin until at least two waves of data are available. For many panel studies, this may take years. Researchers who have limited time and resources might consider one of the alternatives discussed next.

Schulsinger, Mednick, and Knop (1981) outlined a research design called a retrospective panel. In this method, the respondent is asked to recall facts or attitudes about education, occupations, events, situations, and so on, from the past. These recalled factors are then compared with a later measure of the same variable, thus producing an instant longitudinal design. Belson (1978) used a variation of this design in his study of the effects of exposure to violent TV shows on the aggressive behavior of teenage boys when he asked his respondents to recall when they first started watching violent TV programs.

There are several problems with this technique. Many people have faulty memories; some deliberately misrepresent the past; and others try to give a socially desirable response. Only a few research studies have examined the extent to which retrospective panel data might be misleading. Powers, Goudy, and Keith (1978) reanalyzed data from a 1964 study of adult men. In 1974 all the original respondents who could be located were reinterviewed and asked about their answers to the 1964 survey. In most instances, the recall responses presented respondents in a more favorable light than did their original answers. Interestingly enough, using the 1974 recall data produced almost the same pattern of correlations as using the 1964 data, suggesting that recall data might be used, albeit with caution, in correlational studies. In 1974 Norlen (1977) reinterviewed about 4,700 persons originally questioned in 1968. Of those reinterviewed, 464 had originally reported that they had written a letter to the editor of a newspaper or magazine, but in 1974 about a third of this group denied ever having written to a newspaper or magazine. Auriat (1993) found that respondents were more likely to recall correctly the month of a major life event (in this case, a family move) than they were the year. In addition, women were slightly better than men at remembering exact dates. Clearly, the savings in time and money accrued by using retrospective data must be weighed against possible losses in accuracy.

A **follow-back panel** selects a cross-sectional sample in the present and uses archival data from an earlier point in time to create the longitudinal dimension of the study. The advantages of such a technique are clear: Changes that occurred over a great many years can be analyzed in a short time period. This design is also useful in studying dwindling populations, because the researcher can assemble a sample from baseline investigations conducted earlier, probably at great expense. The disadvantages are also obvious. The follow-back panel depends on archival data, and archives do not contain many variables that interest mass media researchers. In addition, the resulting sample in a follow-back design may not represent all possible entities. For example, a follow-back study of the managerial practices of small radio stations will not represent stations that went out of business and no longer exist.

A **catch-up panel** involves selecting a cross-sectional study done in the past and locating all possible units of analysis for observation in the present. The catch-up design is particularly attractive if the researcher has a rich source of baseline data in the archive. Of course, this is usually not the case because most data sources lack enough identifying information to allow the investigator to track down the respondents. When the appropriate data exist, however, the catch-up study can be highly useful. In effect, Lefkowitz and colleagues (1972) used a catch-up technique in their study of TV watching and child aggression. After a lapse of 10 years, the investigators tracked down 735 of 875 youths who had participated in a survey of mental health factors when they were in the third grade. These individuals were recontacted and asked questions similar to those they had answered as young children. Huesmann and his colleagues (Huesmann, 1986) caught up with this panel one more time when the panel members were 30 years old. After reinterviewing 409 subjects from the original pool of 875, the authors concluded that this 22-year panel study demonstrated that viewing TV violence can have harmful lifelong consequences.

Another problem associated with the catch-up panel involves the comparability of measures. If the earlier study was not constructed to be part of a longitudinal design, the original measurement instruments have to be modified. For example, a study of 10-year-olds might have used teacher ratings to measure aggressiveness; however, such a measure is not appropriate with 20-year-olds.

Finally, the researcher in the catch-up situation is confined to the variables measured in the original study. In the intervening time, new variables might have been identified as important, but if those variables were not measured during the original survey, they are unavailable to the researcher. Figure 9.1 shows the similarities and differences among retrospective, follow-back, and catch-up panel designs.

## ▪ *Analyzing Causation in Panel Data*

The panel design provides an opportunity for the researcher to make statements about the causal ordering among different variables. Three conditions are necessary for determining cause and effect. The first is time order. Causation is present if and only if the cause precedes the effect. Second, causation can occur only if some tendency for change in A results in change in B. In other words, there is an association between the two variables. Third, before effects are attributed to causes, all other alternative causes must be ruled out. Cross-sectional surveys, for which the data are collected at a single point in time, can meet only two of these three criteria. A cross-sectional survey allows the researcher to say that Variables A and B are associated. A skillfully constructed questionnaire and statistical controls such as partial correlation can help the researcher rule out alternative explanations. Nonetheless, only if the time order between A and B is evident can statements of cause be inferred. For example, a person's education is typically acquired before his or her occupational status. Thus the statement that education is a cause of occupational status (all other things being equal) can be inferred. If there is no distinguishable temporal sequence in the data (as is the case with viewing violence on TV and aggressive behavior), causal statements are conjectural.

Figure 9.1 *Comparison of Retrospective, Follow-back, and Catch-up Designs*

Retrospective panel

Step 1: Select current sample.
Step 2: Interview sample about past recollections concerning topic of interest.
Step 3: Collect current data on topic of interest.
Step 4: Compare data.

Follow-back panel

Step 1: Select current sample.
Step 2: Collect current data on topic of interest.
Step 3: Locate archival data on sample regarding topic of interest.
Step 4: Compare data.

Catch-up panel

Step 1: Locate archival data on topic of interest.
Step 2: Select current sample by locating as many respondents as possible for whom data exist in the archive.
Step 3: Collect current data on topic of interest.
Step 4: Compare data.

In a panel study, however, the variables are measured across time, which makes causal inferences more defensible.

Note, however, two important points: On the one hand, the interval between measurement periods must be long enough to allow the cause to produce an effect. For example, if it takes a full year for exposure to TV violence to have an effect on viewers' aggressive behavior, then a panel study with only 6 months between measurement periods will not discover any effect. On the other hand, if a cause produces an effect that does not remain stable over the long run, an overly long interval between measurement waves will fail to discover an effect. Continuing the example, let us suppose that exposure to TV violence produces an effect that appears 3 months after exposure but quickly disappears. A panel survey with 6 months between waves will totally miss observing this effect. The hard part, of course, is determining the proper time intervals. Most researchers rely on past research and appropriate theories for some guidelines.

Many statistical techniques are available for determining a causal sequence in panel data. A detailed listing and explanation of the computations involved are beyond the scope of this book. Nonetheless, some of the following references will be helpful to readers who desire more detailed information. Menard (1991) discusses common methods for analyzing panel data measured at the interval level. Similarly, Markus (1979) gives computational methods for data measured at the interval level and discusses ways to analyze dichotomous panel data, including the increasingly popular log-linear technique. Asher (1983) provides a detailed discussion of path analysis. Trumbo (1995) describes statistical methods for analyzing panel data including time series analysis and Granger verification and illustrates their use in a longitudinal study of agenda setting.

Finally, the most mathematically sophisticated technique, linear structural equations, or LISREL, is discussed in Joreskog (1973), Long (1976), and Hayduk (1996). Since it appears that the LISREL method has much to recommend it (it was used in the NBC panel study discussed previously), researchers who intend to do panel studies should be familiar with its assumptions and techniques.

## ▪ *Longitudinal Design in Experiments*

Although the preceding discussion was concerned with survey research, experimental research has a longitudinal dimension that should not be overlooked. Many research designs are based on a single exposure to a message, with the dependent variable measured almost immediately afterward. This procedure might be appropriate in many circumstances, but a longitudinal treatment design may be necessary to measure subtle, cumulative media effects. Furthermore, delayed assessment is essential to determine the duration of the impact of certain media effects (for example, how long does it take a persuasive effect to disappear?).

Bryant, Carveth, and Brown (1981) illustrated the importance of the longitudinal design to the experimental approach. In investigating TV viewing and anxiety, they divided their subjects into groups and assigned to each a menu of TV shows they could watch. Over a 6-week period, one group was assigned a light viewing schedule, and a second was directed to watch a large number of shows that depicted a clear triumph of justice. A third group was assigned to view several shows in which justice did not triumph. One of the dependent variables was also measured over time. The investigators obtained voluntary viewing data by having students fill out diaries for another 3 weeks. The results of this study indicated that the cumulative exposure to TV shows in which justice does not prevail seems to make some viewers more anxious, thus offering some support to Gerbner's cultivation hypothesis.

A study by Zillmann and Bryant (1982) also showed the importance of the longitudinal dimension in assessing the cumulative effects of continued exposure. One experimental group watched nearly 5 hours of pornographic films over a 6-week period, a second group saw about 2.5 hours over the same period, while a control group saw nonpornographic films. Those exposed to the larger dose of pornography showed less compassion toward women as rape victims and toward women in general. More recently, Wicks (1992) exposed 46 subjects to a TV newscast or newspaper account of several stories. Subjects were then told to think about the stories for 2 days. Upon retesting, the subjects had higher recall scores than they had immediately after viewing or reading, thus demonstrating the "hypernesia" effect. Clearly, the longitudinal design can be of great value in experimental research.

## ▪ ▪ ▪ *Summary*

Longitudinal research involves the collection of data at different points in time. The three types of longitudinal study are trend, cohort, and panel. A trend study asks the same questions of different groups of people at different points in time. A cohort study measures some characteristic of a sample whose members share some significant life event (usually the same age range) at two or more points in time. In a panel study, the same respondents are measured at least twice. One advantage of the panel design is that it allows the researcher to make statements about the causal ordering of the study variables, and several different statistical methods are available for this task.

## Questions and Problems for Further Investigation

1. Search recent issues of scholarly journals for examples of longitudinal studies. Which of the three designs discussed in this chapter is used? Try to find additional longitudinal studies done by commercial research firms. What design is used most often?
2. What mass media variables are best studied using the cohort method?
3. What are some possible measures of media or audience characteristics that might be regularly made and stored in a data archive for secondary trend analysis?
4. How might a panel study make use of laboratory techniques?

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Chapter 10

# Experimental Research


- *Advantages and Disadvantages of Laboratory Experiments*
- *Conducting Experimental Research*
- *Control of Confounding Variables*
- *Experimental Design*
- *Quasi-Experimental Designs*
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*Summary*

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This chapter describes the experimental method of research and its use in mass media investigations. Experiments are used much more often in fields such as psychology than in media research. For example, a 1994 survey by Cooper, Potter, and Dupagne (1994) found that from 1965 to 1989 only 15% of published quantitative studies used the experimental method. In contrast, nearly 50% relied on surveys (see Chapter 8). Nonetheless, the experimental method is the oldest approach in mass media research and continues to provide a wealth of information for researchers and critics of the media. Because of their relative infrequency, however, we examine only the more basic techniques in this chapter. Readers who wish to learn more about advanced experimental procedures should consult Montgomery (1997) and Christensen (1997). This chapter discusses controlled laboratory experiments, then examines quasi-experimental designs, and concludes with a consideration of field experiments.

## ■ Advantages and Disadvantages of Laboratory Experiments

There are several reasons why mass media researchers might select the experimental method:

1. *Evidence of causality.* Experiments help establish cause and effect. Although philosophers of science might argue whether we can ever really prove a cause-and-effect link between two variables, the experiment is undoubtedly the best social science research method for establishing causality. The researcher controls the time order of the presentation of two variables and thus makes sure that the cause actually precedes the effect. In addition, the experimental method allows the investigator to control other possible causes of the variable under investigation.

2. *Control.* As suggested previously, control is another advantage of the experimental method. Researchers have control over the environment, the variables, and the subjects. Laboratory research allows investigators to isolate a testing situation from the competing influences of normal activity. Researchers are free to structure the experimental environment in almost any way. Lighting and temperature levels, proximity of subjects to measuring instruments, soundproofing, and nearly every other aspect of the experimental situation can be arranged and altered. Environmental control, however, has its drawbacks, and the artificially created environment of the laboratory is one of the main disadvantages of the technique.

Laboratory studies also allow researchers to control the numbers and types of independent and dependent variables selected and the way these variables are manipulated. Variable control strengthens internal validity and helps eliminate confounding influences. Gilbert and Schleuder (1990), for example, were able to control almost every detail of their laboratory analysis of the effects of color and complexity in still photographs.

The experimental approach also allows researchers to control subjects. This includes control over the selection process, assignment to the control or the experimental group, and exposure to experimental treatment. Researchers can place limits on the number of subjects who participate in a study, and they can choose specific types of subjects for exposure in varying degrees to the independent variable. For example, researchers may select subjects according to which medium they use for news information and vary each subject's exposure to commercials of different types to determine which is the most effective.

3. *Cost.* In relative terms, the cost of an experiment can be low when compared to other research methods. An advertising researcher, for example, can examine the impact of two different ad designs using an experimental design with as few as 40–50 subjects. A comparable test done in the field would be far more costly.

4. *Replication.* Finally, the experimental method permits replication. Typically the conditions of the study are clearly spelled out in the description of an experiment, which makes it easier for others to replicate. In fact, classic experiments are often repeated, sometimes under slightly different conditions, to ensure that the original results were not idiosyncratic.

The experimental technique, however, is not perfect. It has three major disadvantages.

1. *Artificiality.* Perhaps the biggest problem with using this technique is the artificial nature of the experimental environment. The behavior under investigation must be placed in circumstances that afford proper control. Unfortunately, much behavior of interest to mass media researchers is altered when studied out of its natural environment. Critics claim that the sterile and unnatural conditions created in the laboratory produce results that have little direct application to real-world settings, where subjects are continually exposed to competing stimuli. Miller (1991) notes that critics of the laboratory method often resort to ambiguous and disjunctive arguments about the artificiality of the procedure, suggesting that contrasting the "real" world with the "unreal" world may, in fact, be merely a problem in semantics. The main point, he claims, is that both the laboratory method and the field method investigate communication behavior, and if viewed in this way, it is meaningless to speak of behavior as "real" or "unreal": All behavior is real.

Miller also notes, however, that it is unsatisfactory and unscientific to dodge the problem of artificiality in laboratory procedures by including a disclaimer in a study indicating that the findings are applicable only to a particular audience, to the environmental conditions of the analysis, and to the period during which the study was conducted. Since external validity is a major goal of scientific research, a disclaimer of this nature is counterproductive. If researchers are not willing to expand their interests beyond the scope of a single analysis, such studies have only heuristic value; they make little or no contribution to the advancement of knowledge in mass media.

Many researchers have conducted field experiments in an attempt to overcome the artificiality of the laboratory. Although they take place in more natural surroundings, field experiments are subject to problems with control.

2. *Experimenter bias.* Experiments can be influenced by experimenter bias (see Chapter 2). Rosenthal and Jacobson (1966) discovered that experimenters who were told what findings to expect had results more in line with the research hypothesis than experimenters who were not told what to expect. To counteract this problem, some researchers use the double-blind technique, in which neither subjects nor researchers know whether a given subject belongs to the control group or to the experimental group.

3. *Limited scope.* Finally, some research questions simply don't lend themselves to the experimental approach. Many of the more interesting research topics in mass

communication are concerned with the collective behavior of perhaps millions of people. Experiments on this scale are much too massive to conduct. Consider, for example, the cultivation effect (discussed in more detail in Chapter 17), which involves the long-term impact of television on society. Any experimental design that would "test" the cultivation effect would be too time-consuming, expensive, and ethically questionable to take place. Although it is possible to conduct some smaller-scale experiments on this topic with small groups of subjects, it is unclear how these experiments relate to the larger-scale phenomenon.

## ▪ Conducting Experimental Research

The experimental method involves both manipulation and observation. In the simplest form of an experiment, researchers manipulate the independent variable and then observe the responses of subjects on the dependent variable. Although every experiment is different, most researchers agree that the following eight steps should be followed when conducting an experiment:

1. *Select the setting.* Many experiments are best done in a laboratory or in another environment under the direct control of the researcher. Others are best done in more natural surroundings where the researcher has little, if any, control over the experimental situation. This latter type of experiment is discussed in more detail later in this chapter.

2. *Select the experimental design.* The appropriate design depends upon the nature of the hypothesis or the research question, types of variables to be manipulated or measured, availability of subjects, and amount of resources available.

3. *Operationalize the variables.* In the experimental approach, independent variable(s) are usually operationalized in terms of the manipulation done to create them. Dependent variables are operationalized by constructing scales or rules for categorizing observations of behavior.

4. *Decide how to manipulate the independent variable.* To manipulate the independent variable (or variables), a set of specific instructions, events, or stimuli are developed for presentation to the experimental subjects. There are two types of manipulations: straightforward and staged.

In **straightforward manipulation,** written materials, verbal instructions, or other stimuli are presented to the subjects. For example, Baran, Mok, Land, and Kang (1989) used a straightforward manipulation of their independent variable—product positioning. One group of subjects was presented with a "generic" shopping list containing items such as ice cream, frozen dinner, mustard, and coffee. Another group saw the "practical" list with items such as Borden's ice cream, Swanson's frozen dinner, French's mustard, and Maxwell House coffee. A third group was presented with the "upscale" list consisting of Lean Cuisine frozen dinner, Grey Poupon mustard, General Foods International Coffees, and similar items. Each group was then asked to make judgments about the character of the person to whom the list belonged. As predicted by the experimenters, the shopping lists had an impact on the way subjects evaluated the general goodness and responsibility of the lists' authors. Leshner, Reeves, and Nass (1998) manipulated the source of a television news story by attributing it to either a general news source (one of the four broadcast TV networks) or a specialized channel (CNN or a regional news network). News that appeared on the specialized channels was evaluated more positively than the same news on a general channel.

In a **staged manipulation,** researchers construct events and circumstances that enable them to manipulate the independent variable. Staged manipulations can be relatively simple or rather elaborate. They frequently involve the use of a confederate, a person who pretends to be a subject but who is actually part of the manipulation.

For example, staged manipulations and confederates have been used in experiments that examine the impact of media portrayals of antisocial behavior. In their study of rock music videos, Hansen and Hansen (1990) showed half of their sample three music videos that depicted antisocial behavior; the other half of the sample viewed three rock videos depicting a more "neutral" type of behavior. The subjects then watched a videotaped job interview of a person applying for a position with the campus TV station's rock video program. One version of this tape showed the applicant (who was actually a confederate of the experimenters) making an obscene gesture while the interviewer's back was turned. Subjects who had previously viewed the rock videos depicting "neutral" behaviors evaluated the applicant's behavior more negatively than did the subjects who saw the videos depicting antisocial behaviors.

Hoyt (1977) investigated the effects of television coverage on courtroom behavior. In a staged manipulation of three groups of subjects, he separately questioned the groups about a film they had just viewed. One group answered questions in the presence of a TV camera at the front of the room; a second group answered questions with the camera concealed behind a full-length mirror; and a third group answered questions without being filmed. Hoyt found no differences in subjects' verbal behaviors across the three conditions.

No matter what manipulation technique is used, a general principle for the experimenter to follow is to construct or choose a manipulation that is as strong as possible to maximize potential differences between the experimental groups. If, for example, an experimenter is trying to assess the effects of different degrees of newspaper credibility on audience perceptions of the accuracy of a story, one condition might attribute the story to the *New York Times* and another might attribute it to the *National Enquirer* or the *National Star.* A strong manipulation maximizes the chances that the independent variable has an effect.

5. *Select and assign subjects to experimental conditions.* Recall from Chapter 2 that, to ensure external validity, experimental subjects should be selected randomly from the population under investigation. The various random sampling techniques discussed in Chapter 5 are also appropriate for selecting subjects for experimental studies.

6. *Conduct a pilot study.* A pilot study with a small number of subjects will reveal problems, and it will also allow the experimenter to make a **manipulation check**—a test to see whether the manipulation of the independent variable actually has the intended effect. For example, suppose a researcher wants to assess the effect of the viewer's involvement in a TV show on how well the viewer remembers the ads in the show. The experimenter constructs TV shows labeled "high involvement" (a cliff-hanger with lots of suspense), "medium involvement" (a family drama), and "low involvement" (a Senate committee hearing taped from C-SPAN). To check whether these programs actually differ in involvement, the experimenter must measure the degree to which subjects were actually involved with the programs under each of the conditions. Such a check might include a self-report, an observational report (such as counting the number of times a subject looked away from the screen), or even a physiological measure. If the check shows that the manipulation was not effective, the experimenter can revamp the manipulation before the main experiment is conducted. (It is also a good idea to include a manipulation check in the main experiment itself.)

7. *Administer the experiment.* After the bugs are out and the manipulation is checked,

the main phase of data collection begins. Experimental manipulations can be carried out on either individuals or groups. The dependent variable is measured, and the subjects are debriefed. During debriefing, the experimenter explains the purpose and the implications of the research. If the manipulation required deception, the experimenter must explain why and how the deception was used. (See Chapter 4 for more about deception and other ethical problems of research.)

8. *Analyze and interpret the results.* The subjects' scores on the dependent variable(s) are tabulated, and the data are subjected to statistical analysis. Many statistics discussed in Chapters 11 and 13 are used to analyze the results of experiments. Finally, the experimenter must decide what the results mean. In some experiments, this may be the most difficult task.

## Control of Confounding Variables

As discussed in Chapters 2 and 4, experimenters must ensure the internal validity of their research by controlling for the effects of extraneous, or confounding, variables that might contaminate their findings. These variables can be controlled through the environment, experimental manipulations, experimental design, or assignment of subjects; all of these items are under the experimenter's direct supervision. This section concentrates on techniques used to ensure that the various groups in an experiment are comparable before the experimental treatment is administered. This is an important consideration because it helps to rule out all of the possible alternative explanations based on the natural differences among people.

Perhaps an example will illustrate this point. Suppose an experimenter wants to determine whether different versions of a TV commercial's musical soundtrack have different impacts on what is remembered from that ad. The experimenter uses a media research class as the sample and assigns an ad with a rap soundtrack to the students in the first three rows. Students in the last three rows view the same ad but hear a heavy metal soundtrack. Both groups are then given a memory test, and the results show that the group that heard the rap soundtrack remembered more information from the ad. How confident should the researcher be of this conclusion? Not too confident: It is entirely possible that the people who sat in the first three rows of the class are different from those who sat in the back. The "fronters" might have chosen the front seats because they are more intelligent, more attentive, and more alert than the "backers," who might have sat in the rear of the room so they could sleep, talk, or otherwise amuse themselves. Consequently, the superior performance of the "fronters" might be due to these factors rather than to the effectiveness of the soundtrack.

How can experimenters assure that their groups are equivalent? There are three main techniques: randomizing, matching, and including the confounding variable in the design.

### Randomization

A powerful technique for eliminating the influence of extraneous variables is randomization: randomly assigning subjects to various treatment groups. Random assignment means that each subject has an equal chance of being assigned to each treatment group. This method works because the variables to be controlled are distributed in approximately the same manner in all groups. In the preceding example, suppose that the experimenter had randomly assigned students to one group or the other instead of assigning them according to where they sat. It is highly probable that the average level of intelligence in the two groups would have been the same, as would have been their levels of attentive-

*Importance of Pretesting*

The following scenario illustrates the importance of pretesting in an experiment. A researcher was planning to conduct a study with high school students. After completing the laborious process of securing approval from the appropriate authorities, the researcher scheduled a date and showed up bright and early to collect the data. About 70 students were assembled in the auditorium, and the school's principal had given the researcher 45 minutes to collect the data. No problem, thought the researcher. The subjects merely had to listen to a few musical selections and fill out rating scales. The researcher passed out the sheets containing the rating scales and told students to get their pencils or pens ready. At this point the students looked perplexed, and many protested that they did not have pencils or pens with them. Unlike the college students that the researcher was used to, high school students do not routinely carry pens or pencils.

With the allotted time quickly running out, the researcher ran to the principal's office and asked to borrow pencils. Luckily, there were several boxes in the supply cabinet. The researcher hurried back into the auditorium and started to pass out the pencils when he suddenly discovered that they were not sharpened. A frenzied search of the auditorium revealed exactly one pencil sharpener that probably dated from the 1930s. Needless to say, the experiment had to be rescheduled. Since that experience the researcher has never failed to run a pretest before doing an experiment. And he always brings along plenty of pencils!

ness and alertness, thus ruling out those variables as alternative explanations. In addition, randomization would equalize some other confounding factors that the experimenter might have overlooked. Random assignment would avoid the presence of a disproportionate number of men or women in one or the other group, which skews the results. The same might be said for geographic background: Randomization would provide for proportionate numbers of urban versus rural residents in each group.

There are several ways that randomization can be achieved. If there are only two groups in the experiment, the experimenter might simply flip a coin. If heads comes up, the subject goes to Group 1; if tails, Group 2. Experimental designs with more than two groups might use a table of random numbers to assign subjects. In a four-group design, a two-digit random number might be assigned to each subject. Those assigned 00–24 are placed in Group 1; 25–49 in Group 2; 50–74 in Group 3; and 75–99 in Group 4.

Randomization, however, is not infallible. The smaller the size of the sample in the experiment, the greater the risk that randomization will produce nonequivalent groups. This is another reason researchers should use an adequate sample size in an experiment.

### Matching

Another way to control for the impact of confounding variables is to match subjects on characteristics that might be related to the dependent variable. There are two chief methods of matching. The first, *matching by constancy,* makes a variable uniform for all of the experimental groups. For example, let's say a researcher is interested in assessing the impact of playing two types of video games on aggressiveness in children. Past research strongly suggests that gender is related to the levels and types of aggressive acts performed. To match the sample by constancy, then, the researcher may decide to perform the experiment using only boys or only girls in the sample, thus controlling for gender effects.

The second type of matching involves *matching by pairing.* In this method, subjects are paired off on some similar value of a relevant variable before being assigned to different groups. Using the video game example, let us suppose the experimenter suspects that a subject's prior level of aggressive tendencies has an impact on how that subject is affected by violent video games. The experimenter would administer a test of aggressiveness to all subjects and calculate their scores. For simplicity's sake, let us say that there are only three possible scores on this test: low, medium, and high. The experimenter would find two people who scored high on this test, pair them up, and then assign one at random to one treatment group and the other to the second. A similar procedure would be followed for those scoring low and medium. When finished, the researcher would be confident that equal numbers of high-, medium, and low-aggression subjects were placed in each treatment group. This process, of course, is not necessarily restricted to pairs. If an experiment had three groups, subjects could be matched as triplets and then randomly assigned to groups.

In addition to gaining control over confounding variables, matching subjects increases the sensitivity of the experimental design. Since the treatment groups become more homogeneous, smaller differences that might have been obscured by individual variations can be detected.

On the other hand, this method does have some disadvantages. Matching by constancy limits the generalizability of the study and restricts the size of the population available for sampling. Both forms of matching also require at least some prior knowledge about the subjects and may require the extra effort of a pretest.

### Including the Confounding Variable in the Design

Another way to control the impact of confounding variables in an experiment and to increase the sensitivity of the experiment is to incorporate the confounding variable(s) into the design. For instance, let us return to the video game example. Instead of controlling for the effects of gender by restricting the study to either only boys or only girls, the experimenter might include gender as an independent variable. After the sample is divided by gender, each male or female would be randomly assigned to a condition. The resulting design would have four groups: males who play video game A, males who play video game B, females who play video game A, and females who play video game B. (Note that this is an example of the factorial design described later in this chapter.) An added benefit of this design is that it can provide information about the interaction—the combined effects of the confounding variable and independent variable of interest. Again, there are disadvantages to this method. Including another factor in the design increases the number of subjects needed for the experiment and also increases the time and energy necessary to complete it.

For several additional discussions and articles, search the Internet for "confounding variables."

## ▪ Experimental Design

When used in the context of experimental research, the word *design* can have two different meanings. On the one hand, it can refer to the statistical procedures used to analyze the data. Hence, it is common to hear about an analysis of variance design or a repeated-measures *t*-test design. On the other hand, *design* can refer to the total experimental plan or structure of the research. Used in this sense, it means selecting and planning the entire experimental approach to a research problem. This chapter uses the latter meaning. The appropriate statistical techniques for the various experimental designs in this chapter are discussed in Part Three.

An **experimental design** does not have to be a complicated series of statements, diagrams, and figures; it may be as simple as

Pretest > Experimental treatment > Posttest

Although other factors, such as variable and sample selection, control, and construction of a measurement instrument, enter into this design, the diagram does provide a legitimate starting point for research.

To facilitate the discussion of experimental design, the following notations are used to represent specific parts of a design (Campbell & Stanley, 1963):

- R represents a random sample or random assignment.
- X represents a treatment or manipulation of the independent variables so that the effects of these variables on the dependent variables can be measured.
- O refers to a process of observation or measurement; it is usually followed by a numerical subscript indicating the number of the observation ($O_1$ = Observation 1).

A left-to-right listing of symbols, such as R $O_1$ X $O_2$, indicates the order of the experiment. In this case, subjects are randomly selected or assigned to groups (R) and then observed or measured ($O_1$). Next, some type of treatment or manipulation of the independent variable is performed (X), followed by a second observation or measurement ($O_2$). Each line in experimental notation refers to the experience of a single group. Consider the following design:

| | | | |
|---|---|---|---|
| R | $O_1$ | X | $O_2$ |
| R | $O_1$ | | $O_2$ |

This design indicates that the operations in the experiment are conducted simultaneously on two different groups. Notice that the second group, the control group, does not receive the experimental treatment.

## Basic Experimental Designs

Each experimental design makes assumptions about the type of data the researcher wishes to collect because different data require different research methods. Several questions need to be answered by the researcher before any type of design is constructed:

1. What is the purpose of the study?
2. What is to be measured or tested?
3. How many factors (independent variables) are involved?
4. How many levels of the factors (degrees of the independent variables) are involved?
5. What type of data is desired?
6. What is the easiest and most efficient way to collect the data?
7. What type of statistical analysis is appropriate for the data?
8. How much will the study cost?
9. How can these costs be trimmed?
10. What facilities are available for conducting the study?
11. What types of studies have been conducted in the area?
12. What benefits will be received from the results of the study?

The answer to each question has a bearing on the sequence of steps a study should follow. For example, if a limited budget is available for the study, a complicated, four-group research design must be excluded. Or if previous studies have shown the "posttest only" design to be useful, another design may be unjustified.

Not all experimental designs are covered in this section; only the most widely used are considered. The sources listed at the end of the chapter provide more information about these and other designs.

Figure 10.1 *Pretest-Posttest Control Group Design*

| | | | |
|---|---|---|---|
| R | $O_1$ | X | $O_2$ |
| R | $O_1$ | | $O_2$ |

Figure 10.2 *Posttest-Only Control Group Design*

| | | |
|---|---|---|
| R | X | $O_1$ |
| R | | $O_2$ |

***Pretest–Posttest Control Group.*** The pretest–posttest control group design is a fundamental and widely used procedure in all research areas. The design controls many of the rival hypotheses generated by artifacts; the effects of maturation, testing, history, and other sources are controlled because each group faces the same circumstances in the study. As shown in Figure 10.1, subjects are randomly selected or assigned, and each group is given a pretest. Only the first group, however, receives the experimental treatment. The difference between $O_1$ and $O_2$ for Group 1 is compared to the difference between $O_1$ and $O_2$ for Group 2. If a significant statistical difference is found, it is assumed that the experimental treatment was the primary cause.

***Posttest-Only Control Group.*** When researchers are hesitant to use a pretest because of the possibility of subject sensitization to the posttest, the design in Figure 10.1 can be altered to describe a posttest-only control group (see Figure 10.2). Neither group has a pretest, but Group 1 is exposed to the treatment variable, followed by a posttest. The two groups are compared to determine whether a statistical significance is present.

The posttest-only control group design is also widely used to control rival explanations. Both groups are equally affected by maturation, history, and so on. Also, both normally call for a *t*-test, a test to compare the significance between two groups, to determine whether a significant statistical difference is present (see Chapter 13).

***Solomon Four-Group Design.*** The Solomon four-group design combines the first two designs and is useful if pretesting is considered to be a negative factor (see Figure 10.3). Each alternative for pretesting and posttesting is accounted for in the design, which makes it attractive to researchers.

For example, consider the hypothetical data presented in Figure 10.4. The numbers represent college students' scores on a test of current events knowledge. The X represents a program of regular newspaper reading. If the newspaper reading had an effect, $O_2$ should be significantly different from $O_1$ and also significantly different from $O_4$. In addition, $O_2$ should be significantly different from $O_6$ and also from $O_3$. If we assume that the 20-point difference shown in Figure 10.4 is significant, it appears that the independent variable in our example is indeed having an effect on current events knowledge. Note that other informative comparisons are also possible in this design. To assess the possible effects of pretesting, $O_4$ can

Figure 10.3 *Solomon Four-Group Design*

| | | | |
|---|---|---|---|
| R | $O_1$ | X | $O_2$ |
| R | $O_3$ | | $O_4$ |
| R | | X | $O_5$ |
| R | | | $O_6$ |

Figure 10.4 *Hypothetical Data for Solomon Four-Group Design*

| Group | | | | |
|---|---|---|---|---|
| 1 | R | 20 ($O_1$) | X | 40 ($O_2$) |
| 2 | R | 20 ($O_3$) | | 20 ($O_4$) |
| 3 | R | | X | 40 ($O_5$) |
| 4 | R | | | 20 ($O_6$) |

be compared with $O_6$. Comparing $O_1$ and $O_3$ allows the experimenter to check on the efficacy of randomization, and any possible pretest manipulation interaction can be detected by comparing $O_2$ and $O_5$.

The biggest drawback of the Solomon four-group design is a practical one. The design requires four separate groups, which means more subjects, more time, and more money. Further, some results produced from this design can be difficult to interpret. For example, what does it mean if $O_2$ is significantly greater than $O_4$ even though $O_5$ is significantly less than $O_6$?

### Factorial Studies

Research studies involving the simultaneous analysis of two or more independent variables are called **factorial designs**, and each independent variable is called a *factor*. The approach saves time, money, and resources and allows researchers to investigate the interaction between the independent variables. That is, in many instances it is possible that two or more variables are interdependent in the effects they produce on the dependent variable, a relationship that could not be detected if two simple randomized designs were used.

The term *two-factor design* indicates that two independent variables are manipulated; a *three-factor design* includes three independent variables; and so on. (A one-factor design is a simple random design because only one independent variable is involved.) A *factorial* design for a study must have at least two factors or independent variables.

Factors may also have two or more levels. Therefore the 2 × 2 factorial design has two independent variables, each with two levels. A 3 × 3 factorial design has three levels for each of the two independent variables. A 2 × 3 × 3 factorial design has three independent variables: The first has two levels, and the second and third have three levels each.

To demonstrate the concept of levels, imagine that a television station manager wants to study the success of a promotional campaign for a new movie-of-the-week series. The manager plans to advertise the new series on radio and in newspapers. Subjects selected randomly are placed into one of the *cells* of the 2 × 2 factorial design in Figure 10.5. This allows for the testing of two levels of two independent variables—exposure to radio and exposure to newspapers.

Four groups are involved in the study: Group I is exposed to both newspaper material and radio material; Group II is exposed to only newspaper; Group III is exposed to only radio; and Group IV serves as a control group and receives no exposure to either radio or newspaper. After the groups have undergone the experimental treatment, the manager can administer a short questionnaire to determine which medium, or combination of media, worked most effectively.

Figure 10.5 *2 × 2 Factorial Design*

| | Radio | No radio |
|---|---|---|
| Newspapers | I | II |
| No newspapers | III | IV |

Figure 10.6 *2 × 3 Factorial Design*

| | Radio | No radio |
|---|---|---|
| Full color newspaper ad | I | II |
| Black/white newspaper ad | III | IV |
| No newspaper | V | VI |

A 2 × 3 factorial design, which adds a third level to the second independent variable, is illustrated in Figure 10.6. This design demonstrates how the manager might investigate the relative effectiveness of full-color versus black-and-white newspaper advertisements while also measuring the impact of the exposure to radio material.

Assume the television station manager wants to include promotional advertisements on television as well as use radio and newspaper. The third factor produces a 2 × 2 × 2 factorial design. This three-factor design in Figure 10.7 shows the eight possibilities of a 2 × 2 × 2 factorial study. Note that the subjects in Group I are exposed to newspaper, radio, and television announcements, whereas those in Group VIII are not exposed to any of the announcements.

The testing procedure in the three-factor design is similar to that of previous methods. Subjects in all eight cells are given some type of measurement instrument, and differences between the groups are tested for statistical significance. For example, Perry and colleagues (1997) used a 2 × 2 × 2 factorial design to study the impact of humorous commercials on the enjoyment of an entertainment program. Factor 1 was gender (male or female), factor 2 was the degree of humor in a program (low or high), and factor 3 was the degree of humor in commercials during the program (low or high). The results showed that the humor level of the commercials in the program influenced

Figure 10.7 *2 × 2 × 2 Factorial Design*

| | Radio | | No radio | |
|---|---|---|---|---|
| | TV | No TV | TV | No TV |
| Newspaper | I | II | III | IV |
| No newspaper | V | VI | VII | VIII |

program enjoyment. No other main effects or interaction effects were found.

## *Other Experimental Designs*

Research designs are as unique and varied as the questions and hypotheses they help to study. Designs of different types yield different types of information. If information about the effects of multiple manipulations is desired, a **repeated-measures design** (several measurements of the same subject) is appropriate. In this design, instead of assigning different people to different manipulations, the researcher exposes the same subjects to multiple manipulations. The effects of the various manipulations appear as variations within the same person's performance rather than as differences between groups of people.

One obvious advantage of the repeated-measures design is that fewer subjects are necessary because each subject participates in all conditions. Furthermore, since each subject in effect acts as his or her own control, the design is quite sensitive to detecting treatment differences. On the other hand, repeated-measures designs are subject to carryover effects: The effects of one manipulation may still be present when the next manipulation is presented. Another possible disadvantage is that the subjects experience all of the various experimental conditions and they may figure out the purpose behind the experiment. As a result, they may behave differently than they would if they were unaware of the study's goal.

Figure 10.8 *Latin Square Design*

| Subjects | Experimental conditions | | | |
|---|---|---|---|---|
| A | 1 | 2 | 3 | 4 |
| B | 2 | 3 | 4 | 1 |
| C | 3 | 4 | 1 | 2 |
| D | 4 | 1 | 2 | 3 |

If the experimenter thinks that the order of presentation of the independent variables in a repeated-measures design will be a problem, a Latin square design can be used. Figure 10.8 shows an example of a Latin square design for a repeated-measures experiment with four subjects. Note that each subject is exposed to all conditions and that each of the four conditions appears only once per row and once per column. The Latin square arrangement also can be used when repeated measures are made on independent groups rather than on individual subjects.

## ▪ Quasi-Experimental Designs

Sometimes the experimenter does not have the luxury of randomly assigning subjects to experimental conditions. Suppose, for example, a researcher knows that a local radio station is about to be sold and he or she is interested in determining the effects of this change of ownership on employee morale. The researcher measures the morale of a sample of employees at the station before and after the sale. At the same time, the researcher collects data on morale from a sample of employees at a comparable station in the same community. This design is similar to the pretest–posttest control group design discussed on page 218, but it does not involve the random assignment of subjects to experimental groups. Using Campbell and Stanley's (1963) terminology, we call it a **quasi-experiment.** Quasi-experiments are a valuable source of information, but there are design faults that must be considered in the interpretation of the data.

This chapter discusses only two types of quasi-experimental designs: the pretest–posttest nonequivalent control group design and the interrupted time series design. For more information, consult Campbell and Stanley (1963) and Cook and Campbell (1979).

***Pretest–Posttest Nonequivalent Control Group Design.*** This approach, illustrated in Figure 10.9, is the one used by the hypothetical researcher studying employee morale at radio stations. One group is exposed to the experimental manipulation and is compared to a similar group that is not exposed. The pre- and posttest differences are compared to determine whether the experimental condition had an effect.

In the radio station example, assume the pretest of employee morale showed that the workers at both radio stations had the same morale level before the sale. The posttest, however, showed that the morale of the employees at the sold station decreased significantly after the sale, but the morale level at the other (control) station remained constant. This indicates that the station sale had an impact on morale. However, this may not be true. The two groups might have been different on other variables at the time of the pretest. For example, suppose the two groups of employees were of different ages. It is possible that the effect of the station sale on older employees produced the difference. The quasi-experimental design does not rule out this alternative selection-treatment interaction explanation.

Figure 10.9 *Pretest-Posttest Nonequivalent Control Group Design*

| | | |
|---|---|---|
| $O_1$ | X | $O_2$ |
| $O_3$ | | $O_4$ |

*Note:* The line dividing the two groups indicates that no random assignment occurred.

***Interrupted Time Series Design.*** In this arrangement, illustrated in Figure 10.10, a series of periodic measurements is made of a group. The series of measurements is interrupted by the experimental treatment, and then measurements are continued.

This design can rule out threats to internal validity. If there is a significant difference between $O_5$ and $O_6$, maturation can be ruled out by examining the scores for all the intervals before the manipulation. If maturation was occurring, it would probably produce differences between $O_1$ and $O_2$, $O_2$ and $O_3$, and so on. If the only difference is between $O_5$ and $O_6$, then maturation is not a plausible explanation. The same logic can be applied to

Figure 10.10 *Interrupted Time Series Design*

$O_1$ $O_2$ $O_3$ $O_4$ $O_5$ X $O_6$ $O_7$ $O_8$ $O_9$ $O_{10}$

rule out the sensitizing effects of testing. The biggest threat to the internal validity in this design is history. It is possible that any apparent changes occurring after the experimental manipulation might be due to some other event that occurred at the same time as the experimental treatment. Donohew, Lorch, and Palmgreen (1998) describe an example of an interrupted time series design. Monthly samples of 100 teenagers were interviewed about their exposure to anti-marijuana public service announcements and their attitudes toward marijuana use in two matched cities over a 32-month period. A 4-month public service announcement campaign featuring the anti-marijuana public service announcements took place in both cities at different times. Comparison of the month-to-month data revealed changes in attitudes and behaviors.

## ▪ *Field Experiments*

Experiments conducted in a laboratory can be disadvantageous for many research studies because of certain problems they present: They are performed in controlled conditions that are unlike natural settings; they are generally considered to lack external validity; and they usually necessitate subject awareness of the testing situation. Because of these shortcomings, many researchers prefer to use field experiments (Haskins, 1968).

The exact difference between laboratory experiments and field experiments has been a subject of debate for years, especially with regard to the "realism" of the situations involved. Many researchers consider field and laboratory experiments to be on opposite ends of the "realism" continuum. However, the main difference between the two approaches is the setting. As Westley (1989, p. 129) points out:

> The laboratory experiment is carried out on the experimenter's own turf; the subjects come into the laboratory. In the field experiment, the experimenter goes to the subject's turf. In general, the physical controls available in the laboratory are greater than those found in the field. For that reason, statistical controls are often substituted for physical controls in the field.

The presence or absence of rules and procedures to control the conditions and the subjects' awareness or unawareness of being subjects can also distinguish the two approaches. If the researcher maintains tight control over the subjects' behavior and the subjects are placed in an environment they perceive to be radically different from their everyday life, the situation is probably better described as a laboratory experiment. On the other hand, if the subjects function primarily in their everyday social roles with little investigator interference or environmental restructuring, the case is probably closer to a field experiment. Basically, the difference between laboratory experiments and field experiments is one of degree.

### *Advantages of Field Experiments*

The major advantage of field experiments is their external validity: Since study conditions closely resemble natural settings, subjects usually provide a truer picture of their normal behavior and are not influenced by the experimental situation. For example, consider a laboratory study designed to test the effectiveness of two versions of a television commercial. One group views Version A, and the other group views Version B. Both groups are then given a questionnaire to measure their willingness to purchase the advertised product. Based on these results, it may be concluded that Version B is more effective in selling the product. Although this may actually be the case, the validity of the experiment is questionable because the subjects knew they were being studied. (See the discussion of demand characteristics in Chapter 2.) Another problem is that answering a questionnaire cannot be equated to buying a product. Furthermore, viewing commercials in a laboratory setting is different from the normal viewing situation, in which competing stimuli (crying children, ringing telephones, and so on) are often present.

In a field experiment, these commercials might be tested by showing Version A in one market and Version B in a similar, but different, market. Actual sales of the product in both markets might then be monitored to determine which commercial was the more successful in persuading viewers to buy the product. As can be seen, the results of the field experiment have more relevance to reality, but the degree of control involved is markedly less than in the laboratory experiment.

Some field studies have the advantage of being nonreactive. Reactivity is the influence that a subject's awareness of being measured or observed has on his or her behavior. Laboratory subjects are almost always aware of being measured. Although this is also true of some field experiments, many can be conducted without the subjects' knowledge of their participation.

Field experiments are useful for studying complex social processes and situations. In their study of the effects of the arrival of television in an English community, Himmelweit, Oppenheim, and Vince (1958) recognized the advantages of the field experiment. Since television has an impact on several lifestyle variables, the researchers used a range of analysis techniques, including diaries, personal interviews, direct observation, questionnaires, and teachers' ratings of students, to document this impact. A topic area as broad as this does not easily lend itself to laboratory research.

Field experiments can be inexpensive. Most studies require no special equipment or facilities; however, expenses increase rapidly with the size and scope of the study (Babbie, 1997). Finally, the field experiment may be the only research option to use. For example, suppose a researcher is interested in examining patterns of communication at a television station before and after a change in management—a problem difficult, if not impossible, to simulate in a laboratory. The only practical option is to conduct the study in the field—that is, at the station.

### Disadvantages of Field Experiments

The disadvantages of the field experiment are mostly practical ones. However, some research is impossible to conduct because of ethical considerations. The vexing question of the effects of television violence on young viewers provides a good example of this problem. Probably the most informative study that could be performed in this area would be a field experiment in which one group of children is required to watch violent television programs and another similar group to watch only nonviolent programs. The subjects could be carefully observed over a number of years to check for any significant difference in the number of aggressive acts committed by the members of each group. However, the ethics involved in controlling the television viewing behavior of children and in possibly encouraging aggressive acts are extremely questionable. Therefore scientists have resorted to laboratory and survey techniques to study this problem.

On a more practical level, field experiments often encounter external hindrances that cannot be anticipated. For example, a researcher may spend weeks planning a study to manipulate the media use of students in a summer camp, only to have camp counselors or a group of parents scuttle the project because they do not want the children to be used as "guinea pigs." Also, it takes time for researchers to establish contacts, secure cooperation, and gain necessary permissions before beginning a field experiment. In many cases this phase of the process may take weeks or months to complete.

Finally, and perhaps most important, researchers cannot control all the intervening variables in a field experiment. The presence of those extraneous variables affects the precision of the experiment and the confidence of the researchers in its outcome.

### *Types of Field Experiments*

There are two basic categories of field experiments: those in which the researcher manipulates the independent variable(s) and those in which independent variable manipulation occurs naturally as a result of other circumstances. To illustrate the first type, suppose that a researcher is interested in investigating the effects of not being able to read a newspaper. A possible approach would be to select two comparable samples and not allow one of the samples to read any newspapers for a period of time; the second sample (the control group) would continue to read the newspaper as usual. A comparison could then be made to determine whether abstinence from newspapers has any effect in other areas of life, such as interpersonal communication. In this example, reading the newspaper is the independent variable that has been manipulated.

The second type of field experiment involves passive manipulation of independent variables. Suppose a community with no cable television system is scheduled to be wired for cable in the future. In an attempt to gauge the effects of cable on television viewing and other media use, a researcher might begin studying a large sample of television set owners in the community long before the cable service is available. A few months after it is introduced, the researcher could return to the original sample, sort out the households that subscribed to cable and those that did not, and then determine the effects of the cable service. In this case, there is no control over the independent variable (cable service); the researcher is merely taking advantage of existing conditions.

Note that in some field experiments, the experimenter is not able to assign subjects randomly to treatment groups. As a result, many field experiments are classified as quasi-experiments. As Cook and Campbell (1979) point out, the extent to which causal statements can be made from the results of these studies depends upon the ability to rule out alternative explanations. Consequently, researchers who use field experiments must pay close attention to threats to internal validity.

### *Examples of Field Experiments*

Tan (1977) was interested in what people would do during a week without television. He recruited a sample of 51 adults and paid them each $4 a day not to watch television for an entire week. Before depriving these subjects of television, Tan requested that they watch television normally for a 1-week period and keep a detailed diary of all their activities. At the start of the experimental week, Tan's assistants visited the subjects' homes and taped up the electrical plugs on their television sets to lessen temptation. Again, the subjects were requested to record their activities for the week. To maintain some control over the experiment, the assistants visited the subjects' homes periodically during the week to ensure that the television was not being viewed.

One week later, the diaries completed during the week of deprivation were collected, and the data were compared to the week of normal television viewing. Tan discovered that, when deprived of television, subjects turned more to radio and newspapers for entertainment and information. They also tended to engage in more social activities with their friends and family.

This study illustrates some of the strengths and weaknesses of field experiments. In the first place, they are probably the only viable technique available to investigate this particular topic. A survey (see Chapter 8) does not permit the researcher to control whether the subjects watch television, and it would be impossible in the United States to select a representative sample composed of people who do not own a television set. Nor would it be feasible to bring people into the laboratory for an entire week of television deprivation.

On the other hand, the ability of the field experimenter to control independent variables is not conclusively demonstrated here: Tan had no way to be sure that his sample subjects actually avoided television for the entire week. Subjects could have watched at friends' homes or at local bars, or even at home by untaping the plugs. Moreover, Tan mentioned that several individuals who fell into the initial sample refused to go without television for only $4 per day. As a result, the nonprobability sample did not accurately reflect the general makeup of the community.

Smith and Hand (1987) took advantage of a natural occurrence in their field experiment on the effects of viewing pornography. One XXX-rated film was shown every year at the small college that served as the site of the research. About one third of all the male students on campus typically attend this film at its annual showing. One week before the film was shown, the investigators surveyed 230 female students of the college about their contact with aggression. The same measurement was taken on the Monday following the film and then again a week later. The researchers then analyzed the amount of violence experienced by females whose male companions had seen the film as compared to females whose male companions had not seen the film. The results showed no differences in the amount of violence experienced by the two groups of females.

This study represents one of the few times that the effects of exposure to pornographic films have been studied experimentally outside of the laboratory. Nonetheless, the study suffers from some common limitations of field experiments. First, the researchers were unable to make random assignments of sample subjects. As a consequence, this study is more accurately described as a quasi-experiment. The males who went to the film may have been different from those who stayed away. Second, the researchers had no control over the content of the film that was shown. The actual film may have been too mild to elicit much aggression. Third, the researchers could not control how many females or which particular females had contact with males who attended the movie. They were able to find only 38 of 230 whose companions saw the film. These 38 might not be typical of the rest of the population.

Williams (1986) and her colleagues conducted an elaborate field experiment on the impact of television on a community. In 1973 she was able to identify a Canadian town that, because of its peculiar geographic location, was unable to receive television. This particular town, however, was scheduled to acquire television service within a year. Given this lead time, the researchers could match the town with two others that were similar in population, area, income, transportation systems, education, and other variables. Residents of the three towns completed questionnaires that measured a large number of variables including aggressive behavior, personality traits, reading ability, creativity, sex-role perceptions, intelligence, and vocabulary. Two years later the research team went back to the three communities, and residents completed a posttest with questions that measured the same variables as before. The design of this field experiment is illustrated in Figure 10.11. Note that it is a variation of the quasi-experimental pretest–posttest nonequivalent control group design discussed earlier.

Figure 10.11 *Design of Canadian Field Experiment*

| Town | Time one | Time two |
|---|---|---|
| A | No TV reception | One TV channel |
| B | One TV channel | Two TV channels |
| C | Four TV channels | Four TV channels |

This field experiment provided a wealth of data. Among other things, the researchers found that the arrival of TV apparently slowed down the acquisition of reading skills, lowered attendance at outside social events, fostered more stereotypical attitudes toward sex roles, and increased children's verbal and physical aggression.

Two rather ambitious field experiments were conducted by Milgram and Shotland (1973) with the cooperation of the CBS television network. The researchers arranged to have three versions of the popular television series "Medical Center" constructed. One version depicted antisocial behavior that was punished by a jail sentence; another portrayed antisocial behavior that went unpunished; and a third contained prosocial (favorable) behavior. The antisocial behavior consisted of scenes of a distraught young man smashing a plastic charity collection box and pocketing the money.

In the first experiment, the researchers used two methods to recruit subjects: Ads placed in New York City newspapers promised a free transistor radio to anyone willing to view a 1-hour television show, and business reply cards containing the same message were passed out to pedestrians near several subway stops. Subjects were asked to report to a special television theater to view the program. Upon arrival, each person was randomly assigned to one of four groups, and each group was shown a different program (the three programs described above plus a different nonviolent show used as a control). After viewing the program (with no commercial interruptions) and completing a short questionnaire about it, the subjects were instructed to go to an office in a downtown building to receive their free radio.

The downtown office, monitored by hidden cameras, was part of the experiment. The office contained a plastic charity collection box with about $5 in it, and a notice informed the subjects that no more transistor radios were available. Their behavior on reading the notice was the dependent variable: How many would emulate the antisocial act seen in the program and take the money from the charity box? Milgram and Shotland found no differences in antisocial behavior among the groups of viewers; no one broke into the charity box.

The second study tried to gauge the immediate effects of televised antisocial acts on viewers. Subjects were recruited from the streets of New York City's Times Square area and ushered into a room with a color television set and a plastic charity collection box containing $4.45. A hidden camera monitored the subjects' behavior, even though they were told that they would not be observed. Although this time some subjects broke into the box, once again no differences emerged between the groups.

These two studies demonstrate several positive and negative aspects of field experiments. In the first place, Milgram and Shotland had to secure the cooperation of CBS to conduct their expensive experiments. Second, volunteer subjects were used, and it is reasonable to assume that the sample was unrepresentative of the general population. Third, in the first experiment the researchers did not control for the amount of time that passed between viewing the program and arriving at the testing center. Some participants arrived 24 hours after watching "Medical Center," whereas others came several days later. Clearly, the subjects' experiences during this interval may have influenced their responses. Finally, Milgram and Shotland reported that the second experiment had to be terminated early because some of the subjects started resorting to behavior that the researchers could not control. On the positive side, the first experiment clearly shows the potential of the field experiment to simulate natural conditions and to provide a nonreactive setting. Upon leaving the theater after seeing the program, subjects had no reason to believe that they would be participating in another phase of the research. Consequently, their behavior at the supposed gift center was probably genuine and not a reaction to the experimental situation.

The Milgram and Shotland studies also raise the important question of ethics in field experiments. Subjects were observed without their knowledge and apparently were never told about the real purpose of the study, or even that they were involved in a research study. Does the use of a hidden camera constitute an invasion of privacy? Does the experimental situation constitute entrapment? How about the subjects who stole the money from the charity box? Have they committed a crime? Field experiments can sometimes pose difficult ethical considerations, and these points must be dealt with *before the experiment is conducted,* not afterward, when harm may already have been inflicted on the subjects (see Chapter 4).

Two recent field experiments concerned the impact of media on politics. Donsbach, Brosius, and Mattenklott (1993) compared the perceptions of people who attended a political event in person with those of people who saw different versions of the same event on television. They concluded that participants in the event and those who saw the television coverage did not differ significantly in their perceptions of the event and the people involved. Those who watched the TV versions, however, were more likely to hold polarized opinions than those who had seen the event in person. Cappella and Jamieson (1994) conducted a field experiment that evaluated the effects of adwatches—analyses by some TV networks of misleading political ads during the 1992 presidential election. The researchers recruited subjects from 12 cities across the country and paid respondents $10 per day for participating in the study. A total of 165 individuals provided useful data. Six groups of respondents were given video tapes that contained several news items and different versions of an adwatch report. The number of exposures per group was also manipulated. One group received a tape that contained only the news reports. All respondents were instructed to view the tapes at home. After exposure, each participant was asked questions about the tapes including information about the particular adwatch he or she had viewed. Results showed that exposure to the adwatches had an impact on the perceived fairness and importance of the ad.

This study is another illustration of the complexity that can be involved in a field experiment. The experimental tapes were constructed with the cooperation of CNN; each research location had to have a research coordinator on site; participants had to be paid for their efforts; and so forth. In addition, it points out some of the difficulties in control and generalization. Respondents were volunteers; they might not be a representative sample of the total population. The researchers could not control exposure to other sources of political information. Some sensitization to the study's purpose might have occurred. Field experiments can go a long way toward providing more external validity, but substantial efforts can be involved in carrying out the study.

## ▪ ▪ ▪ Summary

Mass media researchers have a number of research designs from which to choose when analyzing a given topic. The laboratory experiment has been a staple in mass media research for several decades. Though criticized by many researchers as being artificial, the method offers a number of advantages that make it particularly useful to some researchers. Of specific importance is the researcher's ability to control the experimental situation and to manipulate experimental treatments.

This chapter also described the process of experimental design—the researcher's blueprint for conducting an experiment. The experimental design provides the steps the researcher will follow to accept or reject a hypothesis or research question. Some experimental designs are simple and take very little time to perform; others involve many different groups and numerous treatments.

Quasi-experimental designs are used when random selection and random assignment of subjects are not possible. Field experiments take place in natural settings, which aids the generalizability of the results but introduces problems of control.

## Questions and Problems for Further Investigation

1. Provide four research questions or hypotheses for any mass media area. Which of the designs described in this chapter is best suited to investigate the problems?
2. What are the advantages and disadvantages of each of the following four experimental designs?

| | | | | |
|---|---|---|---|---|
| a. | X | $O_1$ | | |
| | | $O_2$ | | |
| b. | R | X | $O_1$ | |
| c. | R | $O_1$ | X | $O_2$ |
| | R | | X | $O_3$ |
| d. | R | $O_1$ | X | $O_2$ |

3. A good example of the experimental technique as it relates to mass communication research is Ward's (1992) study of the effectiveness of sidebar graphics on reader comprehension, which appears in the Summer 1992 issue of *Journalism Quarterly*. Read this study and note how the independent variable was manipulated.
4. What research questions are best answered by field experiments?
5. Search the Internet for examples of experimental research. Do not limit yourself to only media research.
6. If you are using *InfoTrac College Edition*, conduct a search to find recent examples of field experiments. (*Hint:* Do a power search for articles that have "field experiment" in the title.) What methods did the researchers use to control extraneous influences?

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# Part Three

# Data Analysis

**11** *Introduction to Statistics*

**12** *Hypothesis Testing*

**13** *Basic Statistical Procedures*

Chapter 11

# Introduction to Statistics

- Descriptive Statistics
- Sample Distribution
- Data Transformation

Summary

Questions and Problems for Further Investigation

References and Suggested Readings

Statistics is the science that uses mathematical methods to collect, organize, summarize, and analyze data. Statistics cannot perform miracles. Statistics alone will not "correct" a misdirected, poorly phrased, or ambiguous research question or hypothesis, or a study that uses sloppy measurement and design and contains numerous errors. Statistics provide valid and reliable results only when the data collection and research methods follow established scientific procedures.

The science of statistics and the ease with which they can be used have changed dramatically since the development of mini- and microcomputers. Only a few decades ago, researchers spent weeks or months performing hand-calculated statistical procedures—calculations that now take only minutes or seconds on a hand-held calculator or PC. In addition, there are now dozens of excellent computer software programs to calculate nearly any type of statistical test that is required. These types of software have made statistical analysis very simple. (See the Internet for "statistical methods" and "statistical tests.")

Much of the groundwork for statistics was laid in 1835 by Lambert Adolphe Quetelet ('kay-tuh-lay), a Belgian mathematician and astronomer, with his paper entitled *On Man and the Development of His Faculties*. In addition to other techniques, Quetelet developed the ideas behind the normal distribution and formed the basics of probability theory from preliminary work by French mathematician and physicist Pierre-Simon Laplace (la-'plas) and others. (Although many references are in French, see the Internet for "Quetelet" and "Laplace.")

Quetelet's background is similar to that of others who were instrumental in the development of statistics. Almost all were Renaissance men involved in such disciplines as astronomy, mathematics, physics, and philosophy.

Part Three focuses on the statistical procedures used by mass communication researchers. This chapter provides an introduction to descriptive statistics.

## Descriptive Statistics

Descriptive statistics are intended to reduce data sets to allow for easier interpretation. If you asked a random sample of 100 people how long they listened to the radio yesterday and recorded all 100 answers on a sheet of paper, it would be difficult to draw conclusions by looking at that list. Analysis of this information is much easier if the data are organized in some meaningful way—and this is the function of descriptive statistics. These statistical methods allow researchers to take random data and organize them into some type of ordered fashion.

During a research study, investigators typically collect data that are measurements or observations of the people or items in a sample. These data usually have little meaning or usefulness until they are displayed or summarized using one of the techniques of descriptive statistics. Mass media researchers use two primary methods to make their data more manageable: data distribution and summary statistics.

### Data Distribution

One way researchers can display their data is by distributing them in tables or graphs. A **distribution** is simply a collection of numbers. Table 11.1 shows a hypothetical distribution of 20 respondents' answers to the question, "How many hours did you spend last week listening to the radio and watching TV?" The distribution may look nice, but it is difficult to draw any conclusions or make any generalizations from this collection of unordered scores.

As a preliminary step toward making these numbers more manageable, the data may be arranged in a **frequency distribution**—that is, a table of each score, ordered according to magnitude, and its actual frequency of occurrence. Table 11.2 presents the data from the hypothetical radio/TV survey in a frequency distribution.

Now the data begin to show a pattern. Note that the typical frequency distribution table consists of two columns. The column on the left contains all the values of the variable under study; the column on the right shows the number of occurrences of each value. The sum of the frequency column is the number ($N$) of persons or items that make up the distribution.

A frequency distribution can also be constructed using grouped intervals, each of which contains several score levels. Table 11.3 shows the data from the hypothetical survey with the scores grouped together in intervals. This table is a more compact frequency distribution than Table 11.2, but the scores have lost their individual identity.

Other columns can be included in frequency distribution tables. For example, the

Table 11.1 *Distribution of Responses to "How Many Hours Did You Spend Last Week Listening to the Radio and Watching TV?"*

| Respondent | Hours | Respondent | Hours |
|---|---|---|---|
| A | 12 | K | 14 |
| B | 9 | L | 16 |
| C | 18 | M | 23 |
| D | 8 | N | 25 |
| E | 19 | O | 11 |
| F | 21 | P | 14 |
| G | 15 | Q | 12 |
| H | 8 | R | 19 |
| I | 11 | S | 21 |
| J | 6 | T | 11 |

Table 11.2 *Frequency Distribution of Responses to "How Many Hours Did You Spend Last Week Listening to the Radio and Watching TV?"*

| Hours | Frequency ($N = 20$) |
|---|---|
| 6 | 1 |
| 8 | 2 |
| 9 | 1 |
| 11 | 3 |
| 12 | 2 |
| 14 | 2 |
| 15 | 1 |
| 16 | 1 |
| 18 | 1 |
| 19 | 2 |
| 21 | 2 |
| 23 | 1 |
| 25 | 1 |

Table 11.3 *Frequency Distribution of Radio and TV Listening and Viewing Hours Grouped in Intervals*

| Hours | Frequency |
|---|---|
| 0–10 | 4 |
| 11–15 | 8 |
| 16–20 | 4 |
| 21–25 | 4 |

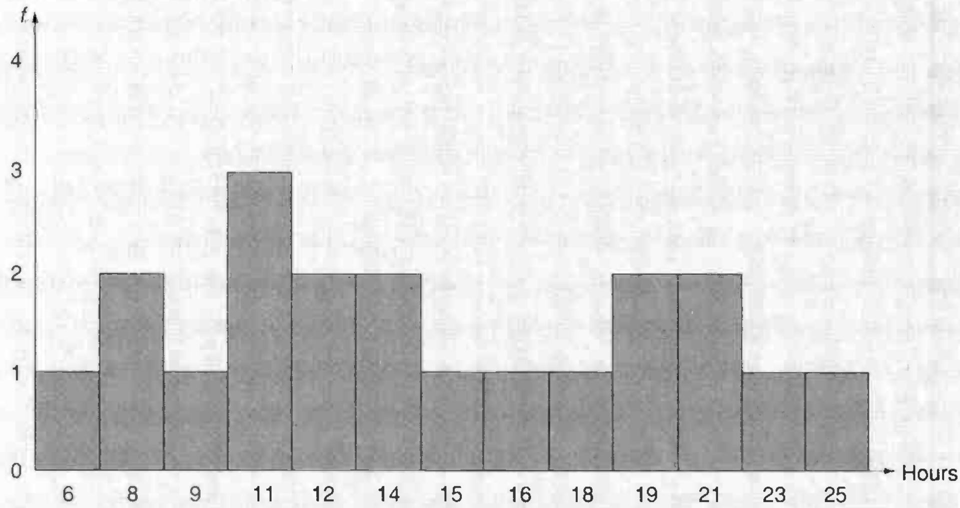
data can be transformed into proportions or percentages. To obtain the percentage of a response, simply divide the frequency of the individual responses by *N*, the total number of responses in the distribution. Percentages allow comparisons to be made between different frequency distributions that are based on different values of *N*.

Some frequency distributions include the cumulative frequency (*cf*). This column is constructed by adding the number of scores in one interval to the number of scores in the intervals above it. Table 11.4 displays the frequency distribution from Table 11.2 with

Table 11.4 *Frequency Distribution with Added Columns for Percentage, Cumulative Frequency, and Cumulative Frequency as a Percentage of N*

| Hours | Frequency | Percentage | *cf* | *cf* percentage of N |
|---|---|---|---|---|
| 6 | 1 | 5 | 1 | 5 |
| 8 | 2 | 10 | 3 | 15 |
| 9 | 1 | 5 | 4 | 20 |
| 11 | 3 | 15 | 7 | 35 |
| 12 | 2 | 10 | 9 | 45 |
| 14 | 2 | 10 | 11 | 55 |
| 15 | 1 | 5 | 12 | 60 |
| 16 | 1 | 5 | 13 | 65 |
| 18 | 1 | 5 | 14 | 70 |
| 19 | 2 | 10 | 16 | 80 |
| 21 | 2 | 10 | 18 | 90 |
| 23 | 1 | 5 | 19 | 95 |
| 25 | 1 | 5 | 20 | 100 |
| | $N = 20$ | 100% | | |

Figure 11.1 *Histogram of Radio Listening/TV Viewing*




the addition of a percentage column, a cumulative frequency column, and a column showing cumulative frequency as a percentage of *N*.

Sometimes it is best to present data in graph form. The graphs shown in this section contain the same information as frequency distributions. Graphs usually consist of two perpendicular lines, the *x-axis,* or *abscissa* (horizontal), and the *y-axis,* or *ordinate* (vertical). Over the years, statisticians have developed certain conventions regarding graphic format. One common convention is to list the scores along the *x*-axis and the frequency or relative frequency along the *y*-axis. Thus the height of a line or bar indicates the frequency of a score. One common form of graph is the **histogram, or bar chart,** in which frequencies are represented by vertical bars. Figure 11.1 is a histogram constructed from the data in Table 11.1. Note that the scores on the *x*-axis are actually the scores (hours) listed from the lowest value to the highest; the *y*-axis shows the frequency of scores.

If a line is drawn from the *midpoint* of each interval at its peak along the *y*-axis to each adjacent midpoint/peak, the resulting graph is called a **frequency polygon.** Figure 11.2 shows a frequency polygon superimposed on the histogram from Figure 11.1. As can be seen, the two figures display the same information.

A **frequency curve** is similar to a frequency polygon except that the points are connected by a continuous, unbroken curve instead of by lines. The curve assumes that any irregularities shown in a frequency polygon are simply due to chance and that the variable being studied is distributed continuously over the population. Figure 11.3 superimposes a frequency curve onto the frequency polygon shown in Figure 11.2.

Frequency curves are described in relation to the **normal curve,** a symmetrical bell-shaped curve whose properties are discussed more fully later in this chapter. Figure 11.4 illustrates the normal curve and shows the ways in which a frequency curve can deviate

Figure 11.2 *Frequency Polygon of Radio Listening/TV Viewing Hours Superimposed on a Histogram of the Same Data*

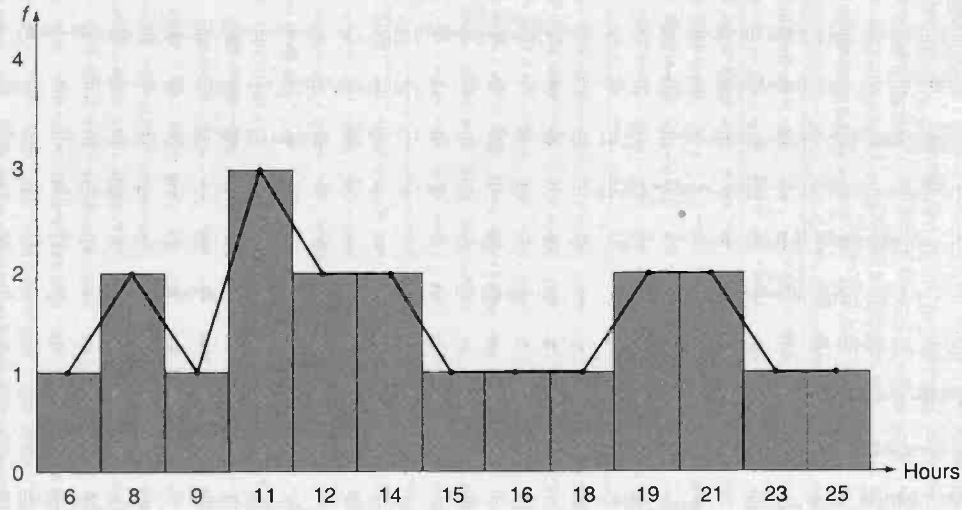



Figure 11.3 *Frequency Curve (Shaded) of Radio Listening/TV Viewing Hours Superimposed on a Frequency Polygon of the Same Data*

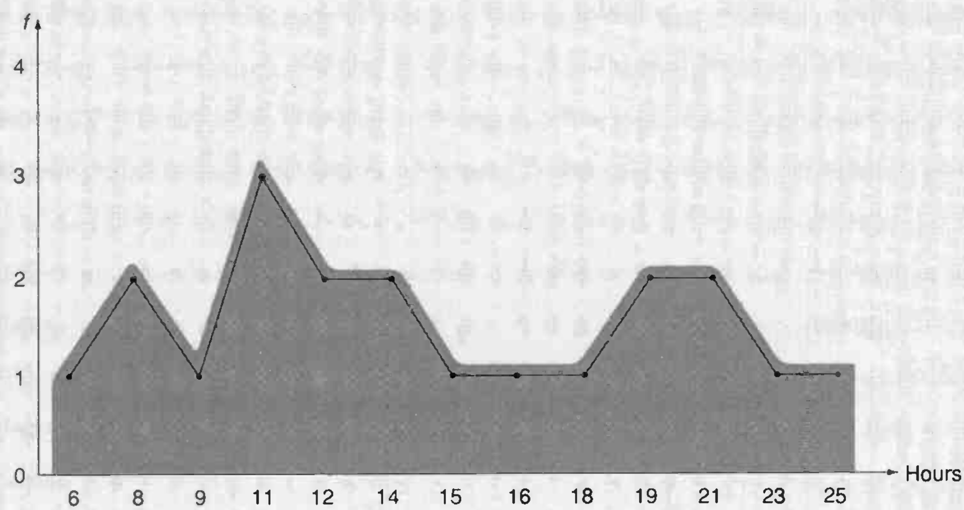
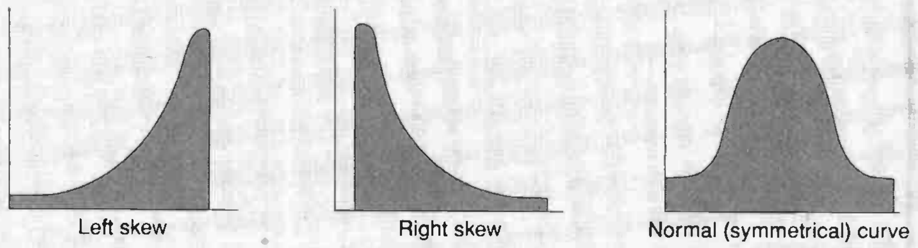


Figure 11.4 *Skewness and the Normal Curve*




from it. These patterns of deviation are called skewness.

Skewness refers to the concentration of scores around a particular point on the $x$-axis. If this concentration lies toward the low end of the scale, with the tail of the curve trailing off to the right, the curve is called a *right skew.* Conversely, if the tail of the curve trails off to the left, it is a *left skew.* If the halves of the curve are identical, it is *symmetrical,* or normal.

A normal distribution of data is free from skewness. If data produce a curve that deviates substantially from the normal curve, then the data may have to be transformed in some way (discussed later in this chapter) to achieve a more normal distribution.

### Summary Statistics

The data in Table 11.1 can be condensed still further through the use of **summary statistics**. These statistics help make data more manageable by measuring two basic tendencies of distributions: central tendency and dispersion, or variability.

***Central Tendency.*** Central tendency statistics answer the question, What is a typical score? They provide information about the grouping of the numbers in a distribution by giving a single number that is characteristic of the entire distribution. Exactly what constitutes a "typical" score depends on the level of measurement and the purpose for which the data will be used.

For every distribution, three characteristic numbers can be identified. One is the **mode** (Mo), or the score or scores that occur most frequently. Calculation is not necessary to determine the mode; it is found by inspecting the distribution. For the data in Table 11.1, the mode is 11. Though easy to determine, the mode has some serious drawbacks as a descriptive statistic. It focuses attention on only one possible score and can thus camouflage important facts about the data when considered in isolation. This is illustrated by the data in Table 11.5: The mode is 70, but the most striking feature about the numbers is the way they cluster around 30. Another serious drawback is that a distribution of scores can have more than one mode. When this happens, the mode does not provide an effective way of analyzing data.

A second characteristic score is the **median** (Mdn), which is the midpoint of a distribution: Half the scores lie above it, and half lie below it. If the distribution has an odd number of scores, the median is the middle score; if there is an even number, the median is a hypothetical score halfway between the two middle scores. To determine the median, one must order the scores from smallest to largest and locate the midpoint by inspection. (The median is 14 in the sample data of Table 11.1.)

Table 11.5 *The Mode As a Potentially Misleading Statistic*

| Score | *f* |
|---|---|
| 70 | 2 |
| 35–69 | 0 |
| 34 | 1 |
| 33 | 1 |
| 32 | 1 |
| 31 | 1 |
| 30 | 1 |
| 29 | 1 |
| 28 | 1 |
| 27 | 1 |
| 26 | 1 |

Consider another example with nine scores:

0 2 2 5 (6) 17 18 19 67

The median score is 6 because there are four scores above this number and four below it. Now consider these numbers:

0 2 2 5 6 17 18 19 67 75
↑
11.5

No score neatly bisects this distribution; to determine the median, the two middle scores must be added and divided by 2:

$$\text{Mdn} = \frac{6 + 17}{2} = 11.5$$

When many scores in the distribution are the same, computing the median becomes more complicated. See *Comprehending Behavioral Statistics* by Hurlburt (1998, p. 52) for a detailed description of how to compute the median when there are duplications of middle scores.

The third type of central tendency statistic is the mean. The mean is probably the most familiar summary statistic; it represents the average of a set of scores. Mathematically speaking, we define the mean as the sum of all scores divided by *N*, the total number of scores. Since the mean is used widely in both descriptive statistics and inferential statistics, it is described here in greater detail.

As a first step, some basic statistical notation is required:

$X$ = any score in a series of scores
$\overline{X}$ = the mean (read "X bar"; *M* is also commonly used to denote the mean)
$\Sigma$ = summation (symbol is Greek capital letter **sigma**)
$N$ = the total number of scores in a distribution

Using these symbols, we can write the formula for the calculation of the mean as

$$\overline{X} = \frac{\Sigma X}{N}$$

This equation indicates that the mean is the sum of all scores ($\Sigma X$) divided by the total number of scores ($N$). From the data in Table 11.1, the mean is

$$\overline{X} = \frac{293}{20} = 14.65$$

If the data are contained in a frequency distribution, a slightly different formula is used to calculate the mean:

$$\overline{X} = \frac{\Sigma fX}{N}$$

Table 11.6 *Calculation of Mean from Frequency Distribution*

| Hours | Frequency | *fx* |
|---|---|---|
| 6 | 1 | 6 |
| 8 | 2 | 16 |
| 9 | 1 | 9 |
| 11 | 3 | 33 |
| 12 | 2 | 24 |
| 14 | 2 | 28 |
| 15 | 1 | 15 |
| 16 | 1 | 16 |
| 18 | 1 | 18 |
| 19 | 2 | 38 |
| 21 | 2 | 42 |
| 23 | 1 | 23 |
| 25 | 1 | 25 |
| | $N = 20$ | $\Sigma fX = 293$ |

$$\bar{X} = \frac{293}{20} = 14.65$$

In this case $X$ represents the midpoint of any given interval, and $f$ is the frequency of that interval. Table 11.6 uses this formula to calculate the mean of the frequency distribution in Table 11.2.

Unlike the mode and the median, the mean takes into account all the values in the distribution, which makes it especially sensitive to extreme scores or "outliers." Extreme scores draw the mean toward their direction. For example, suppose Table 11.1 contained another response, from Respondent U, who reported 100 hours of radio and television use. The new mean would then be approximately 18.71, an increase of about 28% due to the addition of only one large number.

The mean may be thought of as the score that would be assigned to each individual or element if the total were evenly distributed among all members of the sample. It is also the only measure of central tendency that can be defined algebraically. As we show later, this allows the mean to be used in a wide range of situations. It also suggests that the data used to calculate the mean should be at the interval or ratio level (see Chapter 3).

Two factors must be considered in decisions about which of the three measures of central tendency to report for a given set of data. First, the level of measurement used may determine the choice: If the data are at the nominal level, only the mode is meaningful; with ordinal data, either the mode or the median may be used. All three measures are appropriate for interval and ratio data, however, and it may be desirable to report more than one.

Second, the purpose of the statistic is important. If the ultimate goal is to describe a set of data, the measure that is most typical of the distribution should be used. To illustrate, suppose the scores on a statistics exam are 100, 100, 100, 100, 0, and 0. To say that the mean grade is 67 does not accurately portray the distribution; the mode provides a more characteristic description.

***Dispersion.*** The second type of descriptive statistics is used to measure dispersion, or variation. Measures of central tendency determine the typical score of a distribution; dispersion measures describe the way the scores are spread out about this central point. Dispersion measures can be particularly valuable in comparisons of different distributions. For example, suppose the average grades for two classes in research methods are the same; however, one class has several excellent students and many poor students, whereas the other class has students who are all about average. A measure of dispersion must be used to reflect this difference. In many cases, a data set can be described adequately by simply reporting a measure of central tendency (usually the mean) and an index of dispersion.

The three measures of dispersion, or variation, are range, variance, and standard deviation. (Some statisticians include a fourth measure—sum of squares.) The simplest measure, range ($R$), is the difference between the highest and lowest scores in a distribution of scores. The formula used to calculate the range is

$$R = X_{hi} - X_{lo}$$

where $X_{hi}$ is the highest score and $X_{lo}$ is the lowest score. The range is sometimes reported simply as "the range among scores was 40."

Since the range uses only two scores out of the entire distribution, it is not particularly descriptive of the data set. Additionally, the range often increases with the sample size because larger samples tend to include more extreme values. For these reasons, the range is seldom used in mass media research as the sole measure of dispersion.

A second measure, variance, is a mathematical index of the degree to which scores deviate from, or are at variance with, the mean. A small variance indicates that most of the scores in the distribution lie fairly close to the mean; a large variance represents widely scattered scores. Thus variance is directly proportional to the degree of dispersion.

To compute the variance of a distribution, the mean is first subtracted from each score; these *deviation scores* are then squared, and the squares are summed and divided by $N - 1$.* The formula for variance (usually symbolized as $S^2$, although many textbooks use a different notation) is

$$S^2 = \frac{\Sigma(X - \overline{X})^2}{N - 1}$$

[In many texts, the expression $(X - \overline{X})^2$ is symbolized by $x^2$.] The numerator in this formula, $\Sigma(X - \overline{X})^2$, is called the *sum of squares*. Although this quantity usually is not reported as a descriptive statistic, the sum of squares is used in the calculation of several other statistics. An example using this variance formula is shown in Table 11.7.

This equation may not be the most convenient for calculating variance, especially if $N$ is large. A simpler, equivalent formula is

$$S^2 = \frac{\Sigma X^2}{N} - \overline{X}^2$$

The expression $\Sigma X^2$ means to square each score and sum the squared scores. [Note that this is not the same as $\Sigma (X)^2$, which means to sum all the scores and then square the sum.]

Variance is a commonly used and highly valuable measure of dispersion. In fact, it is at the heart of one powerful technique, analysis of variance (see Chapter 13), which is widely used in inferential statistics. However, variance does have one minor inconvenience: It is expressed in terms of squared deviations from the mean rather than in terms of the original measurements. To obtain a measure of dispersion that is calibrated in the same units as the original data, it is necessary to take the square root of the variance. This quantity, called the **standard deviation**, is the third type of dispersion measure. The standard deviation is more meaningful than the variance because it is expressed in the same units as the measurement used to compute it.

To illustrate, assume that a research project involves a question on household income

*Strictly speaking, this formula is used to find the variance of a sample of scores, where the sample variance is used to estimate the population variance. If a researcher is working with a population of scores, the denominator becomes $N$ rather than $N - 1$.

Table 11.7 *Calculation of Variance: X = Score*

| $X$ | $\overline{X}$ | $X - \overline{X}$ | $(X - \overline{X})^2$ |
|---|---|---|---|
| 6 | 14.65 | −8.65 | 74.8 |
| 8 | 14.65 | −6.65 | 44.2 |
| 8 | 14.65 | −6.65 | 44.2 |
| 9 | 14.65 | −5.65 | 31.9 |
| 11 | 14.65 | −3.65 | 13.3 |
| 11 | 14.65 | −3.65 | 13.3 |
| 11 | 14.65 | −3.65 | 13.3 |
| 12 | 14.65 | −2.65 | 7.0 |
| 12 | 14.65 | −2.65 | 7.0 |
| 14 | 14.65 | −0.65 | 0.4 |
| 14 | 14.65 | −0.65 | 0.4 |
| 15 | 14.65 | 0.35 | 0.1 |
| 16 | 14.65 | 1.35 | 1.8 |
| 18 | 14.65 | 3.35 | 11.2 |
| 19 | 14.65 | 4.35 | 18.9 |
| 19 | 14.65 | 4.35 | 18.9 |
| 21 | 14.65 | 6.35 | 40.3 |
| 21 | 14.65 | 6.35 | 40.3 |
| 23 | 14.65 | 8.35 | 69.7 |
| 25 | 14.65 | 10.35 | 107.1 |
| | | | 558 |

$$S^2 = \frac{\Sigma(X - \overline{X})^2}{N - 1} = \frac{558}{19} = 29.4$$

that produces a variance of $90,000—interpreted as 90,000 "squared dollars." Because the concept of "squared dollars" is confusing to work with, a researcher would probably choose to report the standard deviation: 300 "regular dollars" ($300 = \sqrt{90{,}000}$). Usually symbolized as $S$ (or $SD$), standard deviation is computed using either of these formulas:

$$S = \sqrt{\frac{\Sigma(X - \overline{X})^2}{N - 1}}$$

$$S = \sqrt{\frac{\Sigma X^2}{N - 1} - \overline{X}^2}$$

Note that these two equations correspond to the two variance formulas given earlier. Standard deviation represents a given distance of a score from the mean of a distribution. This figure is especially helpful in describing the results of standardized tests. For example, modern intelligence tests are constructed to yield a mean of 100 and a standard deviation of 15. A person with a score of 115 is 1 standard deviation above the mean; a person with a score of 85 is 1 standard deviation below the mean.

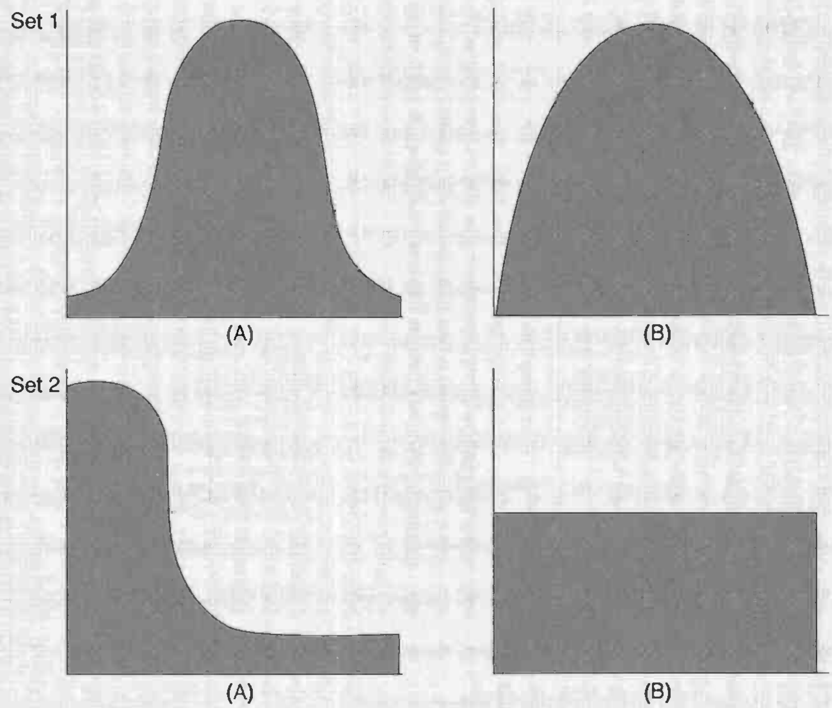
The notions of variance and standard deviation are easier to understand if they are visualized. Figure 11.5 shows two sets of frequency curves. Which curve in each set has the larger $S^2$ and $S$?

By determining the mean and standard deviation of a set of scores or measurements, researchers can compute **standard scores** (*z-scores*) for any distribution of data. Standard scores allow us to compare scores or measurements obtained from totally different methods—"apple and orange" comparisons. This is possible because all standard score computations are based on the same metric; they all have a mean of 0 and a standard deviation of 1.

Standard scores are easy to compute and interpret. The formula for computing standard scores is simply the score minus the mean, divided by the standard deviation:

$$z = \frac{X - \overline{X}}{S}$$

Figure 11.5 *Variance As Seen in Frequency Curves*




Interpretation is easy because each score simply represents how many standard deviation units an entity is above or below the mean.

The computation of standard scores and the ability to compare different measurements or methods can be demonstrated by a brief example. Suppose that two roommates are in different sections of a mass media research course. On a particular day, the two sections are given different exams, and both students score 73. However, the first roommate receives a letter grade of C, whereas the second roommate gets an A. How can this be? To understand how the professors arrived at the different grades, it is necessary to look at each section's standard scores.

Table 11.8 shows the hypothetical data for the two research sections. Each section contains 20 students. The scores in the first roommate's section range from a low of 68 to a high of 84 (range = 16), whereas the scores in the second roommate's section range from a low of 38 to a high of 73 (range = 35). The differences in scores can be due to a variety of things including the difficulty of the tests, the ability of students in each section, and the teaching approach used by the professors.

The mean score in the first roommate's section is 74.6, with a standard deviation of 4.9 (43.9 and 7.5, respectively, in the other section). If we assume that the professors strictly followed the normal curve (discussed later in the chapter), it is easy to see why a score of 73 can result in different grades. The first roommate's performance is about average in comparison to the other students in the

Table 11.8 *z-Score Hypothetical Data*

| | First Roommate's Section | | | Second Roommate's Section | | | |
|---|---|---|---|---|---|---|---|
| | **Scores** | **(Computation)** | ***z* Score** | **Scores** | **(Computation)** | ***z* Score** | |
| B grade | 84 | (84−74.6)/4.9= | 1.9 | 73 | (73− 43.9)/7.5= | 3.9 | A grade |
| | 81 | (81−74.6)/4.9= | 1.3 | 50 | (50−43.9)/7.5= | .8 | C grade |
| | 81 | (81−74.6)/4.9= | 1.3 | 50 | (50−43.9)/7.5= | .8 | |
| C grade | 79 | (79−74.6)/4.9= | .9 | 47 | (47−43.9)/7.5= | .4 | |
| | 79 | (79−74.6)/4.9= | .9 | 46 | (46−43.9)/7.5= | .3 | |
| | 79 | (79−74.6)/4.9= | .9 | 45 | (45−43.9)/7.5= | .2 | |
| | 78 | (78−74.6)/4.9= | .7 | 43 | (43−43.9)/7.5= | −.1 | |
| | 77 | (77−74.6)/4.9= | .5 | 43 | (43−43.9)/7.5= | −.1 | |
| | 77 | (77−74.6)/4.9= | .5 | 42 | (42−43.9)/7.5= | −.2 | |
| | 75 | (75−74.6)/4.9= | .1 | 41 | (41−43.9)/7.5= | −.4 | |
| | 73 | (73−74.6)/4.9= | −.3 | 41 | (41−43.9)/7.5= | −.4 | |
| | 71 | (71−74.6)/4.9= | −.7 | 41 | (41−43.9)/7.5= | −.4 | |
| | 71 | (71−74.6)/4.9= | −.7 | 40 | (40−43.9)/7.5= | −.5 | |
| | 71 | (71−74.6)/4.9= | −.7 | 40 | (40−43.9)/7.5= | −.5 | |
| | 70 | (70−74.6)/4.9= | −.9 | 40 | (40−43.9)/7.5= | −.5 | |
| | 70 | (70−74.6)/4.9= | −.9 | 40 | (40−43.9)/7.5= | −.5 | |
| | 70 | (70−74.6)/4.9= | −.9 | 40 | (40−43.9)/7.5= | −.5 | |
| D grade | 69 | (69−74.6)/4.9= | −1.1 | 39 | (39−43.9)/7.5= | −.6 | |
| | 68 | (68−74.6)/4.9= | −1.3 | 38 | (38−43.9)/7.5= | −.8 | |
| | 68 | (68−74.6)/4.9= | −1.3 | 38 | (38−43.9)/7.5= | −.8 | |
| | | Mean 74.6 | | Mean 43.9 | | | |
| | | *S* 4.9 | | *S* 7.5 | | | |

*Note:* The distribution of scores in each section is not normal (discussed later). In reality, the professors might transform the scores to produce a more normal distribution, or they might set grade cutoffs at other scores to spread the grades out.

section; the second roommate is clearly above the performance of the other students.

*Note:* The distribution of scores in each section is not normal (discussed later). In reality, the professors might transform (change to a different metric) the scores to produce a more normal distribution, or they might set grade cutoffs at other scores to spread the grades out. When any collection of raw scores is transformed into *z-scores,* the resulting distribution possesses certain characteristics. Any score below the mean becomes a negative *z-score,* and any score above the mean is positive. The mean of a distribution of *z-scores* is 0, which is also the *z-score* assigned to a person whose raw score equals the mean. As mentioned, the variance and the standard deviation of a *z-score* distribution are both 1.00. (The mean is 0.) Standard scores are expressed in units of the standard deviation; thus a *z-score* of 3.00 means that the score is 3 standard deviation units above the mean.

Standard scores are used frequently in all types of research because they allow researchers to directly compare the performances of different subjects on tests using different measurements (assuming the distributions have similar shapes). Assume for a moment that the apple harvest in a certain year was 24 bushels per acre, compared to an average annual yield of 22 bushels per acre, with a standard deviation of 10. During the same year, the orange crop yielded 18 bushels per acre, compared to an average of 16 bushels, with a standard deviation of 8. Was it a better year for apples or for oranges? The standard score formula reveals a *z*-score of .20 for apples [(24 − 22)/10] and .25 for oranges [(18 − 16)/8]. Relatively speaking, oranges had a better year.

### The Normal Curve

An important tool in statistical analysis is the normal curve, which was introduced briefly in Chapter 5. Standard scores not only enable comparisons to be made between dissimilar measurements, but, when used in connection with the normal curve, also allow statements to be made regarding the frequency of occurrence of certain variables. Figure 11.6 shows an example of the familiar normal curve. The curve is symmetrical and achieves its maximum height at the mean, which is also its median and its mode. Also note that the curve in Figure 11.6 is calibrated in standard score units. When the curve is expressed in this way, it is called a *standard normal curve* and has all the properties of a *z-score* distribution.

Statisticians have studied the normal curve closely to describe its properties. (Search the Internet for more information on the normal curve.) The most important of these is that a fixed proportion of the area below the curve lies between the mean and any unit of standard deviation. The area under a certain segment of the curve represents the frequency of the scores that fall therein. From Figure 11.7, which portrays the areas under the normal curve between several key standard deviation units, it can be determined that roughly 68% of the total area, hence of the scores, lies within +1 and −1 standard deviations from the mean; about 95% lies within +2 and −2 standard deviations; and so forth.

This knowledge, together with the presence of a normal distribution, allows researchers to make useful predictive statements. For example, suppose that television viewing is normally distributed with a mean of 2 hours per day and a standard deviation of 0.5 hour. What proportion of the population watches between 2 and 2.5 hours of TV? First we change the raw scores to standard scores:

$$\frac{2-2}{0.5} = 0 \quad \text{and} \quad \frac{2.5-2}{0.5} = 1.00$$

Figure 11.7 shows that approximately 34% of the area below the curve is contained

Figure 11.6 *The Normal Curve*

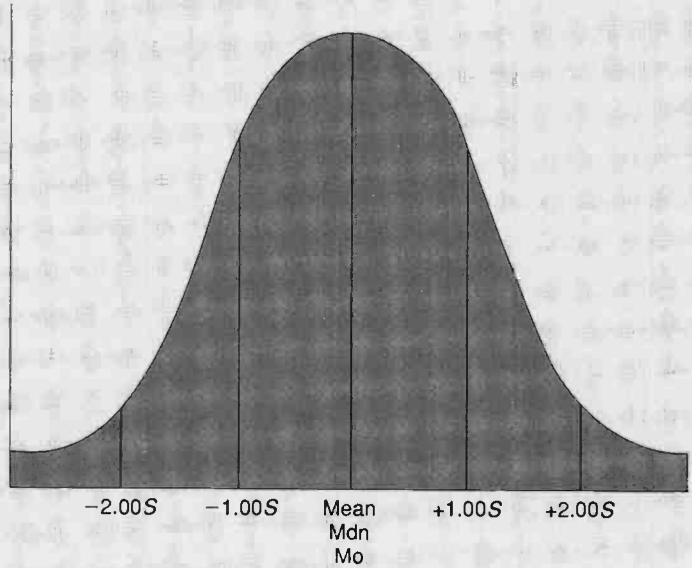
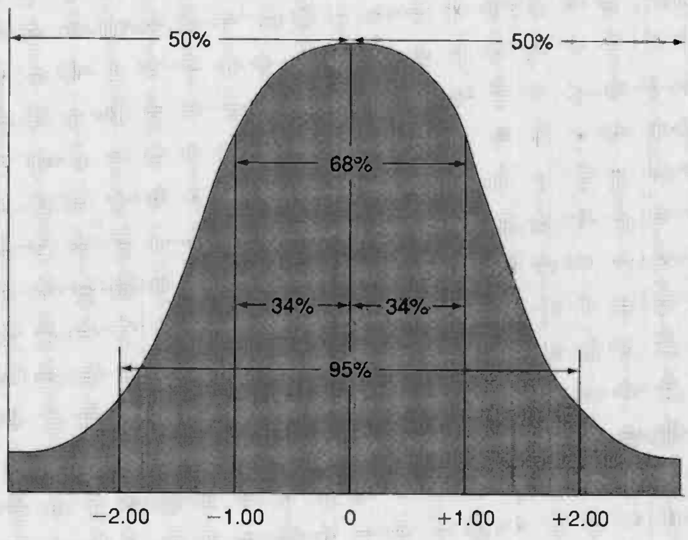



Figure 11.7 *Areas Under the Normal Curve*



between the mean and 1 standard deviation. Thus 34% of the population watches between 2 and 2.5 hours of television daily.

The same data can be used to find the proportion of the population that watches more than 3 hours of TV per day. Again, the first step is to translate the raw figures into $z$-scores. In this case, 3 hours corresponds to a $z$-score of 2.00. A glance at Figure 11.7 shows that approximately 98% of the area under the curve falls below a score of 2.00 (50% in the left half of the curve plus about 48% from the mean to the 2.00 mark). Thus only 2% of the population view more than 3 hours of TV daily.

Table 3 in Appendix 1 lists all the areas under the normal curve between the mean of the curve and some specified distance. To use this table, we match the row and the column represented by some standard score. For example, let us assume that the standard score of a normally distributed variable is 1.79. In Table 3, first find the row labeled 1.7, and then find the column labeled .09. At the intersection of the 1.7 row and the .09 column is the number .4633. The area between the mean of the curve (the midpoint) and a standard score of 1.79 is .4633, or roughly 46%. To take another example, what is the distance from the midpoint of the curve to the standard score of −1.32? According to Table 3, 40.66% of the curve lies between these two values. (In the left-hand column, find 1.3; then go over to the column labeled .02.) Note that the area is always positive even though the standard score was expressed as a negative value.

To make this exercise more meaningful, let us go back to our example of the two roommates (see Table 11.8). Assume that the scores were normally distributed in the class that had a mean of 74.6 and a standard deviation of 4.9. The instructor decided to assign Cs to the middle 50% of the class. What numerical scores would receive these grades? To begin, remember that "the middle 50% of the grades" actually means "25% above the mean and 25% below the mean." What standard deviation unit corresponds to this distance? To answer this question, it is necessary to reverse the process performed above. Specifically, the first thing that we must do is examine the body of Table 3 in Appendix 1 for the corresponding $z$ value of .2500. Unfortunately, it does not appear. There are, however, two percentages bracketing it—.2486 ($z$ = .67) and .2517 ($z$ = .68). Since .2486 is a little closer to .2500, let's use it as our area. Examining the row and column intersection at .2486, we find that it corresponds to 0.67 standard deviation unit. Now we can quickly calculate the scores that receive Cs. First, we find the upper limit of the C range by taking the mean (74.6) and adding it to 0.67 × 4.9, or 3.28. This yields 77.88, which represents the quarter of the area above the mean. To find the lower limit of the range, we take the mean (74.6) and subtract from it 0.67 × 4.9, or 74.6 − 3.28. This gives us 71.32. After rounding, we find that all students who scored 71–78 would receive the C grade.

The normal curve is important because many of the variables encountered by mass media researchers are distributed in a normal manner, or normally enough that minor departures can be overlooked. Furthermore, the normal curve is an example of a probability distribution that is important in inferential statistics. Finally, many of the more advanced statistics discussed in later chapters assume normal distribution of the variable(s) under consideration.

## ▪ *Sample Distribution*

A sample distribution is the distribution of some characteristic measured on the individuals or other units of analysis that were part of a sample. If a random sample of 1,500 college students is asked how many movies they attended in the last month, the resulting distribution of the variable "number of movies attended" is a sample distribution, with a mean ($\overline{X}$) and variance ($S^2$). It is theoretically possible (though not practical) to ask the same question of every college student in the United States. This would create a **population distribution** with a mean ($\mu$) and a variance ($\sigma^2$). A statistic is a measure based on a sample, whereas a parameter is a measure taken from a population. Ordinarily, the precise shape of the population distribution and the values of $\mu$ and $\sigma^2$ are unknown and are estimated from the sample. This estimate is called a **sampling distribution.**

| Characteristic | Sample statistic | Population parameter |
|---|---|---|
| Average | $\overline{X}$ (or *M*) | $\mu$ (mu) |
| Variance | $S^2$ | $\sigma^2$ (sigma squared) |
| Standard deviation | *S* (or *SD*) | $\sigma$ (sigma) |

In any sample drawn from a specified population, the mean of the sample, $\overline{X}$, probably differs somewhat from the population mean, $\mu$. For example, suppose that the average number of movies seen by each college student in the United States during the past month was exactly 3.8. It is unlikely that a random sample of 10 students from this population would produce a mean of exactly 3.8. The amount that the sample mean differs from $\mu$ is called the *sampling error* (see Chapter 4). If more random samples of 10 were selected from this population, the values calculated for $\overline{X}$ that are close to the population mean would become more numerous than the values of $\overline{X}$ that are greatly different from $\mu$. If this process were repeated an infinite number of times and each mean was placed on a frequency curve, the curve would form a sampling distribution.

Once the sampling distribution has been identified, statements about the *probability* of occurrence of certain values are possible. There are many ways to define the concept of probability. Stated simply, the probability that an event will occur is equal to the relative frequency of occurrence of that event in the population under consideration (Roscoe, 1975). To illustrate, suppose a large urn contains 1,000 table tennis balls, of which 700 are red and 300 white. The probability of drawing a red ball at random is 700/1,000, or 70%. It is also possible to calculate probability when the relative frequency of occurrence of an event is determined theoretically. For example, what is the probability of randomly guessing the answer to a true/false question? One out of two, or 50%. What is the probability of guessing the right answer on a four-item multiple-choice question? One out of four, or 25%. Probabilities can range from 0 (no chance) to 1 (a sure thing). The sum of all the probable events in a population must equal 1.00, which is also the sum of the probabilities that an event will and will not occur. For instance, when a coin is tossed, the probability of it landing face up ("heads") is .50, and the probability of it not landing face up ("tails") is .50 (.50 + .50 = 1.00).

There are two important rules of probability. The "addition rule" states that the probability that any one of a set of mutually exclusive events will occur is the sum of the probabilities of the separate events. (Two events are mutually exclusive if the occurrence of one precludes the other. In the table tennis ball example, the color of the ball is either red or white; it cannot be both.) To illustrate the addition rule, consider a population in which 20% of the people read no magazines per month, 40% read only one, 20% read two, 10% read three, and 10% read four. What is the probability of selecting at random a person who reads at least two magazines per month? The answer is .40 (.20 + .10 + .10), the sum of the probabilities of the separate events.

The "multiplication rule" states that the probability of a combination of independent events occurring is the product of the separate probabilities of the events. (Two events are independent when the occurrence of one has no effect on the other. For example, getting "tails" on the flip of a coin has no impact on the next flip.) To illustrate the multiplication rule, calculate the probability that an unprepared student will guess the correct answers to the first four questions on a true/false test. The answer is the product of the probabilities of each event: .5 (chance of guessing right on Question 1) × .5 (chance of guessing right on Question 2) × .5 (chance of guessing right on Question 3) × .5 (chance of guessing right on Question 4) = .0625.

The notion of probability is important in inferential statistics because sampling distributions are a type of probability distribution. When the concept of probability is understood, a formal definition of "sampling distribution" is possible. A sampling distribution *is a probability distribution of all possible values of a statistic that would occur if all possible samples of a fixed size from a given population were taken.* For each outcome, the sampling distribution determines the probability of occurrence. For example, assume that a population consists of six college students. Their film viewing for the last month was as follows:

| Student | Number of films seen |
|---|---|
| A | 1 |
| B | 2 |
| C | 3 |
| D | 3 |
| E | 4 |
| F | 5 |

$$\mu = \frac{1 + 2 + 3 + 3 + 4 + 5}{6} = 3.00$$

Suppose a study is made using a sample of two ($N = 2$) from this population. As is evident, there is a limit to the number of combinations that can be generated, assuming that sampling is done without replacement. Table 11.9 shows the possible outcomes. The mean of this sampling distribution is equal to $\mu$, the mean of the population. The likelihood of drawing a sample whose mean is 2.0 or 1.5 or any other value is found simply by reading the figure in the far right-hand column.

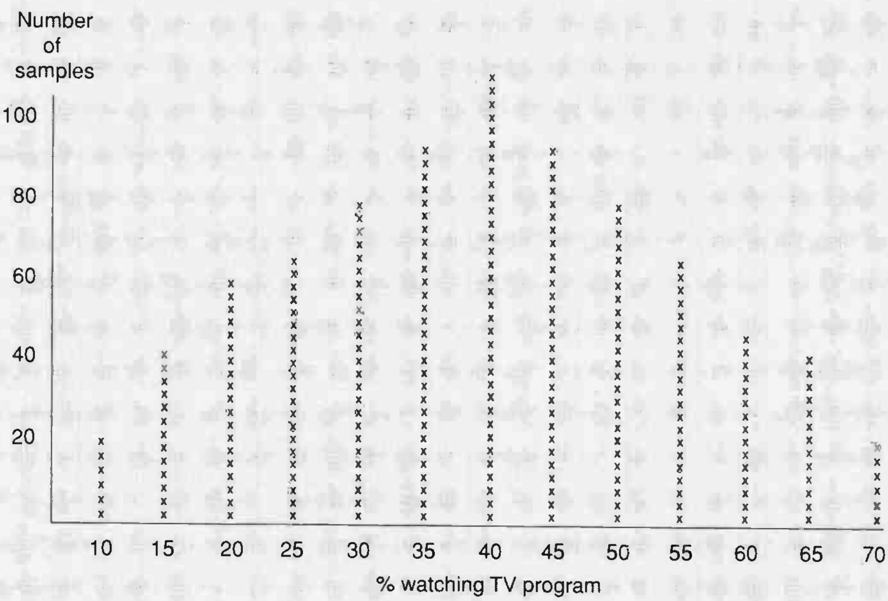
Table 11.9 is an example of a sampling distribution determined by empirical means. Many sampling distributions, however, are not derived by mathematical calculations but are determined theoretically. For example, sampling distributions often take the form of a normal curve. When this is the case, the researcher can make use of everything that is known about the properties of the normal curve. Consider a hypothetical example using dichotomous data (data with only two possible values). (This type of data is chosen because it makes the mathematics less complicated. The same logic applies to continuous data, but the computations are elaborate.) A television rating firm is attempting to estimate from the results of a sample the total number of people in the population who saw a given program. One sample of 100 people might produce an estimate of 40%, a second an estimate of 42%, and a third an estimate of 39%. If, after a large number of samples have been taken, the results are expressed as a sampling distribution, probability theory predicts that it would have the shape of the normal curve with a mean equal to $\mu$. This distribution is shown in Figure 11.8. It is interesting that if a person draws samples of size $N$ repeatedly from a given population, the sampling distribution of the means of these samples, assuming $N$ is large enough, will almost always be normal. This holds even if the population itself is not normally distributed. Furthermore, the mean of the sampling distribution will equal the population mean—the parameter.

In earlier discussions of the normal curve, the horizontal divisions along the base of the curve were expressed in terms of standard

Table 11.9 *Generating a Sampling Distribution Population* = (1,2,3,3,4,5) *N* = 2

| $\overline{X}$ | Number of possible sample combinations producing this $\overline{X}$ | Probability of occurrence |
|---|---|---|
| 1.5 | 2 (1,2) (2,1) | 2/30 or .07 |
| 2.0 | 4 (1,3) (1,3) (3,1) (3,1) | 4/30 or .13 |
| 2.5 | 6 (1,4) (2,3) (2,3) (3,2) (3,2) (4,1) | 6/30 or .20 |
| 3.0 | 6 (1,5) (2,4) (3,3) (3,3) (4,2) (5,1) | 6/30 or .20 |
| 3.5 | 6 (2,5) (3,4) (3,4) (4,3) (4,3) (5,2) | 6/30 or .20 |
| 4.0 | 4 (3,5) (3,5) (5,3) (5,3) | 4/30 or .13 |
| 4.5 | 2 (4,5) (5,4) | 2/30 or .07 |
| | | 1.00 |
| | Total number of possible sample combinations = 30 | |

Figure 11.8 *Hypothetical Sampling Distribution*



deviation units. With sampling distributions, this unit is called the *standard error of the mean* (*SE*) and serves as a criterion for determining the probable accuracy of an estimate. As is the case with the normal curve, roughly 68% of the sample fall within ±1 standard error of the population mean, and about 95% fall within ±2 standard errors.

In most actual research studies, a sampling distribution is not generated by taking large numbers of samples and computing the probable outcome of each, and the standard error is not computed by taking the standard deviation of a sampling distribution of means. Instead, a researcher takes only one sample and uses it to estimate the population mean and the standard error. The process of inference from only one sample works in the following way: The sample mean is used as the best estimate of the population mean, and the standard error is calculated from the sample data. Suppose that in the foregoing example, 40 of a sample of 100 people were watching a particular program. The mean, in this case symbolized as $p$ because the data are dichotomous, is 40% (dichotomous data require this unique formula). The formula for standard error in a dichotomous situation is

$$SE = \sqrt{\frac{pq}{N}}$$

where $p$ is the proportion viewing, $q = 1 - p$, and $N$ is the number in the sample. In the example, the standard error is

$$\sqrt{\frac{(.4)\,(.6)}{100}} = \sqrt{\frac{.24}{100}} = .048\text{, or } 4.8\%$$

Standard error is used in conjunction with the confidence interval (CI) set by the researcher. Recall from Chapter 5 that a confidence interval establishes an interval in which researchers state, with a certain degree of probability, that the statistical result found will fall. In the previous example, this means that at the 68% confidence interval, 68% of all possible samples taken will fall within the interval of plus and minus one standard error or 35.2 (40 − 4.8) and 44.8 (40 + 4.8), and at the 95% confidence level, 95% of all samples will fall between plus and minus 1.96 (*SE*) or 30.4 (40 − 9.6) and 49.6 (40 + 9.6). The most commonly used confidence level is .95, which is expressed by this formula:

$$.95CI = p \pm 1.96SE$$

where $p$ is the proportion obtained in the sample, *SE* is the standard error, and 1.96 is the specific value to use for enclosing exactly 95% of the scores in a normal distribution.

As an example, consider that a television ratings firm sampled 400 people and found that 20% of the sample was watching a certain program. What is the .95 confidence interval estimate for the population mean? The standard error is equal to the square root of [(.20)(.80)]/400, or .02. Inserting this value into the formula above yields a .95 confidence interval of .20 ± (1.96) (.02), or .16–.24. In other words, there is a .95 chance that the population average lies between 16% and 24%. There is also a 5% chance of error—that is, that $\mu$ lies outside this interval. If this 5% chance is too great a risk, it is possible to compute a .99 confidence interval estimate by substituting 2.58 for 1.96 in the formula. (In the normal curve, 99% of all scores fall within ±2.58 standard errors of the mean.) For a discussion of confidence intervals using continuous data, consult Hays (1973) and the Internet.

The concept of sampling distribution is important to statistical inference. Confidence intervals represent only one way in which sampling distributions are used in inferential statistics. They are also important in hypothesis testing, where the probability of a specified sample result is determined under assumed population conditions (see Chapter 12).

## ▪ Data Transformation

Most statistical procedures are based on the assumption that the data are normally distributed. Although many statistical procedures are "robust," or conservative, in their requirement of normally distributed data, in some instances the results of studies using data that show a high degree of skewness may be invalid. The data used for any study should be checked for normality, a procedure accomplished very easily with most computer programs.

Most nonnormal distributions are created by outliers. When such anomalies arise, researchers can attempt to transform the data to achieve normality. Basically, transformation involves performing some type of mathematical adjustment to each score to try to bring the outliers closer to the group mean. This may take the form of multiplying or dividing each score by a certain number, or even taking the square root or log of the scores. It makes no difference what procedure is used (although some methods are more powerful than others), as long as the same procedure is applied to all the data.

There is a variety of transformation methods from which to choose, depending on the type of distribution found in the data. Rummel (1970) describes these procedures in more detail, and there are many references on the Internet—search for "data transformation."

## ▪ ▪ ▪ Summary

This chapter introduced some of the more common descriptive and inferential statistics used by mass media researchers. Little attempt has been made to explain the mathematical derivations of the formulas and principles presented; rather, the emphasis here (as throughout the book) has been on understanding the reasoning behind these statistics and their applications. Unless researchers understand the logic underlying such concepts as mean, standard deviation, and standard error, the statistics themselves are of little value.

### Questions and Problems for Further Investigation

1. Find the mean, variance, and standard deviation for these two sets of data (answers appear at the end of the exercise):

   Group 1: 5, 5, 5, 6, 7, 5, 4, 8, 4, 5, 8, 8, 7, 6, 3, 3, 2, 5, 4, 7
   Group 2: 19, 21, 22, 27, 16, 15, 18, 24, 26, 24, 22, 27, 16, 15, 18, 21, 20

2. From a regular deck of playing cards, what is the probability of randomly drawing an ace? An ace or a nine? A spade or a face card?
3. Assume that scores on the Mass Media History Test are normally distributed in the population with a $\mu$ of 50 and a population standard deviation of 5. What are the probabilities of these events?
   a. Someone picked at random has a score between 50 and 55.
   b. Someone picked at random scores 2 standard deviations above the mean.
   c. Someone picked at random has a score of 58 or higher.
4. Assume that a population of scores is 2, 4, 5, 5, 7, and 9. Generate the sampling distribution of the mean if $N = 2$ (sampling without replacement).
5. Search the Internet for more information on confidence intervals and probability. How are the two concepts related?
6. If you are using *InfoTrac College Edition,* you can read another explanation of descriptive statistics (with examples taken from sports) by retrieving: "A statistics primer: descriptive measures for continuous data" by Mary Lou V. H. Greenfield, John E. Kuhn, and Edward M. Wojtys in the October–November issue of the *Journal of Sports Medicine.*

Answers to Question 1:

Group 1: $\overline{X} = 5.35, S^2 = 3.08, S = 1.76$

Group 2: $\overline{X} = 20.6, S^2 = 16.2, S = 4.0$

## References and Suggested Readings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Chapter 12

# Hypothesis Testing


- *Research Questions and Hypotheses*
- *Testing Hypotheses for Statistical Significance*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

Scientists rarely begin a research study without a problem or a question to test. That would be similar to holding a cross-country race without telling the runners where to start. Both events need an initial step: The cross-country race needs a starting line, and the research study needs a question or statement to test. This chapter describes the procedures for developing research questions and the steps involved in testing them. (See the writings of John W. Tukey on the topics of exploratory and confirmatory research and search the Internet for many fascinating articles by and about J. W. Tukey.)

## Research Questions and Hypotheses

Mass media researchers use a variety of approaches to answer questions. Some research is informal and seeks to solve relatively simple problems; some is based on theory and requires formally worded questions. All researchers, however, must start with some tentative generalization regarding a relationship between two or more variables. These generalizations may take two forms: *research questions* and *statistical hypotheses*. The two are identical except for the aspect of prediction—hypotheses predict an experimental outcome; research questions do not.

### Research Questions

Researchers often use research questions in problem- or policy-oriented studies when they are not specifically interested in testing the statistical significance of their findings. For instance, researchers analyzing television program preferences or newspaper circulation are probably concerned only with discovering general indications, not with gathering data for statistical testing. However, research questions can be tested for statistical significance. They are not merely weak hypotheses; they are valuable tools for many types of research.

Research questions are frequently used in areas that have been studied only marginally or not at all. Studies of this nature are classified as *exploratory research* because researchers have no idea what may be found. They have no prior information to make predictions. Exploratory research is intended to search for data *indications* rather than to attempt to find causality (Tukey, 1962, 1986). The goal is to gather preliminary data, to be able to refine research questions, and possibly to develop hypotheses.

Research questions may be stated as simple questions about the relationship between two or more variables or about the components of a phenomenon. As Tukey (1986) states, exploratory research responds to the question: What appears to be going on? For example, researchers might ask, "How do high-technology firms perceive and use advertising?" (Traynor & Traynor, 1989) or "How do television and radio programs influence children's creativity as measured by a standardized test?" (Runco & Pezdek, 1984). Slater and Thompson (1984) pose several research questions about the attitudes of parents concerning warning statements that precede some television shows: "Do parents indicate that they frequently see the warning statements?" "Do the warnings influence parents' decisions about the suitability of a program for their child's viewing?" "Do parents advocate the imposition of a movie-type rating system for TV programs?"

## Research Hypotheses

In countless situations, researchers develop studies based on existing theory and are thus able to make predictions about the outcome of the work. Tukey (1986) says that hypotheses ask, Do we have firm evidence that such-and-such is happening (has happened)? Brody (1984) hypothesized that access to the diverse offerings of cable television would result in people borrowing fewer books from the library. His data revealed support for this hypothesis in one cable market but not in another. Milliman, Fugate, and Rahim (1991, p. 53) investigated the advertising of legal services and tested these three hypotheses:

1. The level of price disclosure in advertising legal services on the radio will influence the public's perception of the legal services advertiser.
2. The use (or nonuse) of a free first consultation in advertising legal services on the radio will influence the consuming public's perception of the legal services advertiser.
3. The interaction between the different levels of price disclosure and the free consultation offer used in the advertisements tested in this experiment will influence the consumers' perceptions of legal services advertisers.

The authors found that advertisements including free consultation or price mentions were considered the least credible.

To facilitate the discussion of research testing, the remainder of this chapter uses only the word *hypothesis*. But recall that research questions and hypotheses are identical except for the absence of the element of prediction in the former.

## Purposes of Hypotheses

Hypotheses offer researchers a variety of benefits. First, they *provide direction* for a study. As indicated at the opening of the chapter, research that begins without hypotheses offers no starting point; there is no indication of the sequence of steps to follow. Hypothesis development is usually the culmination of a rigorous literature review and emerges as a natural step in the research process. Without hypotheses, research lacks focus and clarity.

A second benefit of hypotheses is that they *eliminate trial-and-error research*—that is, the haphazard investigation of a topic in the hope of finding something significant. Hypothesis development requires researchers to isolate a specific area for study. Trial-and-error research is time-consuming and wasteful. The development of hypotheses eliminates this waste.

Hypotheses also *help rule out intervening and confounding variables.* Since hypotheses focus research to precise testable statements, other variables, whether relevant or not, are excluded. For instance, researchers interested in determining how the media are used to provide consumer information must develop a specific hypothesis stating what media are included, what products are being tested for what specific demographic groups, and so on. Through this process of narrowing, extraneous and intervening variables are eliminated or controlled. This does not mean that hypotheses eliminate all error in research, however; nothing can do that. Error in some form is present in every study (see Chapter 5).

Finally, hypotheses *allow for quantification of variables.* As stated in Chapter 3, any concept or phenomenon can be quantified if it is given an adequate operational defini-

*Benefits of Hypotheses*
Provide direction for a study
Eliminate trial-and-error research
Help rule out intervening and confounding variables
Allow for quantification of variables

*Criteria for Good Hypotheses*
Compatible with current knowledge
Logically consistent
Succinct
Testable

tion. All terms used in hypotheses must have an operational definition. For example, to test the hypothesis "There is a significant difference between recall of television commercials for subjects exposed to low-frequency broadcasts and that for subjects exposed to high-frequency broadcasts," researchers need operational definitions of *recall, low-frequency,* and *high-frequency.* Words that cannot be quantified cannot be included in a hypothesis.

In addition, some concepts have a variety of definitions. One example is violence. The complaint of many researchers is not that violence cannot be quantified, but rather that it can be operationally defined in more than one way. Therefore, before one can compare the results of studies of media violence, it is necessary to consider the definition of violence used in each study. Contradictory results may be due to the definitions used, not to the presence or absence of violence.

## Criteria for Good Hypotheses

A useful hypothesis should possess at least four essential characteristics: It should be compatible with current knowledge in the area, it should be logically consistent, it should be stated concisely, and it should be testable.

That hypotheses must be in harmony with current knowledge is obvious. If available literature strongly suggests one point of view, researchers who develop hypotheses that oppose this knowledge without basis only slow the development of the area. For example, it has been demonstrated beyond a doubt that most people obtain their news from television. It would be rather wasteful for a researcher to develop a hypothesis suggesting that this is not true. There is simply too much evidence to the contrary.

The criterion of logical consistency means that if a hypothesis suggests that $A = B$ and $B = C$, then $A$ must also equal $C$. That is, if reading the *New York Times* implies a knowledge of current events, and a knowledge of current events means greater participation in social activities, then readers of the *New York Times* should exhibit greater participation in social activities. (Logical consistency relates to Aristotle's notion of an enthymeme, which produces such pop culture "logical consistencies" as: God is Love/Love is blind/Stevie Wonder is God.)

It should come as no surprise that hypotheses must be stated as succinctly as possible. A hypothesis such as "Intellectual and psychomotor creativity possessed by an individual positively coincides with the level of intelligence of the individual as indicated by standardized evaluative procedures measuring intelligence" is not exactly concise. Stated simply, the same hypothesis could read, "Psychomotor ability and IQ are positively related."

Most researchers agree that developing an untestable hypothesis is unproductive, but there is a fine line between what is and what is not testable. We agree that untestable hypotheses will probably create a great deal of frustration, and the information collected and tested will probably add nothing to the development of knowledge. However, the situation here is similar to some teachers who say (and really mean) on the first day of class, "Don't ever be afraid to ask me a question because you think it's stupid. The only stupid question is the one that is not asked."

We consider hypothesis development a similar situation. It is much better to form an untestable hypothesis than to form none at all. The developmental process itself is a valuable experience, and researchers will no doubt soon find their error. The untestable ("stupid") hypothesis may eventually become a respectable research project. Our suggestion is not to try to develop untestable hypotheses, but rather to accept the fact when it happens, correct it and move on. Beginning researchers should not try to solve the problems of the world. Take small steps.

What are some unrealistic and untestable hypotheses? Read the following list of hypotheses (some relate to areas other than mass media) and determine what is wrong with each one. Feldman (1987) was used in preparing some of these statements.

1. Watching too many soap operas on television creates antisocial behavior.
2. Clocks run clockwise because most people are right-handed.
3. High school students with no exposure to television earn higher grades than those who watch television.
4. Students who give gifts to teachers tend to earn higher grades.
5. People who read newspapers wash their hands more frequently than those who do not read newspapers.
6. Movies rated XXX are 10 times worse than movies rated XX and 20 times worse than movies rated X.
7. College students who cut classes have more deceased relatives than students who attend classes.
8. Einstein's theory of relativity would not have been developed if he had access to television.
9. Sales of Fords in America would be higher if Lexus did not exist.
10. World opinion of the United States would be different if Richard Nixon had never been the president.

### The Null Hypothesis

The null hypothesis (also called the "hypothesis of no difference") asserts that the statistical differences or relationships being analyzed are due to chance or random error. The null hypothesis ($H_0$) is the logical alternative to the research hypothesis ($H_1$). For example, the hypothesis "The level of attention paid to radio commercials is positively related to the amount of recall of the commercial" has its logical alternative (null hypothesis): "The level of attention paid to radio commercials is not related to the amount of recall of the commercial."

In practice, researchers rarely state the null hypothesis. Since every research hypothesis does have its logical alternative, stating the null form is redundant (Williams, 1979). However, the null hypothesis is always present and plays an important role in the rationale underlying hypothesis testing. (Search the Internet for many interesting articles about the "null hypothesis.")

## ▪ *Testing Hypotheses for Statistical Significance*

In hypothesis testing, or significance testing, the researcher either rejects or accepts the null hypothesis. That is, if $H_0$ is accepted (supported), it is assumed that $H_1$ is rejected; and if $H_0$ is rejected, $H_1$ must be accepted.

To determine the statistical significance of a research study, the researcher must set a **probability level,** or significance level, against which the null hypothesis is tested. If the results of the study indicate a probability lower than this level, the researcher can reject the null hypothesis. If the research outcome has a high probability, the researcher must support (or, more precisely, fail to reject) the null hypothesis. In reality, since the null hypothesis is not generally stated, acceptance and rejection apply to the research hypothesis, not to the null hypothesis.

The probability level is expressed by a lowercase letter $p$ (indicating *probability*), followed by a "less than" or "less than or equal to" sign, and then a value. For example, "$p \leq .01$" means that the null hypothesis is being tested at the .01 level of significance and that the results will be considered statistically significant if the probability is equal to or lower than this level. A .05 level of significance indicates that the researcher has a 5% chance of making a wrong decision about rejecting the null hypothesis (or accepting the research hypothesis). Establishing a level of significance depends on the amount of error researchers are willing to accept (in addition to other factors peculiar to the particular research study). The question of error is discussed in greater detail later in the chapter.

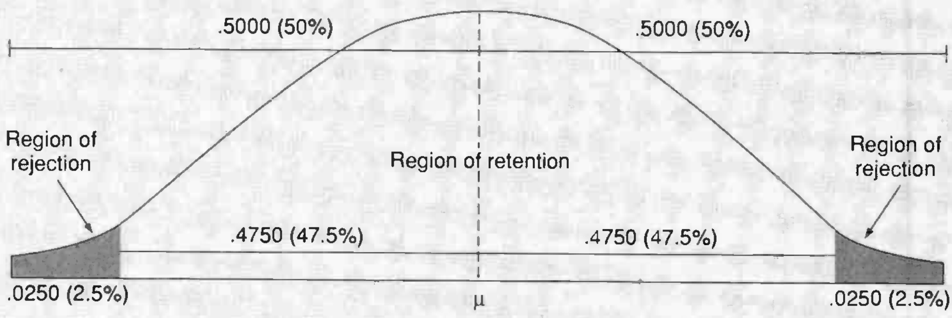
It is common practice in mass media research studies to set the probability level at .01 or .05, which means that either one or five times out of 100, the results of the study are based on random error or chance. There is no logical reason for using these figures; the practice has been followed for many years because Sir Ronald A. Fisher, who developed the concept of significance testing, formulated tables based on the areas under the normal curve defined by .01 and .05. In many research areas, however, researchers set the significance level according to the purpose of the study rather than by general convention. Some studies use .10 or .20, depending on the goals of the research. In exploratory research especially, more liberal levels are generally used; these are made more restrictive as further information is gathered.

In a theoretical sampling distribution (a graphed display of sampling results), the proportion of the area in which the null hypothesis is rejected is called the **region of rejection.** This area is defined by the level of significance chosen by the researcher. If the .05 level of significance is used, then 5% of the sampling distribution becomes the critical region. Conversely, the null hypothesis is retained in the region between the two rejection values (or levels).

As Figure 12.1 shows, the regions of rejection are located in the tails, or outer edges, of the sampling distribution. The terms *one-tail testing* and *two-tail testing* refer to the type of prediction made in a research study. A one-tail test predicts that the results will fall in only one direction—either positive or negative. This approach is more stringent than the two-tail test, which does not predict a direction. Two-tail tests are generally used when little information is available about the research area. One-tail tests are used when researchers have more knowledge of the area and are able to more accurately predict the outcome of the study.

Consider, for example, a study of the math competency of a group of subjects who receive a special learning treatment, possibly a series of television programs on mathematics. The hypothesis is that the group, after viewing the programs, will have scores on a standardized math test significantly different from those of the remainder of the population, which has

Figure 12.1 *Regions of Rejection for $p \leq .05$ (Two-Tail)*




not seen the programs. The level of significance is set at .05, indicating that for the null hypothesis to be rejected, the mean test score of the sample must fall outside the boundaries in the normal distribution that are specified by the statement "$p \leq .05$." These boundaries, or values, are determined by a simple computation. First, the critical values of the boundaries are found by consulting the normal distribution table (see Appendix 1, Table 3).

In Figure 12.1 the area from the middle of the distribution, or $\mu$, the hypothesized mean (denoted by a broken line), to the end of the tails is 50%. At the .05 level, with a two-tail test, there is a 2.5% (.0250) area of rejection tucked into each tail. Consequently, the area from the middle of the distribution to the region of rejection is equal to 47.5% (50% − 2.5% = 47.5%).

It follows that the corresponding $z$ values that define the region of rejection are those that cut off 47.5% (.4750) of the area from $\mu$ to each end of the tail. To find this $z$ value, use Table 3 of Appendix 1 (Areas Under the Normal Curve). This table provides a list of the proportions of various areas under the curve as measured from the midpoint of the curve out toward the tails. The far left column displays the first two digits of the $z$ value. The row across the top of the table contains the third digit. For example, find the 1.0 row in the left-hand column. Next, find the entry under the .08 column in this row. The table entry is .3599. This means that 35.99% of the curve is found between the midpoint and a $z$ value of 1.08. Of course, another 35.99% lies in the other direction, from the midpoint to a $z$ value of −1.08. In our current example, it is necessary to work backward. We know the areas under the curve that we want to define (.4750 to the left and right of $\mu$), and we need to find the $z$ values. An examination of the body of Table 3 shows that .4750 corresponds to a $z$ value of ±1.96.

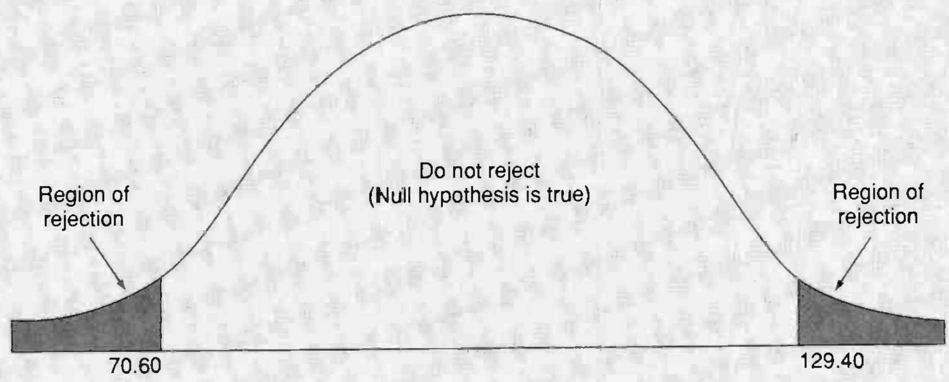
These values are then used to determine the region of rejection:

$$-1.96\alpha_m + \mu = \text{lower boundary}$$
$$+1.96\alpha_m + \mu = \text{upper boundary}$$

where $\alpha_m$ is the standard deviation of the distribution and $\mu$ is the population mean. Assume that the population mean for math competency is 100 and the standard deviation is 15. Thus the sample must achieve a mean math competency score either lower than 70.60 or higher than 129.40 for the research study to be considered significant:

$$-1.96(15) + 100 = 70.60$$
$$+1.96(15) + 100 = 129.40$$

Figure 12.2 *Regions of Rejection for Math Test*




If a research study produces a result between 70.60 and 129.40, then the null hypothesis cannot be rejected; the instructional television programs had no significant effect on math levels. When we use the normal distribution to demonstrate these boundaries, the area of rejection is illustrated in Figure 12.2.

### *Error*

As with all steps in the research process, testing for statistical significance involves error. Two types of error particularly relevant to hypothesis testing are called Type I error and Type II error. **Type I error** is the rejection of a null hypothesis that should be accepted, and **Type II error** is the acceptance of a null hypothesis that should be rejected. These error types are represented in Figure 12.3.

The probability of making a Type I error is equal to the established level of significance and is therefore under the direct control of the researcher. That is, to reduce the probability of Type I error, the researcher can simply set the level of significance closer to zero.

Type II error, often signified by the symbol $\beta$, is a bit more difficult to conceptualize. The researcher does not have direct control over Type II error; instead, Type II error is controlled, though indirectly, by the design of the experiment. In addition, the level of Type II error is inversely proportional to the level of Type I error: As Type I error decreases, Type II error increases, and vice versa. The potential magnitude of Type II error depends in part on the probability level and in part on which of the possible alternative hypotheses actually is true. Figure 12.4 shows the inverse relationship between the two types of error.

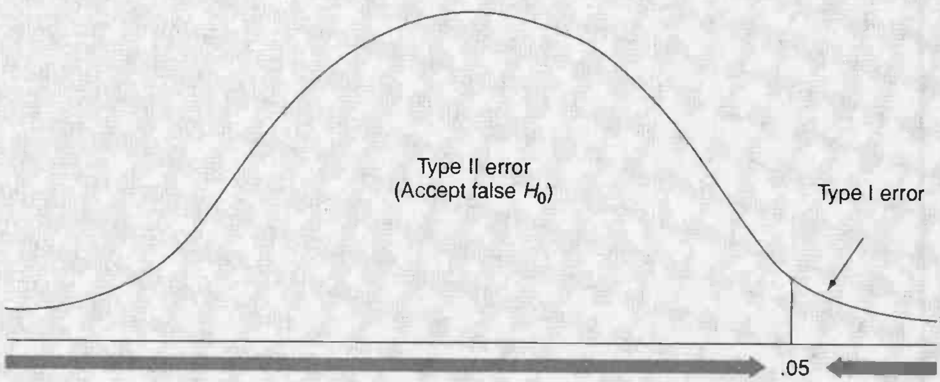
As mentioned earlier, most research studies do not state the null hypothesis because it is generally assumed. There is a way to depict Type I and Type II errors without considering the null hypothesis, however, and this approach may help to demonstrate the relationship between Type I and Type II errors. As Figure 12.5 demonstrates, the research hypothesis is used to describe Type I and Type II errors instead of the null hypothesis. To use the table, start at the desired row on the left side and then read the column entry that completes the hypothesis to be tested. For example, "Significant difference found where none exists = Type I error."

One final way to explain Type I and Type II errors is with a hypothetical example. Consider a research study to determine the effects of a short-term public relations campaign

Figure 12.3 *Type I and Type II Errors*

| | Reject $H_0$ | Accept $H_0$ |
|---|---|---|
| $H_0$ is true | Type I error | Correct |
| $H_0$ is false | Correct | Type II error |

Figure 12.4 *Inverse Relationship Between Type I and Type II Errors*




promoting the use of safety belts in automobiles. Suppose that the effort was highly successful and indeed changed the behavior of a majority of subjects exposed to the campaign. (This information is of course unknown to the researcher.) If the researcher finds that a significant effect was created by the campaign, the conclusion is a correct one; if the researcher does not find a significant effect, a Type II error is committed. On the other hand, if the campaign actually had no effect but the researcher concludes that the campaign was successful, a Type I error is committed.

## The Importance of Significance

The concept of significance testing causes problems for many people, primarily because too many researchers overemphasize the importance of significance. When researchers find that the results of a study are nonsignificant, it is common to "talk around" the re-

Figure 12.5 *Use of the Research Hypothesis to Distinguish Between Type I and Type II Errors*

| | Where one exists | Where none exists |
|---|---|---|
| Significant difference found | Correct | Type I error |
| No significant difference found | Type II error | Correct |

sults—to deemphasize the finding that the results were not significant. But there is really no need to follow this course of action.

There is no difference in value between a study that finds statistically significant results and a study that does not. Both studies provide valuable information. Discovering that some variables are not significant is just as important as determining which variables are significant. The nonsignificant study can save time for other researchers working in the same area by ruling out worthless variables. Nonsignificant research is important in collecting information about a theory or concept.

Also, there is nothing wrong with the idea of proposing a null hypothesis as the research hypothesis. For example, a researcher could formulate this hypothesis: "There is no significant difference in comprehension of program content between a group of adults (ages 18–49) with normal hearing that views a television program with closed-captioned phrases and a similar group that views the same program without captions." A scientific research study does not always have to test for significant relationships; it can also test for nonsignificance. However, sloppy research techniques and faulty measurement procedures can add to error variance in a study and contribute to the failure to reject a hypothesis of no difference as well as jeopardize the entire study. This is a danger in using a null hypothesis as a substantive hypothesis.

## Power

The concept of power is intimately related to Type I and Type II errors. Power refers to the probability of rejecting the null hypothesis when it is true. In other words, power indicates the probability that a statistical test of a null hypothesis will result in the conclusion that the phenomenon under study actually exists (Cohen, 1988).

Statistical power is a function of three parameters: probability level, sample size, and effects size. As we know, the *probability level* is under the direct control of the researcher and predetermines the probability of committing a Type I error. *Sample size* refers to the number of subjects used in an experiment. The most difficult concept is the *effects size.* Basically, the effects size is the degree to which the null hypothesis is rejected; this can be stated either in general terms (such as any nonzero value) or in exact terms (such as .40). That is, when a null hypothesis is false, it is false to some degree; researchers can say the null hypothesis is false and leave it at that, or they can specify exactly how false it is. The larger the effects size, the greater the degree to which the phenomenon under study is present (Cohen, 1988). However, researchers seldom know the exact value of the effects size. When such precision is lacking, researchers can use one of three alternatives:

1. Estimate the effects size based on knowledge in the area of investigation or indications from previous studies in the area, or simply state the size as "small," "medium," or "large." (Cohen describes these values in greater detail.)
2. Assume an effects size of "medium."
3. Select a series of effects sizes and experiment.

When the probability level, sample size, and effects size are known, researchers can consult power tables (published in statistics books) to determine the level of power in their study. Power tables consist of sets of curves that represent different sample sizes, levels of significance (.05 and so on), and types of tests (one- or two-tail). For example, in a two-tail test with a probability of .05 and a sample size of 10, the probability of rejecting the null hypothesis (that is, assume that it is false) is .37 (Type I error), and the probability of accepting or retaining the hypothesis is .63 (Type II error). The power tables show that by increasing the sample size to 20, the probability of rejecting the null hypothesis jumps to .62 and the probability of retaining the hypothesis drops to .38.

A determination of power is important for two reasons. First and most important, if a low power level prevents researchers from arriving at statistical significance, a Type II error may result. If the power of the statistical test is increased, however, the results may be made significant. Second, the high power level may help in interpreting the research results. If an experiment just barely reaches the significance level but has high power, researchers can place more faith in the results. Without power figures, researchers have to be more hesitant in their interpretations.

Statistical power should be considered in all research studies. Although power is only an approximation, computation of the value helps control Type II error. In addition, as power increases, there is no direct effect on Type I error; power acts independently of Type I error. Since the mid-1970s, researchers have paid closer attention to statistical power.

Chase and Tucker (1975) conducted power analyses on articles published in nine communications journals. They found that 82% of the 46 articles analyzed had an average power for medium effects of less than .80 (the recommended minimum power value). In addition, more than half the articles had an average power of less than .50, which suggests a significant increase in the probability of Type II error. (See the Internet under "statistical power" for several on-line power calculators.)

## ▪ ▪ ▪ Summary

Hypothesis development in scientific research is important because the process refines and focuses the research by excluding extraneous variables and permitting variables to be quantified. Rarely will researchers conduct a project without developing some type of research question or hypothesis. Research without this focus usually proves to be a waste of time (although some people may argue that many inventions, theories, and new information have been found without the focus provided by a research question or hypothesis).

An applicable hypothesis must be compatible with current related knowledge, and it must be logically consistent. It should also be stated as simply as possible and, generally speaking, it should be testable. Hypotheses must be tested for statistical significance. This testing involves error, particularly Type

I and Type II error. Error must be considered in all research. An understanding of error such as Type I and Type II does not make research foolproof, but it makes the process somewhat easier because researchers must pay closer attention to the elements involved in the project.

Too much emphasis is often placed on significance testing. It is possible that a nonsignificant test may add information to an available body of knowledge simply by finding what "does not work" or "should not be investigated." However, some nonsignificant research projects may be more valuable if the statistical power is analyzed.

### Questions and Problems for Further Investigation

1. Develop three research questions and three hypotheses in any mass media area that could be investigated or tested. Search the Internet for "hypothesis testing."
2. What is your opinion about using very conservative levels of significance (.10 or greater) in exploratory research?
3. Conduct a brief review of published research in mass media. What percentage of the studies report the results of a power analysis calculation?
4. Explain the relationship between Type I errors and Type II errors. Find additional examples on the Internet.
5. Under what circumstances might a researcher use a probability level of .001?
6. If a researcher's significance level is set at $\leq .02$ and the results of the experiment indicate that the null hypothesis cannot be rejected, what is the probability of a Type I error?

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Chapter 13

# Basic Statistical Procedures


- *History of Small-Sample Statistics*
- *Nonparametric Statistics*
- *Parametric Statistics*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

Researchers often wish to do more than merely describe a sample. In many cases researchers want to use their results to make inferences about the population from which the sample has been taken. Tukey (1986), in his typically nonpresumptuous manner, identifies four purposes of statistics:

1. To aid in summarization
2. To aid in "getting at what is going on"
3. To aid in extracting "information" from the data
4. To aid in communication

With these four purposes as a foundation, this chapter describes some of the basic inferential statistical methods used in mass media research and suggests ways in which these methods may help answer questions.

## History of Small-Sample Statistics

Using a sample to investigate a problem or question has more than likely been done for many centuries. Documented use of sampling in scientific research is found as long ago as 1627, when Sir Francis Bacon published an account of tests he had conducted to measure wheat seed growth in various forms of fertilizer. In 1763 Arthur Young began a series of experiments to discover the most profitable method of farming, and in 1849 James Johnston published a book called *Experimental Agriculture,* in which he provided advice on scientific research (Cochran, 1976).

One of the best known investigators of the early 20th century was William S. Gossett, who in 1908 attempted to quantify experimental results in a paper entitled "The Probable Error of the Mean." Under the pen name "Student," Gossett published the results of small-sample investigations he had conducted while working in a Dublin brewery. The *t*-distribution statistics Gossett developed were not widely accepted at the time; in fact, it took more than 15 years before other researchers began to have an interest in his work. The *t*-test, however, as will be seen, is now one of the most widely used statistical procedures in all areas of research.

Sir Ronald Fisher provided a stepping stone from early work in statistics and sampling procedures to modern statistical inference techniques. It was Fisher who developed the concept of probability and established the use of the .01 and .05 levels of probability testing (see Chapter 11). Until Fisher, statistical methods were not generally perceived as practical in areas other than agriculture, for which they were originally developed. (Search the Internet for several interesting articles about "Sir Ronald Fisher.")

**Note on Calculations.** There are at least four basic ways that you can calculate the statistics mentioned in this chapter:

1. Do them by hand.
2. Use statistical calculators found at various web sites (*www.vassar.edu/~lowry/VassarStats.html* and other sites mentioned in Chapter 18 contain such calculators).

3. Use a common spreadsheet program; Excel, Quattro Pro, and other similar programs can calculate most basic and some advanced statistics.
4. Use a high-powered statistical program such as SPSS.

Although we recognize that most students will not calculate these statistics by hand, we think it is useful for students to see the basic logic behind the statistic. Thus we have provided formulas and simple examples for readers to follow. Understanding how the numbers are used by the statistic will make it easier for students to make sense of the results of web statistical calculators, spreadsheets, and SPSS.

## Nonparametric Statistics

Statistical methods are commonly divided into two broad categories: parametric and nonparametric. Historically, researchers have recognized three primary differences between parametric and nonparametric statistics:

1. Nonparametric statistics are appropriate with only nominal and ordinal data. Parametric statistics are appropriate for interval and ratio data.
2. Nonparametric results cannot be generalized to the population. Generalization is possible with only parametric statistics.
3. Nonparametric statistics make no assumption about normally distributed data, whereas parametric statistics assume normality. Nonparametric statistics are said to be "distribution-free."

For the most part, the distinctions in items 1 and 2 have vanished. Most researchers argue that both parametric statistics and nonparametric statistics can be used successfully with all types of data and that both are appropriate for generalizing results to the population. We agree with this position.

### Chi-Square Goodness of Fit

Mass media researchers often compare the *observed* frequencies of a phenomenon with the frequencies that might be *expected* or hypothesized. For example, assume a researcher wants to determine whether the sales of television sets by four manufacturers in the current year are the same as the sales during the previous year. A logical hypothesis might be: "Television set sales of four major manufacturers are significantly different this year from those of the previous year."

Suppose the previous year's television set sales were distributed as follows:

| Manufacturer | Percent of sales |
|---|---|
| RCA | 22 |
| Sony | 36 |
| JVC | 19 |
| Mitsubishi | 23 |

From these previous sales, the investigator can calculate the expected frequencies (using a sample of 1,000) for each manufacturer's sales by multiplying the percentage of each company's sales by 1,000. These are the expected frequencies:

| Manufacturer | Expected frequency |
|---|---|
| RCA | 220 |
| Sony | 360 |
| JVC | 190 |
| Mitsubishi | 230 |

Next, the researcher surveys a random sample of 1,000 households known to have purchased one of the four manufacturers' television sets during the current year. The data from this survey provide the following information:

| Manufacturer | Expected frequency | Observed frequency |
|---|---|---|
| RCA | 220 | 180 |
| Sony | 360 | 330 |
| JVC | 190 | 220 |
| Mitsubishi | 230 | 270 |

The researcher now must interpret these data to determine whether the change in frequency is actually significant. This can be done by reducing the data to a chi-square statistic and performing a test known as the chi-square "goodness of fit" test.

A chi-square ($X^2$) is simply a value that shows the relationship between expected frequencies and observed frequencies. It is computed by this formula:

$$X^2 = \Sigma\frac{(O_i - E_i)^2}{E_i}$$

where $O_i$ is the observed frequencies and $E_i$ is the expected frequencies. This means that the difference between each expected and observed frequency must be squared and then divided by the expected frequency. The sum of the quotients is the chi-square for those frequencies. For the frequency distribution above, chi-square is calculated as follows:

$$\begin{aligned}X^2 &= \frac{(O_1 - E_1)^2}{E_1} + \frac{(O_2 - E_2)^2}{E_2} \\ &+ \frac{(O_3 - E_3)^2}{E_3} + \frac{(O_4 - E_4)^2}{E_4} \\ &= \frac{(180 - 220)^2}{220} + \frac{(330 - 360)^2}{360} \\ &+ \frac{(220 - 190)^2}{190} + \frac{(270 - 230)^2}{230} \\ &= \frac{(-40)^2}{220} + \frac{(-30)^2}{360} + \frac{(30)^2}{190} + \frac{(40)^2}{230} \\ &= \frac{1{,}600}{220} + \frac{900}{360} + \frac{900}{190} + \frac{1{,}600}{230} \\ &= 7.27 + 2.50 + 4.73 + 6.95 \\ &= 21.45\end{aligned}$$

Once the chi-square value is known, the goodness-of-fit test determines whether this value represents a significant difference in frequencies. To do this, two values are necessary. The first is the probability level, which is predetermined by the researcher; the second, called *degrees of freedom* (*df*), is the number of scores in any particular test that are free to vary in value. For example, if one has three unknown values ($x$, $y$, and $z$) such that $x + y + z = 10$, there are two degrees of freedom: Any two of the three variables may be assigned any value without affecting the total, but the value of the third will then be predetermined. Thus, if $x = 2$ and $y = 5$, then $z$ must be 3. In the goodness-of-fit test, degrees of freedom are expressed in terms of $K - 1$, where $K$ is the number of categories. In the television sales study, $K = 4$ and $df = 4 - 1 = 3$. Next, a chi-square significance table is consulted (see Appendix 1, Table 4). These tables are arranged by probability level and degrees of freedom. A portion of the chi-square table relevant to the hypothetical study is reproduced here to show how the table is used:

| | Probability | | | |
|---|---|---|---|---|
| *df* | .10 | .05 | .01 | .001 |
| 1 | 2.706 | 3.841 | 6.635 | 10.827 |
| 2 | 4.605 | 5.991 | 9.210 | 13.815 |
| 3 | 6.251 | 7.815 | 11.345 | 16.266 |
| 4 | 7.779 | 9.488 | 13.277 | 18.467 |

If the calculated chi-square value equals or exceeds the value found in the table, the differences in the observed frequencies are considered to be statistically significant at the predetermined alpha level; if the calculated value is smaller, the results are nonsignificant.

In the television sales example, suppose the researcher finds a chi-square value of 21.45, with degrees of freedom of 3, and has established a probability level of .05. The chi-square table shows a value of 7.815 at this level when $df = 3$. Since 21.45 is greater than 7.815, the difference is significant, and the hypothesis is accepted or supported: Television set sales of the four manufacturers are significantly different in the current year from sales in the previous year.

The chi-square goodness-of-fit test can be used in a variety of ways to measure changes—for example, in studying audience perceptions of advertising messages over time, in planning changes in television programming, and in analyzing the results of public relations campaigns. Idsvoog and Hoyt (1977) used a chi-square test to analyze the professionalism and performance of television journalists. The authors attempted to determine whether "professionalism" was related to several other characteristics, including the desire to look for employment, educational level, and job satisfaction. The results indicated that journalists classified "high" because of questionnaire responses differed significantly from those classified as "medium" or "low" professionals.

There are limitations to the use of the goodness-of-fit test. Since this is a nonparametric statistical procedure, the variables must be measured at the nominal or ordinal level. The categories must be mutually exclusive, and each observation in each category must be independent from all others. Additionally, because the chi-square distribution is sharply skewed (see Chapter 11) for small samples, Type II errors may occur: Small samples may not produce significant results in cases that could have yielded significant results if a larger sample had been used. To avoid this problem, most researchers suggest that each category contain at least five observations. Other researchers suggest that 20% of the cells should have an expected frequency of at least 5, and none should have expected frequencies of 0.

As an alternative to the chi-square goodness-of-fit test, some researchers prefer the Kolomogorov-Smirnov test, which is considered to be more powerful than the chi-square approach. In addition, a minimum number of expected frequencies in each cell is not required, as in the chi-square test. (See the Internet for more information about the Kolomogorov-Smirnov test and chi-square testing procedures.)

## Contingency Table Analysis

Another nonparametric procedure often used in mass media research is the contingency table analysis, frequently called **cross-tabulation,** or simply **crosstabs.** Crosstab analysis is basically an extension of the goodness-of-fit test, the primary difference being that two or more variables can be tested simultaneously. Consider a study to determine the relationship between a person's gender and his or her use of the media to obtain information on new products. Suppose the researcher selects a random sample of 210 adults and obtains the information displayed in Figure 13.1.

The next step is to calculate the expected frequencies for each cell. This procedure is similar to that used in the goodness-of-fit test, but it involves a slightly more detailed formula:

$$E_{ij} = \frac{R_i C_j}{N}$$

where $E_{ij}$ is the expected frequency for the cell in row $i$, column $j$; $R_i$ is the sum of frequencies in row $i$, $C_j$ is the sum of frequencies in column $j$; and $N$ is the sum of frequencies for all cells. Using this formula, the researcher in the hypothetical example can calculate the expected frequencies:

$$\text{Male/radio} = \frac{100 \times 21}{210} = \frac{2{,}100}{210} = 10$$

$$\text{Female/radio} = \frac{110 \times 21}{210} = \frac{2{,}300}{210} = 11$$

and so forth. Each expected frequency is placed in a small square in the upper right-hand corner of the appropriate cell, as illustrated in Figure 13.2.

Figure 13.1 *Description of Random Sample of Media Users in Study of Sources of New Product Information*

Media Most Used for New Product Information

| Sex | | Radio | Newspapers | Television | |
|---|---|---|---|---|---|
| | Male | 3 | 26 | 71 | 100 |
| | Female | 18 | 31 | 61 | 110 |
| | | 21 | 57 | 132 | |

Figure 13.2 *Random Sample of Media Users Showing Expected Frequencies*

Media Most Used for New Product Information

| Sex | | Radio | Newspapers | Television | |
|---|---|---|---|---|---|
| | Male | 3 (10) | 26 (27) | 71 (63) | 100 |
| | Female | 18 (11) | 31 (30) | 61 (69) | 110 |
| | | 21 | 57 | 132 | |

After the expected frequencies have been calculated, the investigator must compute the chi-square using this formula:

$$X^2 = \Sigma \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

With the same example:

$$X^2 = \frac{(3-10)^2}{10} + \frac{(26-27)^2}{27} + \frac{(71-63)^2}{63} + \frac{(18-11)^2}{11} + \frac{(31-30)^2}{30} + \frac{(61-69)^2}{69}$$

$$= \frac{49}{10} + \frac{1}{27} + \frac{64}{63} + \frac{49}{11} + \frac{1}{30} + \frac{64}{69}$$

$$= 4.90 + 0.04 + 1.01 + 4.45 + 0.03 + 0.92$$

$$= 11.35$$

To determine statistical significance, the researcher must now consult the chi-square table. In a crosstab analysis, the degrees of freedom are expressed as $(R - 1)(C - 1)$, where $R$ is the number of rows and $C$ is the number of columns. If $p = \leq .05$, the chi-square value is listed in Table 4 of Appendix 1 as 5.991, which is lower than the calculated value of 11.35. Thus there is a significant relationship between the gender of the respondent and the media used to acquire new product information. The test indicates that the two variables are somehow related, but it does not tell exactly how. To find this out, it is necessary to go back and examine the original crosstab data in Figure 13.1. According to the distribution, it is easy to see that females use radio more and television less than males do.

For a 2 × 2 crosstab (where $df = 1$), computational effort is saved when the corresponding cells are represented by the letters A, B, C, and D, such as

| | |
|---|---|
| A | B |
| C | D |

The following formula can then be used to compute chi-square:

$$X^2 = \frac{N(AD - BC)^2}{(A + B)(C + D)(A + C)(B + D)}$$

Crosstab analysis has become a widely used analytical technique in mass media research, especially since the development of computer programs such as the *Statistical Package for the Social Sciences* (see *www.spss.com*). In addition to chi-square, various other statistics can be used in crosstabs to determine whether the variables are statistically related.

## ▪ Parametric Statistics

The sections that follow discuss the parametric statistical methods usually used with higher-level data (interval and ratio). Recall that these methods assume that data are normally distributed. The most basic parametric statistic is the *t*-test, a procedure widely used in all areas of mass media research.

### The *t*-Test

Many research studies test two groups of subjects: One group receives some type of treatment, and the other serves as the control. After the treatment has been administered, both groups are tested, and the results are compared to determine whether a statistically significant difference exists between the groups. That is, did the treatment have an effect on the results of the test? In cases such as this, the mean score for each group is compared with a *t*-test. [*Note:* The Internet provides a variety of *t*-test programs; in addition, consult Bruning and Kintz (1997) for a step-by-step algorithm for *t*-tests.]

The *t*-test is the most elementary method for comparing two groups' mean scores. A variety of *t*-test alternatives are available depending on the problem under consideration and the situation of a particular research study. Variations of the *t*-test are available for testing independent groups, related groups, and cases in which the population mean is either known or unknown (Champion, 1981; Roscoe, 1975).

The *t*-test assumes that the variables in the populations from which the samples are drawn are normally distributed (see Chapter 11). The test also assumes that the data have homogeneity of variance—that is, that they deviate equally from the mean.

The *basic* formula for the *t*-test is relatively simple. The numerator of the formula is the difference between the sample mean and the hypothesized population mean, and the denominator is the estimate of the standard error of the mean ($S_m$):

$$t = \frac{\overline{X} - \mu}{S_m}$$

where

$$S_m = \sqrt{\frac{SS}{n-1}} \quad \text{and} \quad SS = \Sigma(X - \overline{X})^2$$

One of the more commonly used forms of the *t*-test is the test for independent groups or means. This procedure is used to study two independent groups for differences (the type of study described at the beginning of this section). The formula for the independent *t*-test is

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S_{\bar{x}_1 - \bar{x}_2}}$$

where $\overline{X}_1$ is the mean for Group 1, $\overline{X}_2$ is the mean for Group 2, and $S_{\bar{x}_1 - \bar{x}_2}$ is the standard error for the groups. The standard error is an important part of the *t*-test formula and is computed as follows:

$$S_{\bar{x}_1 - \bar{x}_2} = \sqrt{\left(\frac{SS_1 + SS_2}{n_1 + n_2 - 2}\right)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

where $SS_1$ is the sum of squares for Group 1, $SS_2$ is the sum of squares for Group 2, $n_1$ is the sample size for Group 1, and $n_2$ is the sample size for Group 2.

To illustrate a *t*-test, consider a research problem to determine the recall of two groups of subjects about a television commercial for a new household cleaner. One group consists of 10 males, and the other consists of 10 females. Each group views the commercial once and then completes a 15-item questionnaire. The hypothesis predicts a significant difference between the recall scores of males and females.

The data are listed in Table 13.1. Using the *t*-test formula, the researcher computes

Table 13.1 *Data on Recall Scores for Men and Women*

| **Female recall scores** | | | **Male recall scores** | | |
|---|---|---|---|---|---|
| $X$ | $x$ | $x^2(SS)$ | $X$ | $x$ | $x^2(SS)$ |
| 4 | −4 | 16 | 2 | −4 | 16 |
| 4 | −4 | 16 | 3 | −3 | 9 |
| 5 | −3 | 9 | 4 | −2 | 4 |
| 7 | −1 | 1 | 4 | −2 | 4 |
| 7 | −1 | 1 | 4 | −2 | 4 |
| 8 | 0 | 0 | 6 | 0 | 0 |
| 9 | 1 | 1 | 6 | 0 | 0 |
| 9 | 1 | 1 | 8 | 2 | 4 |
| 12 | 4 | 16 | 10 | 4 | 16 |
| 15 | 7 | 49 | 13 | 7 | 49 |
| 80 | | 110 | 60 | | 106 |
| $\overline{X} = 8$ | | | $\overline{X} = 6$ | | |

Table 13.2 *Portion of the t-Distribution Table for the Two-Tail Test*

| | Probability | | | |
|---|---|---|---|---|
| $n$ | .10 | .05 | .01 | .001 |
| 1 | 6.314 | 12.706 | 63.657 | 636.619 |
| 2 | 2.920 | 4.303 | 9.925 | 31.598 |
| * | | | | |
| * | | | | |
| * | | | | |
| 17 | 1.740 | 2.110 | 2.898 | 3.965 |
| 18 | 1.734 | 2.101 | 2.878 | 3.992 |
| 19 | 1.729 | 2.093 | 2.861 | 3.883 |
| * | | | | |
| * | | | | |
| * | | | | |

the standard error for the groups by using the previous formula:

$$S_{\bar{x}_1-\bar{x}_2} = \sqrt{\left(\frac{110 + 106}{10 + 10 - 2}\right)\left(\frac{1}{10} + \frac{1}{10}\right)}$$
$$= 1.55$$

The researcher then substitutes this standard error value into the $t$-test formula:

$$t = \frac{8 - 6}{1.55}$$
$$= 1.29$$

To determine whether the $t$ value of 1.29 is statistically significant, a $t$-distribution table is consulted. The $t$-distribution is a family of curves closely resembling the normal curve. The portion of the $t$-distribution table relevant to the sample problem is reproduced in Table 13.2. Again, to interpret the table, two values are required: degrees of freedom and level of probability. (For a complete $t$-distribution table, see Appendix 1, Table 2.)

For purposes of the $t$-test, degrees of freedom are equal to $n_1 + n_2 - 2$, where $n_1$ and $n_2$ are the sizes of the respective groups. In the example of advertising recall, $df = 18$ (10 + 10 − 2). If the problem is tested at the .05 level of significance, a $t$ value of 2.101 is required for the research to be considered statistically significant. However, since the sample problem is a "two-tail test" (the hypothesis predicts only a difference between the two groups, not that one particular group will have the higher mean score), the required values are actually $t \le -2.101$ or $t \ge +2.101$. The conclusion of the hypothetical problem is that there is no significant difference between the recall scores of the female group and the recall scores of the male group because the calculated $t$ does not equal or exceed the table values.

There are many examples of the $t$-test in mass media research that demonstrate the versatility of the method. For example, Garramone (1985) investigated political advertising by exploring the roles of the commercial sponsor (the source of the message) and the rebuttal commercial (a message that charges as false the claims of another commercial). Among six separate hypotheses that were tested, Garramone predicted:

$H_1$: Viewers of a negative political commercial will perceive an independent sponsor as more trustworthy than a candidate sponsor.

$H_2$: Viewers of an independent commercial opposing a candidate will demonstrate
  a. more negative perceptions of the target's image.
  b. lesser likelihood of voting for the target than viewers of a candidate commercial.

$H_3$: Viewers of an independent commercial opposing a candidate will demonstrate
  a. more positive perceptions of the target's opponent.
  b. greater likelihood of voting for the target's opponent than viewers of a candidate commercial.

Among other findings, Garramone concluded that

> The first hypothesis . . . was not supported. [However] hypotheses 2 and 3 . . . were supported. Viewers of an independent commercial opposing a candidate demonstrated a more negative perception of the target's image, $t(110) = 2.41, p \leq .01$, and a lesser likelihood of voting for the target, $t(110) = 1.83, p \leq .05$, than did viewers of a candidate commercial. Also as predicted, viewers of an independent commercial demonstrated a more positive perception of the target's opponent, $t(110) = 1.89$, $p \leq .05$, and a greater likelihood of voting for the target's opponent, $t(110) = 2.45, p \leq .01$, than did viewers of a candidate commercial.

## Analysis of Variance

The $t$-test allows researchers to investigate the effects of one independent variable on two samples of people, such as the effect of room temperature on subjects' performance on a research exam. One group may take the test in a room at 70°F, while another group takes the same test in a room at 100°F. The mean test scores for each group are used to calculate $t$. In many situations, however, researchers want to investigate several levels of an independent variable (rooms set at 70°, 80°, 90°, and 100°F), or possibly several independent variables (heat and light), and possibly several different groups (freshmen, sophomores, and so on). A $t$-test is inappropriate in these cases because the procedure is valid for only one single comparison. What may be required is an **analysis of variance** (ANOVA).

ANOVA is essentially an extension of the $t$-test. The advantage of ANOVA is that it can be used to simultaneously investigate several independent variables, also called *factors*. An ANOVA is named according to the number of factors involved in the study: A one-way ANOVA investigates one independent variable, a two-way ANOVA investigates two independent variables, and so on. An additional naming convention is used to describe an ANOVA that involves different levels of an independent variable. A 2 × 2 ANOVA studies two independent variables, each with two levels. For example, using the room temperature study just described, an ANOVA research project may include two levels of room temperature (70° and 100°F) and two levels of room lighting (dim and bright). This provides four different effects possibilities on test scores: 70°, dim lighting; 70°, bright lighting; 100°, dim lighting; and 100°, bright lighting. ANOVA allows the researcher in this example to look at four unique situations at one time. ANOVA is a versatile statistic that is widely used in mass media research. However, the name of the statistic is somewhat misleading because the most common form of ANOVA tests for significant differences between two or more group means and says little about the analysis of variance differences. Additionally, ANOVA breaks down the total variability in a set of data into its different *sources of variation;* that is, it "explains" the sources of variance in a set of scores on one or more independent variables.

An ANOVA identifies or explains two types of variance: systematic and error. **Systematic variance** in data is attributable to a known factor that predictably increases or decreases all the scores it influences. One such factor commonly identified in mass media research is gender: Often an increase or decrease in a given score can be predicted simply by determining whether a subject is male or female. **Error variance** in data is created by an unknown factor that most likely has not been examined or controlled in the study. A primary goal of all research is to eliminate or control as much error variance as possible (a task that is generally easier to do in the laboratory—see Chapter 10).

The ANOVA model assumes (1) that each sample is normally distributed, (2) that the variances in each group are equal, (3) that the subjects are randomly selected from the population, and (4) that the scores are statistically independent—that they have no concomitant relationship with any other variable or score. The ANOVA procedure begins with the selection of two or more random samples. The samples may be from the same or different populations. Each group is subjected to different experimental treatments, followed by some type of test or measurement. The scores from the measurements are then used to calculate a ratio of variance, known as the *F ratio* (*F*).

To understand this calculation, it is necessary to examine in greater detail the procedure known as sum of squares (discussed briefly in Chapter 11). In the sum of squares procedure, raw scores or deviation scores are squared and summed to eliminate dealing with negative numbers. The squaring process does not change the meaning of the data as long as the same procedure is used on all the data; it simply converts the data into a more easily interpreted set of scores.

In ANOVA, sums of squares are computed *between groups* (of subjects), *within groups* (of subjects), and in *total* (the sum of the between and within figures). The sums of squares between groups and within groups are divided by their respective degrees of freedom (as will be illustrated) to obtain a *mean square:* mean squares between ($MS_b$) and mean squares within ($MS_w$). The $F$ ratio is then calculated using this formula:

$$F = \frac{MS_b}{MS_w}$$

where $MS_b df = K - 1$; $MS_w df = N - K$; $K$ is the number of groups; and $N$ is the total sample. The $F$ ratio derived from the data is then compared to the value in the $F$-distribution table (Tables 5 and 6 in Appendix 1) that corresponds to the appropriate degrees of freedom and the desired probability level. If the calculated value equals or exceeds the tabled value, the ANOVA is considered to be statistically significant. The $F$ table is similar to the $t$ table and the chi-square table except that two different degrees of freedom are used, one for the numerator of the $F$ ratio and one for the denominator.

The ANOVA statistic can be illustrated with an example from advertising. Suppose that three groups of five subjects each are selected randomly to determine the credibility of a newspaper advertisement for a new laundry detergent. The groups are exposed to versions of the advertisement that reflect varying degrees of design complexity: easy, medium, and difficult. The subjects are then asked to rate the advertisement on a scale of 1 to 10, with 10 indicating believable and 1 indicating not believable. The null hypothesis is advanced: "There is no significant difference in credibility among the three versions of the ad."

To test this hypothesis, the researchers must first calculate the three sums of squares: total, within, and between. The formulas for sums of squares (*SS*) are:

$$\text{Total}_{SS} = \Sigma X^2 - \frac{(\Sigma X)^2}{N}$$

where $N$ represents total sample size,

$$\text{Within}_{SS} = \Sigma X^2 - \frac{\Sigma(\Sigma X)^2}{n_K}$$

where $n_K$ represents the sample size of each group, and

$$\text{Between}_{SS} = T_{SS} - W_{SS}$$

The scores for the three groups furnish the data shown next:

| Group A (easy) | | Group B (medium) | | Group C (difficult) | |
|---|---|---|---|---|---|
| X | $X^2$ | X | $X^2$ | X | $X^2$ |
| 1 | 1 | 4 | 16 | 6 | 36 |
| 2 | 4 | 5 | 25 | 7 | 49 |
| 4 | 16 | 6 | 36 | 7 | 49 |
| 4 | 16 | 6 | 36 | 8 | 64 |
| 5 | 25 | 8 | 64 | 10 | 100 |
| 16 | 62 | 29 | 117 | 38 | 298 |

$$\Sigma X = (16 + 29 + 38) = 83$$
$$\Sigma X^2 = (62 + 177 + 298) = 537$$

By inserting the data into the formulas, the researchers are able to calculate the sums of squares as follows:

$$T_{SS} = \Sigma X^2 - \frac{(\Sigma X)^2}{N} = 537 - \frac{(83)^2}{15}$$
$$= 537 - 459.2 = 77.8$$
$$W_{SS} = \Sigma X^2 - \frac{\Sigma(\Sigma X)^2}{n_K}$$
$$= 537 - \frac{16^2}{5} - \frac{29^2}{5} - \frac{38^2}{5}$$
$$= 537 - 508.2 = 28.8$$

$$B_{SS} = T_{SS} - W_{SS} = 77.8 - 28.8 = 49$$

With this information, the research team can calculate the mean squares between and within groups (*SS/df*), which can then be divided ($MS_b/MS_w$) to obtain the value of the *F* ratio. These results are displayed in Figure 13.3.

If we assume a significance level of .05, the *F*-distribution data (Table 5, Appendix 1) for degrees of freedom of 2 and 12 indicate that the *F* ratio must be 3.89 or greater to show statistical significance. Since the calculated value of 10.2 is greater than 3.89, there is a significant difference in credibility among the three types of advertisements, and the researchers must reject the null hypothesis.

See the Internet for more than 22,000 articles about analysis of variance.

### Two-Way ANOVA

Researchers often examine more than one independent variable in a study. For example, if the researchers in the preceding example had wished to investigate simultaneously a second independent variable, product knowledge, they could have used a two-way ANOVA. In a two-way ANOVA, the researchers gather the data and organize them in table form, as with the one-way ANOVA, but the two-way table has both rows *and* columns, where each row and column represents an independent variable.

Figure 13.3 *Values for One-Way ANOVA Example*

| Sources of variation | *df* | Sums of squares | Mean square | *F* |
|---|---|---|---|---|
| Between groups | 2 ($K - 1$) | 49 | 24.50 | 10.19 |
| Within groups | 12 ($n - K$) | 28.8 | 2.4 | xxxx |
| Total | 14 ($n - 1$) | 77.8 | xxxx | |

Figure 13.4 *Two-Way ANOVA Design*

| | Group A (Easy) | Group B (Medium) | Group C (Hard) |
|---|---|---|---|
| No product knowledge | $X_{111}, X_{112} \ldots$ | $X_{121}, X_{122} \ldots$ | $X_{131}, X_{132} \ldots$ |
| Product knowledge | $X_{211}, X_{212} \ldots$ | $X_{221}, X_{222} \ldots$ | $X_{231}, X_{232} \ldots$ |

*X* represents a dependent measurement score.

The subscripts identify the subject who received that score.

For example:

$X_{111}$ — Group A; No product knowledge; Subject number 1

The dependent variable score, represented by the letter *X* for each subject, is entered into each cell of the table. This procedure is demonstrated in Figure 13.4.

The two-way ANOVA can save time and resources because studies for each independent variable are being conducted simultaneously. In addition, it enables researchers to calculate two types of independent variable effects on the dependent variable: main effects and interactions. (One-way ANOVA tests for only main effects.) A main effect is simply the influence of an independent variable on the dependent variable. Interaction refers to the concomitant influence of two or more independent variables on the single dependent variable. For example, it may be found that a subject's educational background has no effect on media used for entertainment, but education and socioeconomic status may interact to create a significant effect.

The main effects plus interaction in a two-way ANOVA create a summary table slightly different from that shown for the one-way ANOVA, as illustrated by comparing Figures 13.3 and 13.4. Instead of computing only one *F* ratio as in one-way ANOVA, a two-way ANOVA involves four *F* ratios, and each is tested for statistical significance on the *F* distribution table (Between columns, Between rows, Interaction, Within cells). "Between columns" (a main effect) represents the test of the independent variable levels located in the columns of a two-way ANOVA. (From the preceding example, this would be a test for the differences between groups "easy," "medium," and "hard.") "Between rows" is another main effects test; it represents the significance between levels of the independent variable identified in the rows of the two-way ANOVA (product knowledge and no product knowledge). The "Interaction" section is the test for interaction between both independent variables in the study, and "Within cells" tests for significant differences between each cell in the study to determine how each individual group performed in the analysis. *F* ratios are not computed for the "Total," which accounts for the *X*s in the mean square and *F* columns.

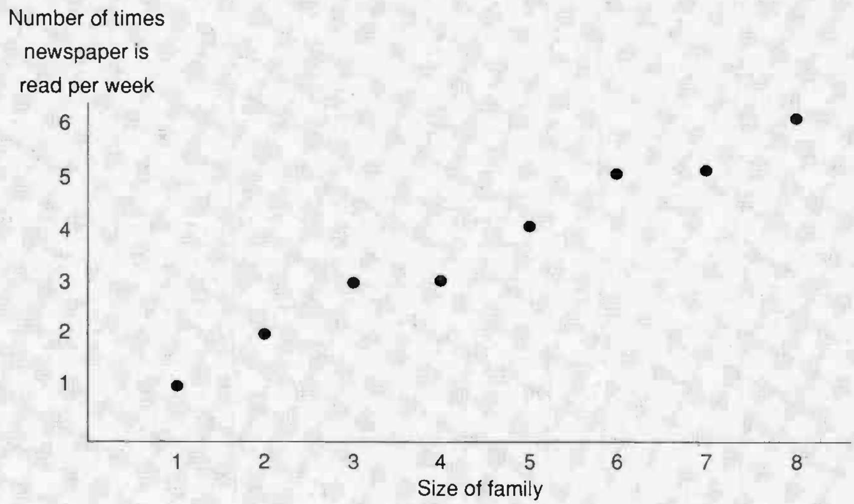
## Basic Correlational Statistics

Assume that a researcher hypothesizes an association between the number of pictures on the front page of a newspaper and the total number of copies sold at newsstands. If the observations reveal that more papers are sold when more pictures are used, there may be a relationship between the two variables. Numerical expressions of the degree to which two variables change in relation to each other are called *measures of association,* or *correlation.* When making two different measurements of the same entity or person, researchers commonly designate one measure as the *X variable* and the other as the *Y variable.* For example, in a study of whether a relationship exists between the size of a subject's family and the frequency with which that person reads a newspaper, the measure of family size could be the *X* variable and the measure of newspaper reading the *Y* variable. Note that each subject in the group under study must be measured for both variables.

Figure 13.5 shows hypothetical data collected from a study of eight subjects. The *Y* variable is the number of times per week the newspaper is read; the *X* variable is the number of persons in the household. The two scores for each subject are plotted on a scattergram, a graphic technique for portraying a relationship between two or more variables. As indicated, family size and newspaper reading increase together. This is an example of a *positive relationship.*

An *inverse* (or *negative*) *relationship* exists when one variable increases while the other decreases. Sometimes the relationship between two variables is positive up to a point and then becomes inverse (or vice versa). When this happens, the relationship is said to be *curvilinear.* When there is no tendency for a high score on one variable to be associated with a high or low score on another variable, the two are said to be *uncorrelated.* Figure 13.6 illustrates these relationships. Many statistics are available to measure the degree of relationship between two variables, but the most commonly used is the Pearson product-moment correlation, commonly symbolized as *r.* It varies between

Figure 13.5 *Scattergram of Family Size and Newspaper Reading Scores*




| Subject | *X*: Family size | *Y*: Number of times newspaper is read per week |
|---|---|---|
| A | 1 | 1 |
| B | 2 | 2 |
| C | 3 | 3 |
| D | 4 | 3 |
| E | 5 | 4 |
| F | 6 | 5 |
| G | 7 | 5 |
| H | 8 | 6 |

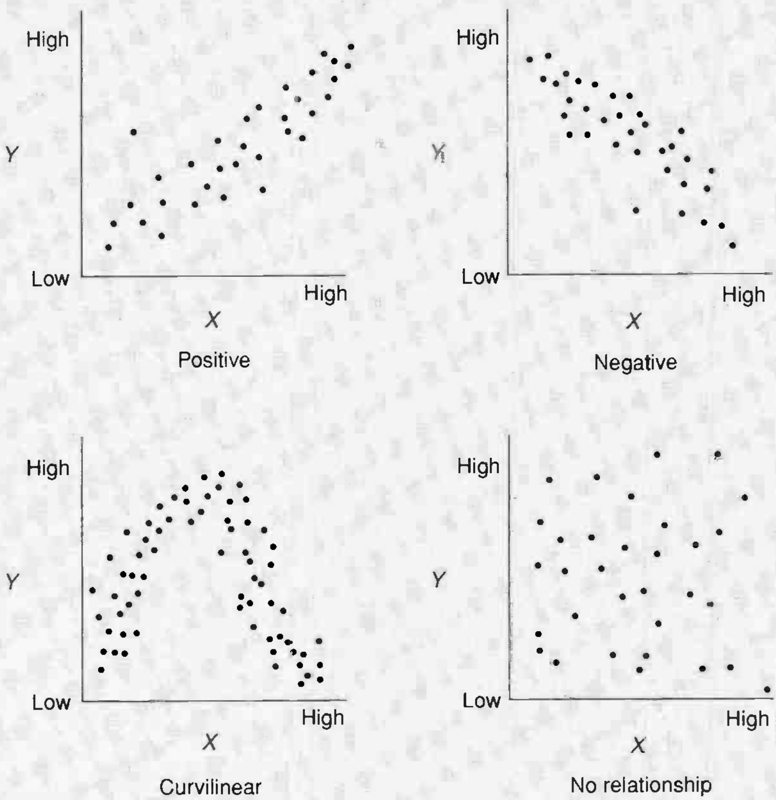
−1.00 and +1.00. A correlation coefficient of +1.00 indicates a perfect positive correlation: $X$ and $Y$ are completely covariant. A Pearson $r$ of −1.00 indicates a perfect relationship in the negative direction. The lowest value that the Pearson $r$ can have is 0.00. This represents absolutely no relationship between two variables. Thus the Pearson $r$ contains two pieces of information: (1) an estimate of the strength of the relationship, as indicated by the number, and (2) a statement about the direction of the relationship, as shown by the sign. Keep in mind that the strength of the relationship depends solely on the number; strength of relationship must be interpreted in terms of absolute value. A correlation of −.83 is a stronger relationship than one of +.23.

The formula for calculating $r$ looks foreboding; actually, however, it includes only one new expression:

$$r = \frac{N\Sigma XY - \Sigma X \Sigma Y}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2]\,[N\Sigma Y^2 - (\Sigma Y)^2]}}$$

where $X$ and $Y$ stand for the original scores, $N$ is the number of pairs of scores, and $\Sigma$

Figure 13.6 *Scattergrams of Possible Relationships*




again is the summation symbol. The only new term is $\Sigma XY$, which stands for the sum of the products of each $X$ and $Y$. To find this quantity, simply multiply each $X$ variable by its corresponding $Y$ variable and then add the results. Table 13.3 demonstrates a computation of $r$.

A correlation coefficient is a pure number; it is not expressed in feet, inches, or pounds, nor is it a proportion or percent. The Pearson $r$ is independent of the size and units of measurement of the original data. (In fact, the original scores do not have to be expressed in the same units.) Because of its abstract nature, $r$ must be interpreted with care. In particular, it is not as easy as it sounds to determine whether a correlation is large or small. Some writers have suggested various adjectives to describe certain ranges of $r$. For example, an $r$ between .40 and .70 might be called a "moderate" or "substantial" relationship, whereas an $r$ of .71 to .90 might be termed "very high." These labels are helpful, but they may lead to confusion. The best advice is to consider the nature of the study. For example, an $r$ of .70 between frequency of viewing television violence and frequency of arrest for violent crimes would be more than substantial; it would be phenomenal. Conversely, a correlation of .70 between two

Table 13.3 *Calculation of r*

| Subject | $X$ | $X^2$ | $Y$ | $Y^2$ | $XY$ |
|---|---|---|---|---|---|
| A | 1 | 1 | 1 | 1 | 1 |
| B | 2 | 4 | 2 | 4 | 4 |
| C | 3 | 9 | 3 | 9 | 9 |
| D | 4 | 16 | 3 | 9 | 12 |
| E | 4 | 16 | 4 | 16 | 16 |
| F | 5 | 25 | 5 | 25 | 25 |
| G | 6 | 36 | 5 | 25 | 30 |
| H | 8 | 64 | 6 | 36 | 48 |
| $N = 8$ | $\Sigma X = 33$ | $\Sigma X^2 = 171$ | $\Sigma Y = 29$ | $\Sigma Y^2 = 125$ | $\Sigma XY = 145$ |

$$(\Sigma X)^2 = 1{,}089$$
$$(\Sigma Y)^2 = 841$$

$$r = \frac{(8)(145) - (33)(29)}{\sqrt{[(8)(171) - 1{,}089][(8)(125) - 841]}}$$
$$= \frac{203}{\sqrt{(279)(159)}} = \frac{203}{(16.7)(12.6)}$$
$$= \frac{203}{210.62} = .964$$

*r* formula:
$$\frac{N\Sigma XY - \Sigma X \Sigma Y}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2]\,[N\Sigma Y^2 - (\Sigma Y)^2}}$$

coders' timings of the lengths of news stories on the evening news is low enough to call the reliability of the study into question. Additionally, correlation does not in itself imply causation. Newspaper reading and income might be strongly related, but this does not mean that earning a high salary causes people to read the newspaper. Correlation is just one factor in determining causality.

Furthermore, a large *r* does not necessarily mean that the two sets of correlated scores are equal. What it does mean is that there is a high likelihood of being correct when predicting the value of one variable by examining another variable that correlates with it. For example, there may be a correlation of .90 between the amount of time people spend reading newspapers and the amount of time they spend watching television news. That is, the amount of time reading newspapers correlates with the amount of time watching television news. The correlation figure says nothing about the *amount* of time spent with each medium. It suggests only that there is a strong likelihood that people who spend time reading newspapers also spend time watching television news.

Perhaps the best way to interpret $r$ is in terms of the coefficient of determination, or the proportion of the total variation of one measure that can be determined by the other. This is calculated by squaring the Pearson $r$ to arrive at a ratio of the two variances: The denominator of this ratio is the total variance of one of the variables, and the numerator is the part of the total variance that can be attributed to the other variable. For example, if $r = .40$, then $r^2 = .16$. One variable explains 16% of the variation in the other. Or to put it another way, 16% of the information necessary to make a perfect prediction from one variable to another is known. Obviously, if $r = 1.00$, then $r^2 = 100\%$; one variable allows perfect predictability of the other. The quantity $1 - r^2$ is usually called the coefficient of nondetermination because it represents that proportion of the variance left unaccounted for or unexplained.

Suppose that a correlation of .30 is found between a child's aggression and the amount of television violence the child views. This means that 9% of the total variance in aggression is accounted for by television violence. The other 91% of the variation is unexplained (it is not accounted for by the television variable). Note that the coefficient of determination is not measured on an equal interval scale: .80 is twice as large as .40, but this does not mean that an $r$ of .80 represents twice as strong a relationship between two variables as an $r$ of .40. In fact, the $r$ of .40 explains 16% of the variance, while the $r$ of .80 explains 64%—four times as much.

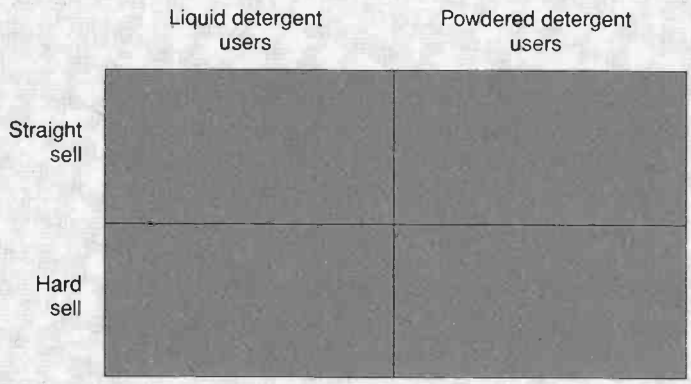
The Pearson $r$ can be computed between any two sets of scores. For the statistic to be a valid description of the relationship, however, three assumptions must be made: (1) the data represent interval or ratio measurements; (2) the relationship between $X$ and $Y$ is linear, not curvilinear; and (3) the distributions of the $X$ and $Y$ variables are symmetrical and comparable. (Pearson's $r$ can also be used as an inferential statistic. When this is the case, it is necessary to assume that $X$ and $Y$ come from normally distributed populations with similar variances.) If these assumptions cannot be made validly, then the researcher must use another kind of correlation coefficient, such as Spearman's rho or Kendall's *W*. For a thorough discussion of these and other correlation coefficients, consult Nunnally (1978) and the Internet, which has more than 1,000 references to "Pearson Correlation."

### Partial Correlation

Partial correlation is a method researchers use when they believe that a confounding or spurious variable may affect the relationship between the independent variables and the dependent variable: If such an influence is perceived, they can "partial out" or control the confounding variable. For example, consider a study of the relationship between being exposed to television commercials and purchasing the advertised products. The researchers select two commercials for a liquid laundry detergent (a "straight sell" version with no special video or audio effects, and a "hard sell" version that does use special effects). The commercials are shown to two groups of subjects: people who use only powdered detergent and people who use only liquid detergent. The study design is shown in Figure 13.7.

If the results show a very low correlation, indicating that any prediction made based on these two variables would be very tenuous, the researchers should suspect the presence of a confounding variable. An examination might reveal, for example, that the technicians had problems adjusting the color definition of the recording equipment; instead of its natural blue color, the detergent appeared

Figure 13.7 *Basic Product Purchase Study Design*




dingy brown on the television screen. The study could be repeated to control (statistically eliminate) this variable by filming new commercials with the color controls properly adjusted. The design for the new study is shown in Figure 13.8. The partial correlation statistical procedure would enable the researchers to determine the influence of the controlled variable. With the new statistical method, the correlation might increase from the original study.

Cutler and Danowski (1981) used partial correlation in their study of older persons' use of television. The authors found it necessary, based on suggestions from earlier analyses, to control for gender and education when determining the correlation between political interest and television use. When these variables were partialed out (controlled), they found that media use varied with the subject's age and when the media were used during the campaign.

### *Simple Linear Regression*

Simple correlation involves measuring the relationship between two variables. The statistic is used to determine the degree to which one variable changes with a given change in another variable. Thus linear regression is a way of using the association between two variables as a method of prediction. Let us take the simplest case to illustrate the logic behind this technique. Suppose two variables are perfectly related ($r = 1.00$). Knowledge of a person's score on one variable allows the researcher to determine the score on the other. Figure 13.9 is a scattergram that portrays this situation. Note that all the points lie on a straight line, the regression line. Unfortunately, relationships are never this simple, and scattergrams more often resemble the one shown in Figure 13.10(a). Obviously, no single straight line can be drawn through all the points in the scattergram. It is possible, however, to mathematically construct a line that best fits all the observations in the figure. This line comes the closest to all the dots even though it might not pass through any of them. Mathematicians have worked out a technique to calculate such a line. This procedure, known as the "least squares" method, was developed in 1794 by German mathematician Karl Gauss, who used it successfully to relocate Ceres, the first recorded asteroid, after it was tracked for 41 days. (Search the Internet for several interesting articles about Karl Gauss.)

Figure 13.8 *Product Purchase Study Design Incorporating Partial Correlation Analysis*

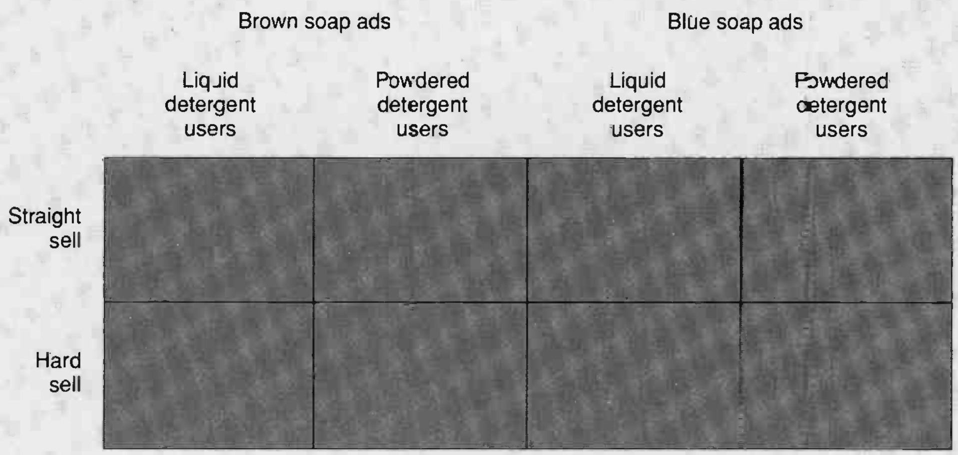



Figure 13.9 *Perfect Linear Correlation*

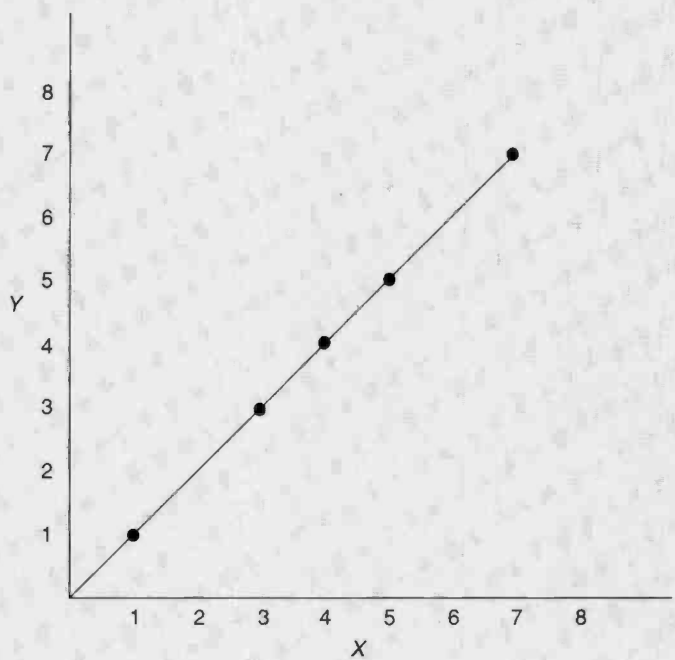
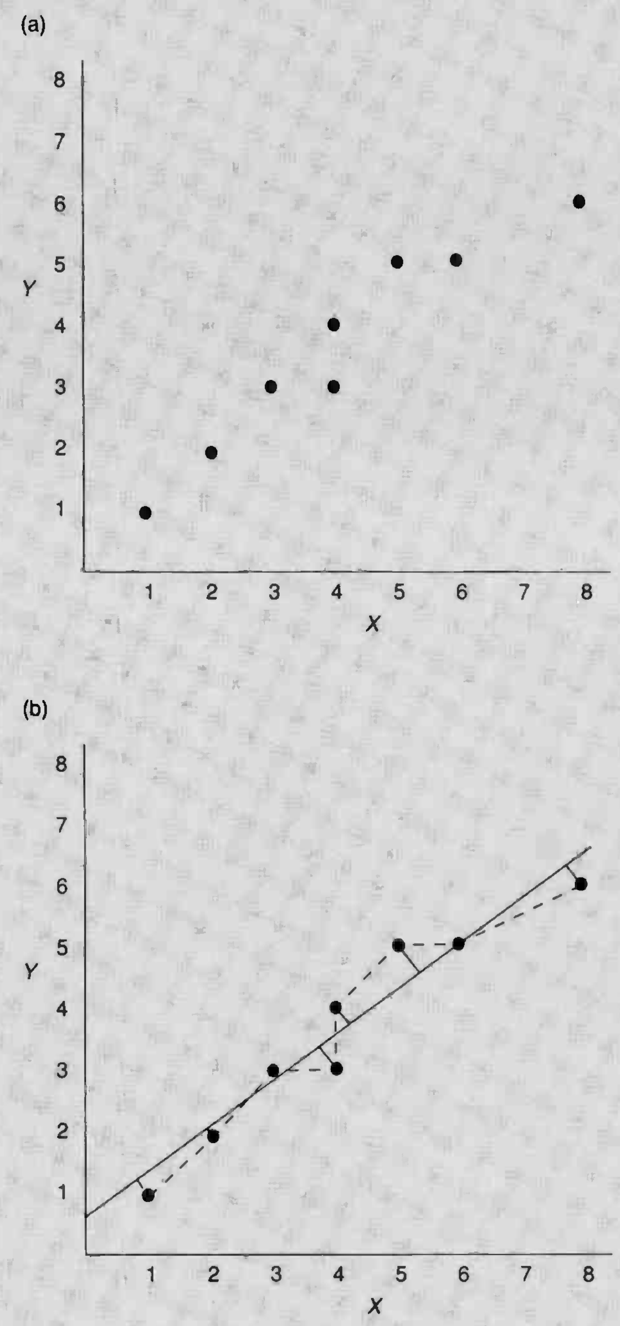


Figure 13.10 *(a) Scattergram of X and Y; (b) Scattergram with Regression Line*




*Note:* The solid perpendicular lines connecting the data points to the computer line in (b) show the distances that must be determined and squared.

The least squares technique produces a line that is the best summary description of the relationship between two variables. For example, Figure 13.10(a) shows the data points that represent the relationship between eight $x$ and $y$ variables. The least squares technique determines the line equation for the data points such that the line passes through, or near, the greatest number of points. The computed line is then compared to the true, or perfect, line to determine the accuracy of the computed (predicted) line. The closer the computed line is to the true line, the more accurate the prediction.

The solid line in Figure 13.10(b) represents the best fitting line that passes through, or closest to, the greatest number of data points. The broken line connects the actual data points. It is clear that the broken line does not fall on the true line. The data points are some distance away from the true line (showing that the prediction is not perfect).

The method of least squares involves measuring the distances from the data points to the perfect line, then *squaring* the distances to eliminate negative values, and adding the squared distances. The computer does this over and over until the sum of the squared distance is the smallest (least squares). The smaller the sum of the squared distances, the greater the accuracy with which the computed formula predicts the dependent variable.

At this point it is necessary to review some basic analytical geometry. The general equation for a line is $Y = a + bX$, where $Y$ is the variable we are trying to predict and $X$ is the variable we are predicting from. Furthermore, $a$ represents the point at which the line crosses the $y$-axis (the vertical axis), and $b$ is a measure of the slope (or steepness) of the line. In other words, $b$ indicates how much $Y$ changes for each change in $X$. Depending on the relationship between $X$ and $Y$, the slope can be positive or negative. To illustrate, Figure 13.9 shows that every time $X$ increases one unit, so does $Y$. In addition, the $a$ value is 0 because the line crosses the vertical axis at the origin.

Strictly speaking, the equation for a regression line is the same as the general equation for a line, since the $Y$ in the regression equation does not represent the actual variable $Y$ but rather a predicted $Y$. Hence, the $Y$ in the regression equation is usually symbolized $\hat{Y}$. Thus the regression equation is written $\hat{Y} = a + bX$.

Now let us put this general equation into more concrete terms. Assume that we have data on the relationship between years of education and number of minutes spent looking at the newspaper per day. The regression equation is

$$\text{Minutes reading newspaper} = 2 + 3\,(\text{education})$$

What can we deduce from this? In the first place, the $a$ value tells us that a person with no formal education spends 2 minutes per day looking at the newspaper. The $b$ value indicates that time spent with the newspaper increases 3 minutes with each additional year of education. What is the prediction for someone with 10 years of education? Substituting, we have $\hat{Y} = 2 + 3(10) = 32$ minutes spent with the newspaper each day.

To take another example, consider the hypothetical regression equation predicting hours of TV viewed daily from a person's IQ score: $\hat{Y} = 5 - .01(\text{IQ})$. How many hours of TV are viewed daily by someone with an IQ of 100?

$$\hat{Y} = 5 - (.01)(100) = 5 - 1 = 4 \text{ hours}$$

Thus, according to this equation, TV viewing per day decreases 0.01 hour for every point of IQ.

The arithmetic calculation of the regression equation is straightforward. First, to find $b$, the slope of the line, use

$$b = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{N\Sigma X^2 - (\Sigma X)^2}$$

Note that the numerator is the same as that for the $r$ coefficient, and the denominator corresponds to the first expression in the denominator of the $r$ formula. Thus, $b$ is easily calculated once the quantities necessary for $r$ have been determined. To illustrate, using the data from Table 13.3, we have

$$b = \frac{8(145) - (33)(29)}{[8(171) - 1{,}089]} = \frac{203}{279} = 0.73$$

The value of the $Y$ intercept ($a$) is found by the following:

$$a = \bar{Y} - b\bar{X}$$

Again, using the data in Table 13.3 and the calculation of $b$, we get

$$a = 3.63 - (0.73)(4.125) = 3.63 - 3.01 = 0.62$$

The completed regression equation is $\hat{Y} = 0.62 + 0.73X$.

Of course, as the name suggests, simple linear regression assumes that the relationship between $X$ and $Y$ is linear. If an examination of the scattergram suggests a curvilinear relationship, other regression techniques are necessary. The notion of regression can be extended to the use of multiple predictor variables to predict the value of a single criterion variable. (See the Internet for nearly 20,000 references for "linear regression.")

### Multiple Regression

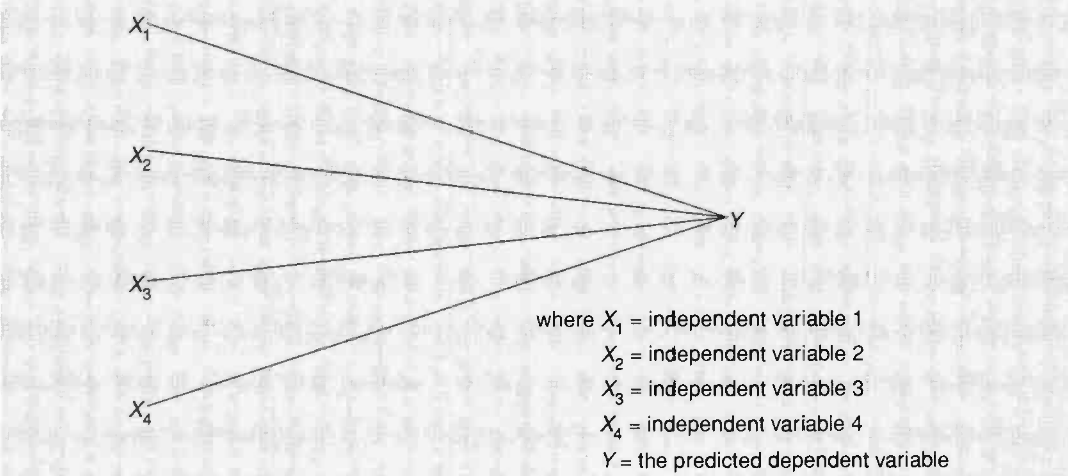
Multiple regression, an extension of linear regression, is another parametric technique used to analyze the relationship between two or more independent variables and a single dependent (criterion) variable. Though similar in some ways to an analysis of variance, multiple regression serves basically to *predict* the dependent variable using information derived from an analysis of the independent variables.

In any research problem, the dependent variable is affected by a variety of independent variables. The primary goal of multiple regression is to develop a formula that accounts for, or explains, as much variance in the dependent variable as possible. It is widely used by researchers to predict success in college, sales levels, and so on. These dependent variables are predicted by *weighted linear combinations* of independent variables. A simple model of multiple regression is shown in Figure 13.11.

Linear combinations of variables play an important role in higher-level statistics. To understand the concept of a weighted linear combination, consider two methods of classroom grading. One instructor determines each student's final grade by his or her performance on five exams: The scores on these exams are summed and averaged to obtain each final grade. A student receives the following scores for the five exams: B (3.0), D+ (1.5), B (3.0), B+ (3.5), and A (4.0); thus the final grade is a B (15/5 = 3.0). This grade is the dependent variable determined by the linear combination of five exam scores (the independent variables). No test is considered more important than another; hence the linear combination is not said to be weighted (except in the sense that all the scores are "weighted" equally).

The second instructor also determines the final grades by students' performances on five exams; however, the first exam counts 30%, the last exam 40%, and the remaining three exams 10% each in the determination. A student with the same five scores as above thus receives a final grade of 3.3. Again, the scores represent a linear combination, but it is a weighted linear combination: The first and last exam contribute more to the final grade than do the other tests. The second grading system is used in multiple regression:

Figure 13.11 *Multiple Regression Model*




The independent variables are weighted and summed to predict a dependent variable. The weight of each variable in a linear combination is referred to as its *coefficient*.

A multiple regression formula may involve any number of independent variables, depending on the complexity of the dependent variable. A simple formula of this type might look like this (hypothetical values are used):

$$\hat{Y} = 0.89X_1 + 2.5X_2 - 3$$

where $\hat{Y}$ is the predicted score or variable, $X_1$ is Independent Variable 1, and $X_2$ is Independent Variable 2. The number 3 in the formula, a constant subtracted from each subject's scores, is derived as part of the multiple regression formula. All formulas produced by multiple regression analyses represent a line in space; that is, the dependent variable is interpreted as a linear combination, or line, of independent variables. The slope of this line is determined by the *regression coefficients* assigned to the variables (Cohen & Cohen, 1975; Thorndike, 1978). The goal of the researcher is to derive a formula for a line that coincides as closely as possible with the true line (a mathematically determined line that represents a perfect prediction) of the dependent variable: The closer the computed line comes to the true line, the more accurate is the prediction.

Another important value that must be calculated in a multiple regression analysis is the *coefficient of correlation* ($R$), which represents the product-moment correlation between the predicted $\hat{Y}$ score and the weighted linear combination of the $X$ scores. The square of this coefficient ($R^2$) indicates the proportion of variance in the dependent variable that is accounted for by the predictor variables. The higher the $R^2$ (that is, the closer the figure is to 1.00), the more accurate the prediction is considered to be.

Drew and Reeves (1980) conducted a multiple regression analysis to determine what factors affect the way children learn from television news stories. They defined the dependent variable, "learning," in terms of performance on a 10-point questionnaire

Table 13.4 *Drew and Reeves' Multiple Regression Analysis*

| Predictor variables | Beta weights |
|---|---|
| Like program | .15** |
| Credibility | .10* |
| Informational content | .39*** |
| Like story | .25*** |
| Multiple *R* | .546 |
| $R^2$ | .298 |

*$p < .05$
**$p < .01$
***$p < .001$

regarding a news program the children watched in an experimental setting. The selection of independent variables was based on the results of previous studies; they decided to measure: (1) whether the children liked the program, (2) whether the children liked the particular news story, (3) the credibility of the program, and (4) the informational content of the particular story. The results, shown in Table 13.4, indicate that all the independent variables were statistically significant in their relation to learning. As the beta weights show, "informational content" seems to be the best predictor of learning, and "credibility" accounts for the least amount of variance. The multiple $R$ of .546 could be considered highly significant; however, since it means that only 30% ($.546^2$) of the variance in the dependent variable is accounted for by the four predictor variables, this value may not substantially explain the variance.

See the Internet for some problems related to multiple regression, particularly "multicolinearity" or "multiple dependence."

## ■ ■ ■ Summary

Mass media research has made great strides in both the number of research studies completed and the types of statistical methods used. This chapter introduced some of the more widely used basic statistical procedures involving one dependent variable and one or more independent variables. The information is intended to help beginning researchers in reading and analyzing published research.

The emphasis in this chapter was on using statistical methods rather than on the statistics themselves. The basic formula for each statistic was briefly outlined so that beginning researchers can understand how the data are derived; the goal, however, has been to convey a knowledge of how and when to use each procedure. It is important that researchers be able to determine not only what the problem or research question is, but also which statistical method most accurately fits the requirements of a particular research study.

### Questions and Problems for Further Investigation

1. Design a mass media study for which a chi-square analysis is appropriate. Consult the Internet for help, using "mass media questions" as a starting point.
2. In the chi-square example of television set sales, assume that the observed sales frequencies are 210 (RCA), 350 (Sony), 200 (JVC), and 240 (Mitsubishi). What is the chi-square value? Is it significant?
3. What are the advantages of using an ANOVA rather than conducting several separate $t$-tests of the same phenomena?
4. How could multiple regression be used to predict a subject's television viewing, radio listening, and newspaper reading behavior?
5. On page 283 we state that a Pearson $r$ can be computed between any two sets of scores. Does

that mean that all Pearson correlations will be logical? See the Internet for numerous interesting discussions by conducting a search on "pseudoscience" or "paranormal.")

6. Calculate $r$ for the following sets of scores:

X: 1 1 3 2 2 4 5 7
Y: 8 6 5 4 3 5 2 3

7. Go to *www.vassar.edu/~lowry/VassarStats.html* on the Internet for online statistical programs to run ANOVA, correlation, and partial correlation.
8. If you are using *InfoTrac College Edition,* you can read a short research article that shows how chi-square can be used in a cross-tabulation. See "Gender stereotypes: A bias against men" by Martin S. Fiebert and Mark W. Meyer in *The Journal of Psychology,* July 1997.

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Part Four

# Research Applications


**14** *Research in the Print Media*

**15** *Research in the Electronic Media*

**16** *Research in Advertising and Public Relations*

**17** *Research in Media Effects*

**18** *Mass Media Research and the Internet*

Chapter 14

# Research in the Print Media


- *Background*
- *Types of Print Media Research*
- *Print Media Research and the Internet*
- *The Journalist As Researcher*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

Methodologies used to study the print media are similar to those used in most areas of research; academic and commercial research organizations often use content analysis, experiments, focus groups, and surveys, among other procedures, to study newspapers and magazines. Print media research, however, tends to be more narrowly focused and more oriented toward practical application. This chapter provides a brief overview of the most common types of studies in newspaper and magazine research, with a special emphasis on the research most likely to be conducted by advertiser-supported publications.

This chapter does not address basic market studies and advertising exposure studies. A basic market study provides a demographic or psychographic portrait of the potential readers of a newspaper or magazine; this market research technique is more fully described by Green, Tull, and Albaum (1988). Advertising exposure studies (also called reader traffic studies) are conducted to determine which ads are noticed or read by a publication's audience; for more information on these studies, see Chapter 16.

## ▪ Background

Magazines and newspapers were one of the first subjects of mass media research. The initial interest in such research came from colleges and universities. In 1924 the Association of American Schools and Departments of Journalism first published the *Journalism Bulletin*. The first issue contained an article by William Bleyer entitled "Research Problems and Newspaper Analysis," which presented a list of possible research topics in journalism. Among them were the effects of form and typography on the ease and rapidity of newspaper reading, the effects of newspaper content on circulation, and the analysis of newspaper content. Bleyer's article was remarkably accurate in predicting the types of studies that would characterize newspaper and magazine research in the coming years.

Much of early print media research was qualitative. The first volume of *Journalism Quarterly*, founded in 1928 to succeed the *Journalism Bulletin*, contained articles on press law, history, international comparisons, and ethics. Soon, however, quantitative research began to make its appearance in this academic journal: An article published in March 1930 surveyed the research interests of those currently working in the newspaper and magazine field and found the most prevalent type of study to be the survey of reader interest in newspaper content. The June 1930 issue contained an article by Ralph Nafziger, "A Reader Interest Survey of Madison, Wisconsin," which served as the prototype for hundreds of future research studies. The 1930s also saw the publication of many studies designed to assess the results of print media advertising. This led to studies in applied research, and several publications began to sponsor their own readership surveys. Mostly, however, the results of these studies were considered proprietary.

As the techniques of quantitative research became more widely known and adopted, newspaper and magazine research became more empirical. This trend was first recognized

*Reading the Tabloids*

Readership research can be either quantitative (as described in the text) or qualitative, like the book by Elizabeth Bird, *For Inquiring Minds: A Cultural Study of Supermarket Tabloids*. The author asked readers of the *National Examiner* to write letters explaining why they read the paper. She received more than 100 replies and conducted intensive interviews with 16 of the respondents. What sort of person reads the tabs? Many were middle-aged, white women with a high school education, but about one-third of those who replied were men. Do they actually believe the wild and bizarre stories that appear in the tabloids? Bird found that belief was selective. People who gave great credence to ESP, for example, were likely to put great faith in stories about its existence, but these same people might totally dismiss stories about UFOs or astrology. Some people, however, seemed completely gullible. One person traveled all the way to Guatemala after reading a report that a plant had been discovered there that would make people younger. Alas, the reader was unable to locate the plant.

by Wilbur Schramm (1957) in an article in *Public Opinion Quarterly* that reviewed 20 years of research as reported in *Journalism Quarterly*. Schramm found that only 10% of the 101 articles published between 1937 and 1941 concerned quantitative analyses; by 1952–1956, however, nearly half the 143 articles published were quantitative, a fivefold increase in only 15 years. The reasons for this trend, according to Schramm, were the growing availability of basic data, the development of more sophisticated research tools, and the increase in institutional support for research.

By 1960, newspapers and magazines were competing with television as well as radio for audience attention and advertiser investment. This situation greatly spurred the growth of private sector research. The Bureau of Advertising of the American Newspaper Publishers Association (subsequently called the Newspaper Advertising Bureau) began conducting studies on all aspects of the press and its audience. In the 1970s, it founded the News Research Center, which reports the results of research to editors. The Magazine Publishers Association also began to sponsor survey research at this time. The continuing interest of academics in print media research led to the creation of the *Newspaper Research Journal* in 1979, a publication devoted entirely to research that has practical implications for newspaper management.

In 1976 the Newspaper Readership Project was instituted to study the problems of declining circulation and sagging readership. As a major part of the 6-year, $5-million study, a news research center was set up at Syracuse University to abstract and synthesize the results of more than 300 private and published studies of newspaper reading habits. The Newspaper Advertising Bureau produced dozens of research reports and conducted extensive focus group studies. In addition, regional workshops were held across the country to explain to editors the uses and limitations of research. By the time the Readership Project ended, most editors had accepted research as a necessary tool of the trade. Bogart (1991) presents a thorough history of the Readership Project, and search the Internet for more information on the "readership project."

In 1977 the Newspaper Research Council (NRC), a subgroup of the Newspaper Advertising Bureau, was incorporated with 75 members. This group was involved with the American Society of Newspaper Editors in a circulation retention study and with the International Newspaper Marketing Association on how to convert Sunday-only readers to daily readers. In 1992 the Newspaper Advertising Bureau merged with the American Newspaper Publishers Association to create the Newspaper Association of America (NAA). The NAA continued the efforts of the NRC in the research area. In 1994 the NAA sponsored a study to determine how newspapers could attract younger readers. Another study released in 1995 dealt with the characteristics of readers of the editorial page. A 1996 NAA study examined why women were leaving the newspaper business. The most recent effort of the NAA, launched in 1998, was a 3-year, $18-million advertising campaign to encourage newspaper reading.

Most newspapers with a circulation of at least 100,000 now have an in-house research department. The growth of group-owned newspapers—about 75% of U.S. dailies in 1999—has also increased the trend toward research because many small papers can call upon their corporate research staffs for aid. Even some of the individually owned small papers have added researchers to their staff. The Vancouver, Washington, *Columbian* (circulation 48,000) recently hired a research manager, as did the Rochester, Minnesota, *Post-Bulletin* (circulation 39,000). A recent survey (Stein, 1991) of research directors of newspapers found that about half of the participating directors felt that research activity was enjoying increased influence at their papers. Experts estimate that the newspaper industry spent $30–$40 million on research in 1998, a substantial increase since 1988.

As Veronis (1989) points out, research touches nearly every corner of the publishing industry: advertising, marketing, circulation, readership, and news-editorial. Print media research is conducted by commercial research firms, in-house research organizations, professional associations, and colleges. Print media research is likely to continue its growth. The Associated Press Managing Editors Association recently released its "Year 2000" report, in which it called for the establishment of an industry-wide research institute. A survey by Schweitzer (1992) of 135 researchers at newspapers across the country revealed that two-thirds thought the importance their newspapers placed on research would increase in the next 5 years. The advent of on-line news media and electronic newspapers has prompted a busy new research area as traditional newspapers try to assess the competition from the Internet and examine how on-line newspapers relate to the traditional paper versions.

See *www.mediainfo.com* for a wealth of information about newspaper research.

## ▪ Types of Print Media Research

Newspaper and magazine researchers conduct six basic types of studies: readership, circulation, management, typography/makeup, readability, and on-line media usage. Most of their research focuses on readership; studies of circulation and management rank next. Studies about the use of on-line media and their potential competition with traditional newspapers is a recent area that is attracting a great deal of attention. Only a few studies have been conducted of typography/makeup and readability. (See the Internet under "newspaper research" for nearly 1,000 references.)

### Readership Research

Many readership studies were done in the United States in the years immediately preceding and following World War II. The George Gallup organization was a pioneer in developing the methodology of these studies—namely, a personal interview in which respondents were shown a copy of a newspaper and asked to identify the articles they had read. The most complete survey of newspaper readership was undertaken by the American Newspaper Publishers Association (ANPA), whose *Continuing Studies of Newspapers* involved more than 50,000 interviews with readers of 130 daily newspapers between 1939 and 1950 (Swanson, 1955).

Readership research became important to management during the 1960s and 1970s, as circulation rates in metropolitan areas began to level off or decline. Concerned with holding the interests of their readers, editors and publishers began to depend on surveys for the detailed audience information they needed to shape the content of a publication. The uncertain economy of the early 1990s and increasing competition from other traditional media and new on-line media have made readership research even more important today. This conclusion is reinforced by Bream's survey (1995) of 78 newspaper companies concerning their use of readership research. He found that 74 of the 78 companies had conducted some type of reader research, with focus groups, mail surveys, and telephone surveys most common.

Research into newspaper readership is composed primarily of five types of studies: reader profiles, item-selection studies, reader-nonreader studies, uses and gratifications studies, and editor-reader comparisons.

***Reader Profiles.*** A **reader profile** provides a demographic summary of the readers of a particular publication. For example, a profile of the audience of a travel-oriented magazine might disclose that the majority of the readers earn more than $40,000 a year, are 25–34 years old, hold college degrees, possess six credit cards, and travel at least three times a year. This information can be used to focus the publication, prepare advertising promotions, and increase subscriptions.

Such information is particularly helpful when launching a new publication. For example, when *USA Today* debuted, a reader profile showed that 29% of its readers had annual incomes exceeding $35,000, 67% reported attending college, 32% were 18–29 years old, and 26% had taken six or more round-trip plane trips in the past year. Obviously, such numbers were of interest to both advertisers and editors.

Because there may be significant differences in the nature and extent of newspaper reading among individuals who have the same demographic characteristics, researchers recently have turned to psychographic and lifestyle segmentation studies to construct reader profiles. Both procedures go beyond the traditional demographic portrait and describe readers in terms of what they think or how they live. **Psychographic studies** usually ask readers to indicate their level of agreement or disagreement with a large number of attitudinal statements. Subsequently, patterns of response are analyzed to see how they correlate or cluster together. People who show high levels of agreement with questions that cluster together can be described with labels that summarize the substance of the questions. On the one hand, people who tend to agree with statements such as "I like to think I'm a swinger," "I'm a night person," and "Sex outside marriage can be a healthy thing" might be called "progressives." On the other hand, people who agree with items such as "Women's lib has gone too far," "Young people have too much freedom," and "The good old days were better" might be labeled "traditionalists."

**Lifestyle segmentation research** takes a similar approach. Respondents are asked a battery of questions concerning their activities, hobbies, interests, and attitudes. Again, the results are analyzed to see which items cluster together. Groups of individuals who share the same attitudes and activities are identified and labeled. To illustrate, Guzda (1984) reported on a lifestyle segmentation study that resulted in these group labels:

young busy mothers, Mrs. traditionalist, ladder climbers, senior solid conservatives, midlife upscalers, and winter affluents. Similarly, Ruotolo (1988) identified five types of newspaper readers: instrumental readers, opinion makers, pleasure readers, ego boosters, and scanners.

Both psychographic and lifestyle segmentation studies are designed to provide management with additional insights about editorial aims, target audiences, and circulation goals. In addition, they give advertisers a multidimensional portrait of the publications' readers. Two of the most popular scales designed to measure these variables are the List of Values (LOV) and the recently revised Values and Life Styles test (VALS II). Descriptions and comparisons of these scales are found in Novak and MacEvoy (1990). Other social factors might also be important. Loges and Ball-Rokeach (1993) note that newspaper readership is related to several sociological variables—including social understanding, self-understanding, and action orientation—that explain more of the variation in readership than do traditional demographic variables.

***Item-Selection Studies.*** A second type of newspaper readership study, the item-selection study, is used to determine who reads specific parts of the paper. The readership of a particular item is usually measured by means of **aided recall**, whereby the interviewer shows a copy of the paper to the respondent to find out which stories the respondent remembers. In one variation on this technique, the interviewer preselects items for which readership data are to be gathered and asks subjects about those items only. Because of the expense involved in conducting personal interviews, some researchers now use phone interviews to collect readership data. Calls are made on the same day the issue of the paper is published. The interviewer asks the respondent to bring a copy of the paper to the phone, and together they go over each page, with the respondent identifying the items he or she has read. Although this method saves money, it excludes from study those readers who do not happen to have a copy of the paper handy.

Another money-saving technique is to mail respondents a self-administered readership survey. Hvistendahl (1977) described two variations of this type of study. In the "whole copy" method, a sample of respondents receives an entire copy of the previous day's paper in the mail, along with a set of instructions and a questionnaire. The instructions direct the respondents to go through the newspaper and mark each item they have read by drawing a line through it. A return envelope with postage prepaid is provided. In the "clipping" method, the procedure is identical except that respondents are mailed clippings of certain items rather than the whole paper. To save postage fees, the clippings are pasted up on pages, reduced 25%, and reproduced by offset. Hvistendahl reported a 67% return rate using this method with only one follow-up postcard. He noted that the whole copy and clipping methods produced roughly equivalent results, although readership scores on some items tended to be slightly higher when clippings were used. A comparison of the results of these self-administered surveys with the results of personal interviews also indicated an overall equivalence.

Stamm, Jackson, and Jacoubovitch (1980) suggested a more detailed method of item-selection analysis, which they called a tracking study. They supplied their respondents with a selection of colored pencils and asked them to identify which parts of an article (headline, text, photo, cutline) they had read, using a different colored pencil each time they began a new *reading episode* (defined as a stream of uninterrupted reading). The results showed a wide degree of variability in the readership of the elements that made up an item: For one story, 27% of the

*Readership Profile*

All types of magazines construct readership profiles. Here are some of the characteristics of the readers of the business publication *Latin Trade* based on a 1997 survey:

86% were men.

72% were in top management.

50% traveled either first or business class.

The mean income of its North American readers was $141,000.

More than 85% graduated from college or a graduate program.

subjects had read the headline, 32% the text, and 36% the cutline. There was also variation in the length and type of articles read per reading episode.

The unit of analysis in an item-selection study is a specific news article (such as a front-page story dealing with a fire) or a specific content category (such as crime news, sports, obituaries). The readership of items or categories is then related to certain audience demographic or psychographic characteristics. For example, Lynn and Bennett (1980) divided their sample according to residence in urban, rural, or farming areas. Their survey found that there was little difference in the type of news content read by farm and rural dwellers, but that urban residents were more likely to read letters to the editor, society items, and local news. Griswold and Moore (1989) found that readers of a small daily newspaper most often read local news, obituaries, police news, state news, and weather forecasts.

A 1991 study by Simmons Market Research Bureau found that, among a national sample of adults, the general news and entertainment sections of the paper were read the most and the classified and "Home" sections were read the least. Item-selection studies are often used to help newspapers reach certain groups of readers. Gersh (1990), for example, reported that teenage readers have reading habits different from adults. The most popular sections of the newspaper among teens were comics, sports, and entertainment; finance, food, and home sections were the least popular. Stone and Boudreau (1995) compared data from a 1985 survey of newspaper reader preferences with data gathered in 1994. They found that content preferences changed remarkably little during the time period. A survey of 22,400 households sponsored by the Newspaper Association of America (Fisher, 1993) found that 92% of the audience read general news; the entertainment and sports section ranked second and third.

***Reader-Nonreader Studies.*** The third type of newspaper readership research is called the reader-nonreader study. This type of study can be conducted via personal, telephone, or mail interviews with minor modifications. It is difficult, however, to establish an operational definition for the term *nonreader.* In some studies, a nonreader is determined by a "no" answer to the question "Do you generally read a newspaper?" Others have used the more specific question "Have you read a newspaper yesterday or today?" (The rationale here is that respondents are more likely to admit they have not read a paper today or yesterday than that they have never read one.) A third form of this question uses multiple-response categories. Respondents are asked, "How often do you read a daily paper?" and they are given five choices of response: "very often," "often," "sometimes," "seldom," and "never." Nonreaders are defined as those who check the "never" response, or in some studies "seldom" or "never." Obviously, the form of the question has an impact on how many people are classified as nonreaders. The largest percentage of nonreaders generally occurs when researchers ask, "Have you read a newspaper today or yesterday?" (Penrose, Weaver, Cole & Shaw, 1974); the smallest number is obtained by requiring a "never" response to the multiple-response question (Sobal & Jackson-Beeck, 1981).

Once the nonreaders have been identified, researchers typically attempt to describe them by means of traditional demographic variables. For example, Penrose and colleagues (1974) found nonreading to be related to low education, low income, and residence in a nonurban area. Sobal and Jackson-Beeck (1981) reported that nonreaders tend to be older, to have less education and lower incomes, and to have more often been widowed or divorced than readers. And Bogart (1991) concluded that nonreaders are less likely to have voted in the last presidential election and to believe that their opinions had an impact on local government. A study by Stone (1994) found that education was a better predictor of newspaper readership than race among a sample of 18–34-year-olds.

Several studies of nonreaders have attempted to identify the reasons people do not read the newspaper. The data for these subjects have generally been collected by asking nonreaders to tell the interviewer in their own words why they do not read. Responses are analyzed and the most frequent reasons reported. Bogart (1991) identified four reasons: depressing news, cost, lack of interest, and inability to spend sufficient time at home. Lipschultz (1987) discovered that nonreaders relied more on radio and TV for news, found newspapers too costly, perceived papers as neither interesting nor useful, and thought that newspaper reading took too much time. In addition, as revealed by the studies cited previously, people with less education were more likely to be nonreaders. More recently, Wanta, Hu, and Wu (1995) differentiated newspaper readers and nonreaders using the uses and gratifications approach (discussed later). They found that nonreaders displayed low motivations to use the newspaper to help them understand what's going on and to keep up with current events.

Broader studies in this area have included variables that are beyond the control of the newspaper. In a longitudinal study, Chaffee and Choe (1981) found that changes in marital status, residence, and employment had an impact on newspaper readership. Similarly, Einseidel and Kang (1983) found that reading habits are accounted for, at least in part, by civic attitudes. Finally, Cobb-Walgren (1990) focused on why teenagers do not read the newspaper. She found that both teenagers' home environment and their image of the newspaper were important in determining why teens do not read newspapers. Nonreaders perceived that reading the paper took too much time and effort, and they were more likely to have parents who also did not read newspapers.

***Uses and Gratifications Studies.*** A uses and gratifications study is used to study all media content. For newspapers it can determine the motives that lead to newspaper reading and the personal and psychological rewards that result from it. The methodology of the uses and gratifications study is straightforward: Respondents are given a list of possible uses and gratifications and are asked whether any of these are the motives behind their reading. For example, a reader might be presented with this question:

> Here is a list of some things people have said about why they read the newspaper. How much do you agree or disagree with each statement?

1. I read the newspaper because it is entertaining.
2. I read the newspaper because I want to kill time.
3. I read the newspaper to keep up to date with what's going on around me.
4. I read the newspaper to relax and to relieve tension.
5. I read the newspaper so I can find out what other people are saying about things that are important to me.

The responses are then summed and an average score for each motivation item is calculated.

Several studies have taken this approach to explain readership. For example, McCombs (1977) found three primary psychological motivations for reading newspapers: the need to keep up to date, the need for information, and the need for fun. Reading for information seemed to be the strongest motivator. Similarly, Weaver, Wilhoit, and Reide (1979) found that the three motivations most common in explaining general media use are the need to keep tabs on what is going on around one, the need to be entertained, and the need to kill time. The authors also noted differences among demographic groups regarding which of these needs was best met by the newspaper. For example, young males, young females, and middle-aged males were most likely to say they read a newspaper to satisfy their need to keep tabs on things, but they preferred other forms of media for entertainment and killing time. A study done in Hawaii (Blood, Keir & Kang, 1983) reinforced these conclusions. The two factors that were the best predictors of readership were "use in daily living" and "fun to read." In addition, gratifications from reading the newspaper seemed to differ across ethnic groups.

Elliott and Rosenberg (1987) took advantage of the 1985 newspaper strike in Philadelphia to survey the gratifications of readers during and after the strike. They found that people deprived of a daily newspaper turned to other media to fill the surveillance/contact function, but there was no evidence of compensatory media behavior for the entertainment, "killing time," and advertising functions associated with newspaper reading. Payne, Severn, and Dozier (1988) studied uses and gratifications as indicators of magazine readership. They found three main classes of gratifications: surveillance, diversion, and interaction. In addition, readers' scores on these three categories were consistent with the magazines they chose to read. Bramlett-Solomon and Merrill (1991), in their study of newspaper use in a retirement community, found that readers used the newspaper to keep involved with the community. More recently, Perse and Courtright (1993) found that print media were seen as most useful in fulfilling learning needs but were not rated high for social, arousal, or companionship needs. (See "uses and gratifications" on the Internet for several recent studies.)

***Editor-Reader Comparisons.*** In the final area of newspaper readership research, editor-reader comparisons, a group of editors is questioned about a certain topic, and their answers are compared to those of their readers to see whether there is any correspondence between the two groups. Bogart (1989) presented two examples of such research. In one study, a group of several hundred editors was asked to rate 23 attributes of a high-quality newspaper. The editors ranked "high ratio of staff-written copy to wire service copy" first, "high amount of nonadvertising content" second, and "high ratio of news interpretations . . . to spot news reports" third. When a sample of readers ranked the same list, the editors' three top attributes were ranked 7th, 11th, and 12th, respectively. The readers rated "presence of an action line column" first, "high ratio of

*Measuring Readership: Daily or Weekly*

Since it began, newspaper readership research has been geared to measuring the amount of readership garnered by daily newspapers. One of the most common questions used to measure readership has been, "Did you read a newspaper today or yesterday?" This question, however, is not adequate to measure weekly newspaper reading. Surveys done on Mondays, Tuesdays, Wednesdays, Saturdays, and Sundays would probably not accurately assess the reading of a weekly that appears on Thursday.

Thurlow and Milo (1993) suggest that more research should be devoted to the readership of weeklies. Their study of college students revealed that about half of them reported reading every issue of their campus weekly and a local weekly. In contrast, 56% of the students reported that they never read the local daily and only about 3% were classified as everyday readers. The authors note that it is important to track these students to see if they continue to favor the weekly over the daily or if they join the ranks of nonreaders.

sports and feature news to total news" second, and "presence of a news summary" and "high number of letters to the editor per issue" in a tie for third. In short, there was little congruence between the two groups in their perceptions of the attributes of a high-quality newspaper.

In a related study, Bogart gave readers an opportunity to design their own newspaper. Interviewers presented a sample of readers with 34 subjects and asked how much space they would give to each in a paper tailor-made to their own interests. Major categories of news were omitted from the listings because they were topics over which editors have little control. When the results were tabulated, the contents of a sample of newspapers were analyzed to see whether the space allocations made by editors matched the public's preferences. The resulting data indicated that readers wanted more of certain content than they were getting (consumer news; health, nutritional, and medical advice; home maintenance; travel) and that they were getting more of some topics than they desired (sports news; human interest stories; school news; crossword puzzles; astrology). More recently, Jones (1993) used a coorientation model to investigate the perceptions of a newspaper's editorial staff and its readers concerning the news selection process. The data revealed that the professionals' ranking of news items correlated significantly with the readers' ranking. Two studies indicate that this technique has been broadened to include journalist-reader comparisons as well as editor-reader matchups.

More recently, Gladney (1996) explored whether editors and readers agreed on what makes a good newspaper. A survey revealed that both groups agreed on the importance of many journalistic standards, but readers didn't value professional staffing goals and enterprise reporting as highly as the editors did. Grierson and Scott (1995) compared editors' and readers' attitudes on a topic not directly related to journalism: mental illness. They found that editors were less likely than the general public to think that the mentally ill were dangerous and unpredictable.

***Magazine Readership Research.*** Magazine readership surveys are fundamentally similar to those conducted for newspapers but tend to differ in the particulars. Some magazine research is done by personal interview; respondents are shown a copy of the magazine under study and asked to rate each article on a four-point scale ("read all," "read most," "read some," or "didn't read"). The mail survey technique, also frequently used, involves sending a second copy of the magazine to a subscriber shortly after the regular copy has been mailed; instructions on how to mark the survey copy to show readership are included. For example, the respondents might be instructed to mark with a check the articles they scanned, to draw an X through articles read in their entirety, and to underline titles of articles that were only partly read. Laitin (1997) presents a basic outline of the methods used to survey magazine subscribers.

Most consumer magazines use audience data compiled by the Simmons Market Research Bureau (SMRB) and Mediamark Research Inc. (MRI). Both companies select a large random sample of households and interview readers. Before 1994, SMRB and MRI used different techniques to measure readership. Simmons screened its respondents by showing them first cards with magazine logos printed on them and then stripped-down issues of actual magazines. Those people who reported reading one or more magazines were then interviewed again. Mediamark presented logo cards to respondents to identify readers and then gathered more detailed data in a single interview. Since the two research companies used different techniques, their readership data did not always agree and the discrepancy was a source of some concern in the magazine industry. In 1994, however, partly as a money-saving strategy, SMRB announced that it was adopting a technique similar to that used by MRI.

Both MRI and SMRB face a troublesome problem caused by the proliferation of magazines targeted for a narrow readership. It is difficult to draw a sample that includes enough readers of specialized publications to generate statistically reliable results. In that connection, MRI announced in 1997 that it was planning to expand its sample size from 20,000 to 30,000 households (Wilson, 1997).

Many magazines maintain *reader panels* of 25–30 people who are selected to participate for a predetermined period. All feature articles that appear in each issue of the magazine are sent to these panel members, who rate each article on a number of scales, including interest, ease of readership, and usefulness. Over time, a set of guidelines for evaluating the success of an article is drawn up, and future articles can be measured against that standard. The primary advantage of this form of panel survey is that it can provide information about audience reactions at a modest cost. Other publications might use surveys that are included with the magazine itself. *The Engineering News-Record*, for example, conducts periodic in-magazine surveys that ask readers about career issues. The results are then published in a special advertising section sponsored by recruiting firms (Katcher, 1995). In 1997 *Vogue* started an on-line reader panel of college students called the "Style Council."

Another procedure that is peculiar to magazine research is the item pretest (Haskins, 1960). A random sample of magazine readers is shown an article title, a byline, and a brief description of the content of the story. Respondents are asked to rate the idea on a scale from 0 to 100, where 100 represents "would certainly read this article" and 0 represents "would not read this article." The average ratings of the proposed articles are tabulated as a guide for editorial decisions. Note that this technique can be used in personal interviews or a mail survey with little variation in approach. Haskins also reported a positive correlation between scores obtained using this technique and those determined by post-publication readership surveys.

Other magazine research involves item-selection and editor-reader comparisons. For example, *Glamour* generally surveys reader response to every issue (Smith, 1992). Questionnaires are mailed to readers asking them about the articles, the cover, and their general reading habits. *Travel & Leisure* has a similar system.

The McGraw-Hill magazine group spends approximately $250,000 a year on readership research. *Good Housekeeping* takes a random survey of its subscribers each month to determine what stories were enjoyed and what recipes were tried. Harcourt Brace Jovanovich does both pretesting and posttesting in its health care journals. The company sends the titles of 15 articles printed on a single sheet of paper to 400 or 500 physicians. The respondents are asked to rate each article as having high, moderate, or low interest value.

In addition to traditional readership studies, many magazines conduct focus groups. Harcourt Brace Jovanovich depends particularly on focus groups to help fine-tune the content of new publications. Ziff Communications does the same. *Farmer* uses focus group sessions for reader reaction to headlines, graphics, and general editorial feedback. Other magazines use focus groups as supplements to their monthly questionnaires.

### Circulation Research

The term **circulation research** is applied to two different forms of newspaper and magazine study. The first type of circulation research uses a particular group of readers as its unit of analysis. It attempts to measure circulation in terms of the overall characteristics of a particular market—for example, to determine the proportion of households in a given market that are reached by a particular newspaper or the circulation pattern of a magazine among certain demographic groups or in specific geographic areas. Tillinghast (1981), who analyzed changes in newspaper circulation in four regions of the country, found that the greatest decrease had occurred in the East and the South. He also reported that the degree of urbanization in a region was positively related to circulation. In a study of 69 Canadian daily newspaper markets, Alperstein (1980) discovered that newspaper circulation was positively related to the proportion of reading households within the newspaper's home city. In addition, daily newspaper circulation was inversely related to weekly newspaper circulation.

More recently, four studies have examined the impact of content variables on circulation. Lacy and Fico (1991) demonstrated that measures of the content quality of a newspaper were positively related to circulation figures. Somewhat similarly, Lacy and Sohn (1990) found limited support for the hypothesis that the amount of space given to specific content sections in metropolitan newspapers correlates with circulation in suburban areas. McCleneghan (1997) examined the relationship between analytical content and newspaper circulation. Lastly, Ha and Litman (1997) conducted a longitudinal analysis of the impact of magazine advertising clutter on the circulation of 10 magazines. They found that increased clutter had a negative impact on the circulation of entertainment magazines but not news magazines.

A recent trend in circulation research is the identification of other market level or market structure variables that have an impact on circulation. Stone and Trotter (1981) found that the number of households in the local community and measures of broadcast media availability were the two best predictors of circulation. Blankenburg (1981) analyzed market structure variables and determined that county population and distance from the point of publication were strong predictors of circulation. Hale (1983) concluded from a regression analysis of Sunday newspaper sales in all 50 states that degree of urbanization, population density, and affluence were key predictors of circulation. Moore, Howard, and Johnson (1988) discovered that there was no relationship between viewing television news programs and afternoon newspaper circulation. Market size and location showed a stronger relationship with circulation. In sum, it appears from these studies that many factors outside the control of the newspaper publisher have an impact on circulation.

Economic influences have also been examined. Blankenburg and Friend (1994) discovered that circulation figures were not related to the percentage of a newspaper's budget that was spent on news-editorial expenses nor was there a relationship between money spent on promotion and circulation. There was, however, an influence of newspaper price; papers that cost more tended to lose circulation. Similarly, Lewis (1995) found that increases in price were related to declines in circulation. Marchetti (1996) detailed several economic factors, including increased advertising cost, cutbacks in newsstand distribution, and a concentration on core market areas, that were related to declining circulation.

Some publications use computer models to predict circulation. Blankenburg (1987) generated a regression equation to predict circulation after newspaper consolidation. Guthrie, Ludwin, and Jacob (1988) also developed a regression equation to predict metropolitan circulation in outlying counties. They found that the two most important predictor variables were an index of magazine circulation and an index of local newspaper competition for each county.

The second type of circulation research uses the individual reader as the unit of analysis to measure the effects of certain aspects of delivery and pricing systems on reader behavior. For example, McCombs, Mullins, and Weaver (1974) studied why people cancel their subscriptions to newspapers. They found that the primary reasons had less to do with content than with circulation problems, such as irregular delivery and delivery in unreadable condition. These reasons were substantiated in a 1992 Paragon Research study of circulation of the two newspapers in Denver, Colorado.

Magazine publishers often conduct this type of circulation research by drawing samples of subscribers in different states and checking on the delivery dates of their publication and its physical condition when received. Other publications contact subscribers who do not renew to determine what can be done to prevent cancellation (Sullivan, 1993). Studies have even been conducted to find out why some people do not pay their subscription bills promptly.

The Gannett Company's Newspaper Division conducted research that discovered that customer billing was a prime cause of their newspapers losing circulation. Subsequently, Gannett interviewed 1,000 subscribers and conducted several focus groups to devise a billing system that was more responsive to consumer needs. Some circulation research uncovers facts that management would probably never be aware of. For example, at the *Wichita Eagle*, management was puzzled about circulation losses. A survey found that many subscribers were canceling because the plastic delivery bags used by the paper on rainy days were not heavy enough, and many readers were fed up with soggy papers. In short, this type of circulation research investigates the effect on readership or subscription rates of variables that are unrelated to a publication's content.

## Newspaper Management Research

A growing research area in the 1990s has been newspaper management practices. This growth was due to three factors. First, newspaper companies expanded their holdings, which created a more complicated management structure. Second, media competition became more intense. Newspapers with efficient management techniques had a greater advantage in the new competitive environment. Third, the newspaper industry became more labor-intensive. Skilled and experienced personnel form the backbone of a successful newspaper. More and more managers turned to research to determine how to keep employees satisfied and productive.

The techniques used to study newspaper management are the same as those used to study any business activity: surveys, case studies, descriptive content analysis, and mathematical models. The main topics that have attracted the most research attention in the last 5 years are goal setting by management, employee job satisfaction, and effects of competition and ownership on newspaper content and quality.

One representative example of management research into goal setting is Demers and Wackman's (1988) study of the effect of chain (group) ownership on management's objectives. Secondary analysis of data collected from a sample of 101 newspaper managers revealed that editors at chain-owned daily newspapers were more likely to say that profit was a goal driving their organization. Analogous results were found in a follow-up study (Demers, 1991). In a similar study, Busterna (1989) administered a survey to 42 newspaper executives, most of them from weekly papers, asking them to rate several managerial goals in terms of their relative importance to their newspapers. Managers who also owned their papers placed less emphasis on maximizing profits as a goal, whereas nonowner managers ranked it first. Finally, Sylvie (1996) found that interdepartmental differences in goals were a detriment to cooperation in his sample of newspapers.

Job satisfaction among newspaper employees has been the topic of several studies. Bergen and Weaver (1988) conducted a secondary data analysis of a survey of 1,001 U.S. journalists. They found that the strongest correlate of individual job satisfaction was how satisfied the journalist was with the performance of his or her news organization. Stamm and Underwood's (1993) survey of 429 newsrooms revealed that job satisfaction was negatively related to a newspaper's emphasis on business over journalism but positively related to an emphasis on journalistic quality. Bramlett-Solomon (1993) discovered that the job satisfaction motivations of black journalists were not very different from those of white journalists. Technological innovations, such as computer pagination, did not relate to measures of job satisfaction (Stamm, Underwood & Giffard, 1995).

A related issue that has garnered recent attention is job burnout among journalists. Data collected from employees at five newspapers (Cook & Banks, 1993) revealed that the person most likely to suffer from burnout is a young, entry-level journalist working as a copy editor at a small daily newspaper. It is not surprising that journalists with a high level of job satisfaction are unlikely to experience burnout. In a related study, Cook, Banks, and Turner (1993) reported that several work environment variables, including supervisor support and peer cohesion, are also related to burnout.

Research on the impact of concentration of ownership includes Akhavan-Majid, Rife, and Gopinah's (1991) study of editorial positions taken by Gannett-owned papers. They found that the Gannett papers were more likely than other newspapers to endorse similar editorial positions. Lacy (1990) found that local market monopoly newspapers used a smaller number of wire services than did papers in competitive markets, which supports earlier findings that competition encourages more spending on the news-editorial department. Coulson (1994) sampled 773 journalists at independent and group-owned papers about the quality of their publication. Reporters at independently owned papers were more likely to rate their paper's commitment to quality local coverage as excellent. Finally, Coulson and Hansen (1995) examined the news content of the *Louisville Courier-Journal* after its purchase by the Gannett organization. Results indicated that the total amount of news space increased but that the average length of stories and the amount of hard news coverage decreased. Blankenburg (1995) studied the recession of the late 1980s and its impact on managerial practices of chain and independent newspaper owners. He found no clear pattern due to ownership.

### Typography and Makeup Research

Another type of print media research measures the effects of news design elements—specifically typeface and page makeup—on readership, reader preferences, and comprehension. By means of this approach, researchers have tested the effects of different typography and makeup elements, including amount of white space, presence of paragraph headlines, size and style of type, variations in column width, and use of vertical or horizontal page makeup.

The experimental method (see Chapter 10) is used most often in typography and makeup studies. Subjects are typically assigned to one or more treatment groups, exposed to an experimental stimulus (typically in the form of a mock newspaper or magazine page), and asked to rate what they have seen according to a series of dependent variable measures.

Among the dependent variables that have been rated by subjects are the informative value of a publication, interest in reading a publication, image of a page, recall of textual material, readability, and general preference for a particular page. A common practice is to measure these variables by means of a semantic differential rating scale. For example, Siskind (1979) used a nine-point, 20-item differential scale with such adjective pairs as "messy/neat," "informative/uninformative," "unpleasant/pleasant," "easy/difficult," "clear/unclear," "bold/timid," and "passive/active." She obtained a general reader preference score by having subjects rate a newspaper page and summing their responses to all 20 items. Other studies have measured reader interest by using the rating scale technique or the 0–100 "feeling thermometer" (see Figure 8.1). Comprehension and recall are typically measured by a series of true/false or multiple-choice questions on the content that is being evaluated.

Haskins and Flynne (1974) conducted a typical design study to test the effects of different typefaces on the perceived attractiveness of and reader interest in the women's section of a newspaper. They hypothesized that some typefaces would be perceived as more feminine than others and that headlines in such typefaces would create more reader interest in the page. The authors showed an experimental copy of a newspaper prepared specially for the study to a sample of 150 female heads of households: One subsample saw a paper with headlines in the women's section printed in Garamond Italic (a typeface experts had rated as feminine), while a second group saw the same page with Spartan Black headlines (considered to be a masculine typeface). A third group served as a control and saw only the headline copy typed on individual white cards. The subjects were asked to evaluate each article for reading interest. Additionally, each woman was shown a sample of 10 typefaces and asked to rate them on a semantic differential scale with 16 adjective pairs.

The researchers discovered that typeface had no impact on reader interest scores. In fact, the scores were about the same for the printed headlines as they were for those typed on white cards. Analysis of the typeface ratings revealed that readers were able to differentiate between typefaces; Garamond Italic was rated the second most feminine typeface, whereas Spartan Black was rated most masculine, thus confirming the judgment of the expert raters.

Studies of page layout have been used to help magazine editors make decisions about the mechanics of editing and makeup. Click and Baird (1993) provided a summary of the more pertinent research in this area. Some of their conclusions are listed here to illustrate the types of independent variables that have been studied:

- Large illustrations attract more readers than small ones.
- Unusually shaped pictures irritate readers.
- A small amount of text and a large picture on the opening pages of an article increase readership.
- Readers do not like to read type set in italics.
- For titles, readers prefer simple, familiar typefaces.
- Readers and graphic designers seldom agree about what constitutes superior type design.
- Roman type can be read more quickly than other typefaces.

Wanta and Gao (1994) performed a similar study of newspaper design elements that young readers found desirable. They found that their sample of high school students preferred newspapers that used pullout quotes, large graphics, and many small photographs. In a similar study, Wanta and Remy (1995) investigated the effects of design elements on recall with a sample of high school students. Information in pullout quotes was remembered best, whereas facts embedded in graphics were remembered the least.

The popularity of *USA Today*, with its ground-breaking illustrations and use of color, has prompted several studies. Two studies by Geraci (1984a, 1984b) compared the photographs, drawings, and other illustrations used by *USA Today* with those in traditional papers. Click and Stempel (1982) used seven front-page formats ranging from a modular page with a four-color halftone (the format favored by *USA Today*) to a traditional format with no color. Respondents were shown a slide of each page for 15 seconds and were asked to rate the page using 20 semantic differential scales. The results indicated that readers preferred modular pages and color.

More recent studies have continued along these same lines. Smith and Hajash (1988) performed a content analysis of the graphics used by 30 daily newspapers. They found that the average paper had 1 graphic per 17 pages compared to *USA Today's* average of 1.3 graphics per single page. The authors concluded that the impact of *USA Today* on other newspapers has not been overwhelming. Utt and Pasternack (1989) found that the influence of *USA Today* was more evident in the front-page design of American dailies. Most papers increased their front-page use of color, photos, and informational graphics. A follow-up study (Pasternack & Utt, 1995) confirmed that these trends were continuing.

The impact of graphics on reader understanding and comprehension has also been examined, and the studies have had fairly consistent results. Kelly (1989) found that embellished graphic presentations of data (as commonly used by *USA Today*) were no better than unembellished graphics in helping readers retain information. Ward (1992) investigated whether using a sidebar graphic illustration along with a news story aided comprehension. He found that bar charts, tables, and an adorned bar chart were less effective in aiding comprehension than a straight sidebar story that accompanied the main story. On the other hand, Griffin and Stevenson (1992) reported that background material presented in both text and graphic forms increased readers' understanding of a complex story. These same researchers also found that including geographic information, either in the text or with a map, raised comprehension scores on a news article (Griffin & Stevenson, 1994).

Page layout and design have become important topics for Internet websites. See "page layout" for more than 53,000 references on the topic.

## Readability Research

Simply defined, **readability** is the sum total of all the elements and their interactions that affect the success of a piece of printed material. Success is measured by the extent to which readers understand the piece, are able to read it at an optimal speed, and find it interesting (Dale & Chall, 1948).

Several formulas have been developed to determine objectively the readability of text. One of the best known is the **Flesch** (1948) **reading ease formula**, which requires the researcher to select systematically 100 words from the text, determine the total number of syllables in those words (*wl*), determine the average number of words per sentence (*sl*), and perform the following calculation:

$$\text{Reading ease} = 206.835 - 0.846wl - 1.015sl$$

The score is compared to a chart that provides a description of style (such as "very easy") or a school grade level for the potential audience. (*Microsoft Word* will automatically compute the Flesch reading ease value as well as the Flesch-Kincaid grade level.)

Another measure of readability is the **Fog Index**, which was developed by Gunning (1952). To compute the Fog Index, researchers must systematically select samples of 100 words each, determine the mean sentence length by dividing the number of words by the number of sentences, count the number of words with three or more syllables, add the mean sentence length to the number of words with three or more syllables, and multiply this sum by 0.4. Like the Flesch index, the Gunning formula suggests the educational level required for understanding a text. The chief advantages of the Fog Index are that the syllable count and the overall calculations are simpler to perform. (See the Internet for on-line calculation programs to compute the Fog Index.)

McLaughlin (1969) proposed a third readability index called **SMOG Grading** (for Simple Measure Of Gobbledygook). The SMOG Grading is quick and easy to calculate: The researcher merely selects 10 consecutive sentences near the beginning of the text, 10 from the middle, and 10 from the end, and then counts every word of three or more syllables and takes the square root of the total. The number thus obtained represents the reading grade that a person must have reached to understand the text. McLaughlin's index can be calculated quickly using a small, easily measured sample. Although the procedure is related to that for the Fog Index, it appears that the SMOG grade is generally lower.

Taylor (1953) developed yet another method for measuring readability called the **Cloze procedure.** This technique departs from the formulas described above in that it does not require an actual count of words or syllables. Instead, the researcher chooses a passage of about 250–300 words, deletes every fifth word from a random starting point and replaces it with a blank, gives the passage to subjects and asks them to fill the blanks with what they think are the correct words, and then counts the number of times the blanks are replaced with the correct words. The number of correct words or the percentage of correct replacement constitutes the readability score for that passage. The following paragraph is a sample of what a passage might look like after it has been prepared for the Cloze procedure:

> The main stronghold of the far left _____ to be large _____ centers of north Italy. _____ is significant, however, that _____ largest relative increase in _____ leftist vote occurred in _____ areas where most of _____ landless peasants live-in _____ and south Italy and Sicily and Sardinia. The _____ had concentrated much of efforts on winning the _____ of those peasants.

Nestvold (1972) found that Cloze procedure scores were highly correlated with readers' own evaluations of content difficulty. The Cloze procedure was also found to be a better predictor of evaluations than several other common readability tests. (See the Internet for "Cloze procedure" for many additional examples and discussions of the procedure.)

Finally, Mosenthal and Kirsch (1998) have developed the PMOSE/IKIRSCH readability formula expressly designed for assessing the complexity of documents. The formula takes into account such elements as lists, schedules, tables, and graphs in its estimation of readability.

Although they are not used extensively in print media research, readability studies can provide valuable information. For example, Fowler and Smith (1979), using samples from 1904, 1933, and 1965, found that text from magazines had remained constant in readability but that text from newspapers had fluctuated. For all the years studied, magazines were easier to read than newspapers. Hoskins (1973) analyzed the readability levels of Associated Press and United Press International wire copy and found that both services scored in the "difficult" range; the Flesch indexes indicated that a 13th- to 16th-grade education was necessary for comprehension. Smith (1984) found differences in readability among categories of newspaper content, with features and entertainment more readable than national-international or state and local news. Smith also noted that three popular readability formulas did not assign the same level of reading difficulty to his sample of stories. Porter and Stephens (1989) found that a sample of Utah managing editors consistently underestimated the Flesch readability scores of five different stories from five different papers. They also found that the common claim that reporters write front-page stories at an 8th-grade level was a myth. The hard news stories they analyzed were written at an average 12th-grade level. Catalano (1990) discovered that wire service lead paragraphs were written in the "difficult" to "very difficult" range of readability. More recently, McAdams (1992/1993) computed a Fog Index for 14 news stories that were then given to a sample of readers. Results suggest that a high Fog Index did not adversely affect readers who found a story to have high overall quality. Last, Bodle (1996) compared the readability levels of a sample of student newspapers with a sample of private sector papers and found that the private sector dailies had a higher score than the student papers.

## ▪ Print Media Research and the Internet

As of 1999, about 900 newspapers were publishing both traditional print and on-line versions. The total number of magazines on-line is harder to pin down. A recent issue of the *Net.Journal Directory* listed more than 10,000 magazines, newsletters, and journals available on-line. Since the on-line newspaper and magazine is a fairly recent phenomenon, most of the research is still at a rather basic level.

One group of studies is concerned with describing what types of newspapers have web sites, how their on-line version relates to the print version, and how they are trying to make a profit. For example, Harper (1996) collected the following information from his sample of newspapers on-line: (1) start date of on-line version, (2) number of on-line staffers, (3) the amount of print content duplicated by the digital version, and (4) the strategy for turning a profit on-line. He found that most on-line papers were started after 1994, had small staffs, and had no clear strategy for making a profit. Li (1998) analyzed the web page design of *USA Today*, the *New York Times,* and the *Washington Post.* He concluded that the papers gave more priority to text than graphics and that all provided a number of related links for readers to visit.

Another group of studies describes the audience for on-line magazines and newspapers and examines whether on-line newspaper and magazine reading cuts into the time spent with their print equivalents. A 1998 survey (Levins) estimated that 20 million people regularly go on-line for their news. On-line newspaper and magazine readership was associated with more education, higher income levels, and age (Stempel & Hargrove, 1996). Several studies have examined the media usage patterns of on-line newspaper and magazine readers and the results have been fairly consistent: On-line media usage seems to cut more into television viewing time than into print reading time. To illustrate, a 1997 survey by Scarborough Research (Consoli, 1997) found that most on-line usage occurred between 7 and 10 P.M., in the middle of TV's prime-time hours. The top on-line newspaper sites were those maintained by *USA Today,* the *New York Times,* the *Washington Post,* and *The Wall Street Journal.* Other data suggest that on-line users still rely heavily on print. A survey by the NPD group found that 99% of frequent on-line users reported that they often read print magazines or newspapers as well, and nine out of ten readers of both on-line and print newspapers rated the two comparable in terms of accuracy and reliability (Singer, 1997).

There is some evidence, however, that time spent with on-line media causes at least a slight decrease in time spent with the traditional print media. For example, an early study of electronic media users found that 18% of its respondents reported spending less time watching TV, while another 7% stated they spent less time reading print newspapers (Bromley & Bowles, 1995). Another study noted that although 26% of its sample of Internet users reported a decrease in TV viewing time, about 10% said they did less reading as a result of their on-line usage (Outing, 1998). Similarly, a survey by an industry market research company predicted that by the year 2001, newspaper and magazine readership will decrease by as much as 14% because of competition from the Internet (Levins, 1996).

Newspapers, both big and small, also collect data about their audiences on-line. The *Lewiston Tribune* (Maine) conducts an on-line survey that asks readers to provide feedback on the content of their digital edition. The *New York Times* and the *Los Angeles Times* require subscribers to their web versions to register in order to use their on-line editions, a process that lets the papers tabulate how many people subscribe and also allows the company to collect some useful marketing information such as zip code, age, gender, and occupation. There are some drawbacks to registration, however. The *New York Times* has about 1.2 million registered users, but some of them are probably people such as one of the authors who was forced to register again when he forgot his password and was counted twice. *The Wall Street Journal* tracks its readers by charging an annual fee to read the on-line edition. As a result, it probably undercounts its readers because some people share passwords. In addition, private companies offer proprietary reports about on-line readers. NewsLinks, for example, offers an annual report entitled "Tomorrow's News Today" that contains detailed information about readership and content of on-line publications.

Incidentally, there are more than 25,000 entries in a search for "Internet research" on the Internet.

## ▪ The Journalist As Researcher

Print media reporters and social scientists now have more in common with each other, thanks to several recent trends. One of these is precision journalism, a technique of inquiry in which social science research methods are used to gather the news. Popularized by reporter and researcher Philip Meyer in his book, *Precision Journalism* (1973), the method relies primarily on the procedures of content analysis and survey research to generate quantitative data that are reported as news stories. For example, the *Detroit News* content analyzed almost 36,000 drunk-driving conviction records and discovered that big-city judges gave more lenient penalties than rural judges. Similarly, the *Charlotte Observer* analyzed campaign finance reports and noted a link between voting patterns and contributions.

Precision journalism uses survey research to conduct polls designed to measure some aspect of public opinion. Many large newspapers such as *USA Today,* the *Washington Post,* and the *New York Times* regularly conduct public opinion polls on topics ranging from voting choices to attitudes about the environment. Other papers may sponsor a poll on a special topic to highlight a story. The *Dallas Times Herald,* for example, polled more than 1,200 passenger airline pilots as part of a series on the safety of air travel. Their survey noted that two-thirds of the pilots felt the skies were less safe now that the industry was deregulated.

There are, however, disadvantages connected with precision journalism. First, lengthy content analyses and surveys take time and effort. Many of today's newspapers, faced with declining profits, may not be able to spare the people and the hours necessary to do precision journalism. Second, precision journalism can be costly. Telephone bills, copying, computer software, and other supplies make this type of journalism more expensive than the usual reporting technique.

Nonetheless, the popularity of precision journalism suggests that competent journalists need a basic knowledge of social science techniques. To be specific, precision journalism requires knowledge of measurement, research techniques, questionnaire design, sampling, sampling error, statistics, and data presentation. Demers and Nichols (1987) and DeFleur (1997) present practical guides for journalists interested in this area, and consult the Internet for more than 220 references to "precision journalism."

A second trend is known as **database journalism**. Pioneered by reporter Elliot Jaspin, this form of reporting relies on computer-assisted analysis of existing information files, an approach that has been accepted at many newspapers. Jaspin, for example, researching a story on school bus safety, studied computerized records of traffic citations over a 3-year period and found that many bus drivers had frightful driving records. *Quill* magazine published an extensive article on the Social Security system using computer-assisted analysis of several large databases (Feola, 1998).

The popularity and acceptance of database journalism are growing. From 1990 to 1996, at least one story involving database journalism received a Pulitzer prize (Ciotta, 1996). A new professional organization, the National Institute for Computer-Assisted Reporting, has been formed as a joint program between journalists and the University of Missouri School of Journalism. (See the Internet for nearly 100 references for "database journalism.")

Yet a third trend has to do with using the Internet as a tool for research. Much like social scientists, journalists are turning more often to the Internet to gather material for their reporting. Journalists search for earlier stories on their topic, much like doing a literature review for a research project; find related information, much like analyzing secondary data; and draw conclusions from database analyses, much like a researcher accepting or rejecting a hypothesis. Many useful sites exist to help journalists and social scientists in their research. AJR NewsLink *(http://www.newslink.org)* is a collection of many links that are most relevant to reporters. NetMedia *(http://editors-service.com)* is a guide to on-line research, which lists collections of articles describing information resources on topics that are more specific. Newspaper Archives on the web provides links to web versions of more than 60 newspapers and their full-text, on-line back files. For more information, go to the website titled *http://sunsite.unc.edu/slanews/internet/archives.*

## ▪ ▪ ▪ Summary

Magazine and newspaper research began in the 1920s and for much of its early existence was qualitative in nature. Typical research studies dealt with law, history, and international press comparisons. During the 1930s and 1940s, readership surveys and studies of the effectiveness of print media advertising were frequently done by private firms. By the 1950s, quantitative research techniques became common in print media research. The continuing competition between television and radio for advertisers and audiences during the past three decades has spurred the growth of private sector research. Professional associations have started their own research operations.

Research in the print media encompasses readership studies, circulation studies, management studies, typography and makeup studies, and readability studies. Readership research is the most extensive area; it serves to determine who reads a publication, what items are read, and what gratifications the readers get from their choices. Circulation studies examine the penetration levels of newspapers and magazines in various markets as well as various aspects of the delivery and pricing systems. Management studies look at goal setting and at job satisfaction. Typography and makeup are studied to determine the impact of different newspaper and magazine design elements on readership and item preferences. Readability studies investigate the textual elements that affect comprehension of a message. A more recent research area examines newspapers and magazines on the Internet and their readers. Precision journalism, database journalism, and the use of the Internet as an aid in research are three emerging trends that highlight the importance of journalists' understanding of social science research.

### Questions and Problems for Further Investigation

1. Assume that you are the editor of an afternoon newspaper faced with a declining circulation. What types of research projects could you conduct to help increase your readership?
2. Now suppose you have decided to publish a new magazine about women's sports. What types of research could you conduct before starting publication? Why?
3. Conduct a pilot uses and gratifications study of 15–20 people to determine why they read the local daily newspaper.
4. Using any five pages from this chapter as a sample, calculate the Flesch reading ease formula, the Gunning Fog Index, and McLaughlin's SMOG Grading.
5. Make a catalog of existing web sites that are relevant to a local newspaper reporter. Now make a list of sites that are of interest to a social scientist. Are there any similarities?
6. If you are using *InfoTrac College Edition,* do a key word search on "newspaper readership" for articles that examine the problem of declining readership.

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Chapter 15

# Research in the Electronic Media

- *Background*
- *Ratings Research*
- *Nonratings Research*
- *Summary*
- *Questions and Problems for Further Investigation*
- *References and Suggested Readings*

Research in the electronic media continues to grow rapidly. As each day passes, more successful companies are following a similar philosophy: *Find out what people want and give it to them.* In this case, "people" are viewers and listeners; the people who find things out are researchers. And what researchers find is important to broadcasters. Consider the comments from Phil LoCascio (1998), program director of WARW-FM in Washington, D.C.:

> Research is the *only* way to find out about a target audience and what they want from a station. Research helps us determine when we must adjust our business to meet new demands. This is important because changes in broadcasting can happen in a matter of minutes. We have no factories to re-tool and no raw materials to order and we must have accurate information very quickly.
>
> The ratings winners in broadcasting use high-quality research and accurately analyze the data. There are stations that conduct research yet lose in the ratings because they have either used inferior research information or have come to the wrong conclusions. In broadcasting, there is no replacement for quality research information.

Researchers in the electronic media reside in many areas: professional companies, colleges and universities, and in-house research departments in most radio, television, and cable operations, as well as the networks. Broadcasting and cable research is a multimillion-dollar business. Electronic media research continually changes due to advancements in technology as well as improved research methodologies. This chapter introduces some of the more widely used research procedures in this area.

## ■ Background

Broadcast research has developed rapidly in sophistication and volume since its beginnings in the 1920s. In the early years of broadcasting, the broadcasters were experimenters and hobbyists who were interested mainly in making sure that their signal was being sent and received. The potential popularity of radio was unknown, and there was no reason to be concerned with audience size at that time. (Search the Internet for "radio history.")

This situation changed rapidly during the 1930s as radio became a popular mass medium. When broadcast stations began to attract large audiences, concern emerged over how radio would be financed. Eventually it was decided that advertising (as opposed to government financing or taxes on sales of equipment) was the most viable alternative. The acceptance of advertising on radio was the first step in the use of electronic media research.

Advertisers, not broadcasters, were the initiators of broadcast research. Once commercials began to be heard on the air, advertisers naturally wondered how many listeners were exposed to their messages and just how effective the messages were. Broadcasters were thus compelled to provide empirical evidence of the size and characteristics of their audience. This situation still exists—advertisers continually want more information about the people who hear and see their commercial announcements.

In addition to information about audience size, advertisers became interested in why people behave the way they do. This led to the development of the research area known as psychographics. But because psychographic data are rather vague, they were not adequate predictors of audience behavior; advertisers wanted more information. Research procedures were then designed to study lifestyle patterns and how they affect media use and buying behavior. Such information is valuable in designing advertising campaigns: If advertisers understand the lifestyle patterns of the people who purchase their products, they can design commercials to match those lifestyles. (See the Internet for more than 2,000 references for "psychographics.")

Electronic media research studies today fall into two main categories: ratings and nonratings research. The remainder of this chapter is devoted to a discussion of these two areas.

## ▪ Ratings Research

When radio first became popular and advertisers began to grasp its potential for attracting customers, they were faced with the problem of documenting audience size. The print media were able to provide circulation figures, but broadcasters had no equivalent "hard" information—merely estimates. The early attempts at audience measurement failed to provide adequate data. Volunteer mail from listeners was the first source of data, but it is a well-known axiom of research that volunteers do not necessarily represent the general audience. Advertisers and broadcasters quickly realized that more information was urgently needed.

Since 1930, when a group called the Cooperative Analysis of Broadcasting conducted one of the first audience surveys for radio, several individuals and companies have attempted to provide syndicated audience information. The bulk of syndicated information for radio and television stations and cable is provided by two companies: A. C. Nielsen for local market and network TV and cable TV, and The Arbitron Company for local market radio. The country is divided into more than 200 markets, and no city is included in more than one market. In most markets, the Arbitron and Nielsen companies provide ratings data throughout the year (called *continuous measurement*), not just during certain times of the year.

The A. C. Nielsen Company (see *www.acnielsen.com* and *www.nielsenmedia.com*), founded in 1945, is a subsidiary of Dun & Bradstreet, with corporate headquarters in Northbrook, Illinois. Nielsen is one of the world's largest market research companies, and its television and cable ratings account for only a portion of its business even though the company's television measurements are conducted in eight foreign countries. The American Research Bureau (ARB) was founded in 1949. The name of the company was changed to The Arbitron Company in 1972, then to The Arbitron Ratings Company in 1982, and back to The Arbitron Company in 1989 (see *www.arbitron.com*). Arbitron is a subsidiary of the Ceridian Corporation (*www.ceridian.com*) and has headquarters in Laurel, Maryland. For more information about the history of broadcast ratings, see Beville (1988).

The Nielsen Company produces several television ratings reports. *Viewers in Profile* are the basic market-by-market reports published under the category of *National Station Index* (NSI) estimates, which first appeared in 1954. These reports are produced from three to seven times per year, depending on the market, and are based on data collected by diaries (called the *National Audience Composition*, or NAC) and electronic meters. The data from these two collection procedures are combined to develop the ratings reports. The *National Television Index* (NTI), which was first produced in 1950, provides audience estimates for network television programs. Nielsen also publishes a summary of network audience estimates in a publication called *The Pocketpiece*. The *National Audience Demographics Report* (NAD) includes household and person estimates for various market segments (counties, households, and so on). See the A. C. Nielsen web site for current information about the company's products.

The Nielsen Company also produces a variety of specialized ratings reports such as measurements for cable services and for Turner Broadcasting's Airport Channel, and other out-of-home viewing measurements. It produces a Hispanic television measurement service; begun in the fall of 1992, this is a people meter measurement system. (See Nielsen's *Media News* for up-to-date information.) Nielsen conducts national audience surveys four times a year, simultaneously surveying all of the 210 television markets.

These ratings periods—February, May, July, and November—are called **sweeps** and are the year's most important surveys. Although other surveys are conducted throughout the year, most advertising rates set by networks and local stations are based on Nielsen's four "books." Blockbuster movies and special programs are aired during these four ratings periods because of the importance broadcast and cable executives place on the sweeps. The goal is to get the highest audience numbers possible.

Nielsen also has 12 markets that use electronic people meters for data collection and another 44 markets using a different electronic meter system for local TV station information. The metered data are used for NTI and NSI reports but also for **overnights**, which are preliminary ratings data gathered to give network and station executives, program producers, advertising agencies, and others an indication of the performance of the previous night's programs. Because the sample sizes involved in overnights are small, the actual ratings for the programs do not appear until several days later, when an additional sample is added to increase statistical reliability.

For several years, The Arbitron Company provided ratings for local market radio and television; however, it stopped producing television ratings in 1995. Currently, Arbitron produces only radio ratings by collecting information via diaries for its four major books—Winter, Spring, Summer, and Fall. The only network radio ratings are gathered by Statistical Research, Inc., which is hired by networks to produce a RADAR report (Radio's All-Dimension Audience Research). Birch Radio used to collect radio information via telephone interviews.

Broadcast ratings create controversy in many areas. TV viewers complain that "good" shows are canceled; radio listeners complain that their favorite station's format is changed; producers, actors, and other artists complain that numbers are no judge of artistic quality (they are not intended to be); radio and television station owners and operators complain that the results are not reliable; and advertisers balk at the lack of reliable information. Although there may be merit to these complaints, one basic fact remains: Until further refinements are made, ratings as they currently exist will remain the primary decision-making tool in programming and advertising.

Since ratings will continue to be used for some time, it is important to understand some basic points about them. First, ratings are only approximations or estimates of audience size. They do not measure either the quality of programs or opinions about the programs. Second, not all ratings are equally dependable: Different companies produce different ratings figures for the same market during the same time period. (See *www.*

*nielsenmedia.com/wtrrm.html* for an article entitled "What the ratings really mean.")

The important point to remember when discussing or using ratings is that the figures are riddled with error. The data must be interpreted in light of several limitations (which are always printed in the last few pages of every ratings book). Individuals who depend on ratings as though they were facts are misusing the data.

For several reports available to the public and additional information about A. C. Nielsen and Arbitron, visit *www.nielsen-media.com* and *www.arbitron.com.*

## Ratings Methodology

The research methodologies used by Arbitron and Nielsen are complex; each company publishes several texts describing its methods and procedures that should be consulted for specific information (listed in the references at the end of this chapter). The data for ratings surveys are currently gathered by two methods: diaries and electronic meters (commonly called *people meters*). Each method has its own advantages and disadvantages. (Search the Internet for more than 500 references for "people meters.")

Broadcast ratings provide a classic example of the need to sample the population. With about 99 million households in the United States, it would be impossible for any ratings company to conduct a census of media use. The companies naturally resort to sampling to produce data that can be generalized to the population. For example, Nielsen's national samples are selected using national census data and involve multistage area probability sampling that ensures that the sample reflects actual population distributions. That is, if Los Angeles accounts for 10% of the television households in the United States, Los Angeles households should comprise 10% of the sample as well. Nielsen uses four stages in sampling: selection of counties in the country, selection of block groups within the counties, selection of certain blocks within the groups, and selection of individual households within the blocks. Nielsen claims that about 20% of the households in the NTI-metered sample of approximately 5,000 households are replaced each year (Nielsen, 1992b).

To obtain samples for producing broadcast listening and viewing estimates, Arbitron and Nielsen use recruitment by telephone, which includes calls to both listed and unlisted telephone numbers. Although all the ratings companies begin sample selection from telephone directories, each firm uses a statistical procedure to ensure that unlisted telephone numbers are included. This eliminates the bias that would be created if only people or households listed in telephone directories were asked to participate in broadcast audience estimates (see Chapter 5). Nielsen calls its procedure a Total Telephone Frame; Arbitron uses Expanded Sample Frame.

Target sample sizes for local audience measurements vary from market to market. Each ratings service uses a formula to establish a minimum sample size required for a specific level of statistical efficiency, but there is no guarantee that this number of subjects will actually be produced. Although many people may agree to participate in an audience survey, there is no way to force them all to complete the diaries they are given or to use electronic meters accurately. Additionally, completed diaries are often rejected because they are illegible or obviously inaccurate. The companies are often lucky to get a 50% response rate in their local market measurements.

In addition, since participation by minority groups in audience surveys is generally lower than for the remainder of the population, the companies make an extra effort to collect data from these groups by contacting households by telephone or in person to assist them in completing the diary. [These methods are generally used in high-density

Hispanic (HDHA) and high-density African-American areas (HDBA); otherwise, return rates could be too low to provide any type of audience estimates.] When the return (or in-tab) rate is low, statistical weighting or sample balancing is used to compensate for the shortfall. This topic is discussed later.

Perhaps the best known method of gathering ratings data from a sample is by means of electronic ratings-gathering instruments, in particular the Nielsen *audimeter,* which was introduced in 1936 to record radio use on a moving roll of paper. (A. C. Nielsen purchased the audimeter from Robert Elder and Louis Woodruff, professors at the Massachusetts Institute of Technology.) Today's audimeter, the storage instantaneous audimeter (SIA), is a sophisticated device that automatically records the time each set in a household is turned on or off, the broadcasting station, the amount of time each set stays on a channel, and the channel switchings. Every day each household in the NTI sample is called by the central computer, located in Dunedin, Florida, which retrieves the stored data and stores them for computation of the National Television Index. All data collection is done automatically and does not require participation by persons in the NTI households.

For the second major form of data collection, subjects are asked to record in diaries the channels they watch or the stations they listen to, the time periods, and the number of people viewing or listening to each program or daypart, a segment of the broadcast day such as "prime time" (8:00 P.M.–11:00 P.M. EST). Arbitron uses diaries for radio; Nielsen uses diaries for the households in its NAC sample to supplement the information gathered from the SIA households because the audimeter cannot record the number of people who are watching each television set. An example of an Arbitron radio diary instruction page is shown in Figure 15.1. A Nielsen television diary is shown in Figure 15.2.

The third major technique used to collect data is by telephone. The only company that currently uses the telephone methodology for ratings is AccuTrack, produced by Strategic Media Research, located in Chicago (see *www.strategicmediaresearch.com*). AccuTrack offers ratings, radio station advertising awareness, and station image questions and is currently in about 40 markets in the United States.

Nielsen and Arbitron use the telephone to conduct a variety of special studies, which allows clients to request almost any type of survey research project. One of the most frequent types of custom work is the telephone **coincidental**. This procedure measures the size of the medium's audience at a given time; the survey coincides with actual viewing or listening. The method involves selecting a sample of households at random and calling these numbers during the viewing or listening period of interest. Individuals are simply asked what they are watching or listening to at that moment. This method avoids having respondents try to recall information from the previous day. Coincidentals are fairly inexpensive (generally a few thousand dollars) and are frequently used by station management to receive immediate feedback about the success of special programming. In most cases, coincidental data are used for advertising sales purposes.

The fourth method of ratings data collection, **people meters**, was started in the mid-1980s by A. C. Nielsen to attempt to improve the accuracy of ratings information and to obtain "single-source data," whereby research companies collect television ratings data, demographic data, and even household member purchasing behavior at the same time. (See *www.nielsenmedia.com/wtrrm.html* for an excellent discussion of the people meter.)

Traditional television meters indicate only whether the television set is on or off and the channel to which the set is tuned;

Figure 15.1 Arbitron Radio Diary Instruction Page

# You count in the radio ratings!

**No matter how much or how little you listen, you're important!**
You're one of the few people picked in your area to have the chance to tell radio stations what you listen to.
This is *your* ratings diary. Please make sure you fill it out yourself.

**Here's what we mean by "listening":**
"Listening" is any time you can hear a radio – whether you choose the station or not.
When you hear a radio between Thursday, July 23, and Wednesday, July 29, write it down – whether you're at home, in a car, at work or someplace else.

## When you hear a radio, write down:

**TIME**

**Write the time you start listening and the time you stop.** If you start at one time of day and stop in another, draw a line from the time you start to the time you stop.

**STATION**

**Write the call letters or station name.** If you don't know either, write down the program name or dial setting.
**Check AM or FM.** AM and FM stations can have the same call letters. Make sure you check the right box.

**PLACE**

**Check where you listen:**
- at home
- in a car
- at work
- other place

Write down *all* the radio you hear. Carry your diary with you starting **Thursday, July 23.**

**No listening?** If you haven't heard a radio all day, check the box at the bottom of the page.

Sample diary (THURSDAY — Time / Station / Place):
- Early Morning: 5 45 – 7 15 KGTU; 7 15 – 7 40 105.5 on the dial; 9 30 – 3 00 WGXP
- Late Afternoon: 4 20 – 4 25 Jo Convery Show
- Night: 11 30 – 12 15 KEM

If you didn't hear a radio today, please check here. ☐

**Questions?** Call us toll-free at 1-800-638-7091.



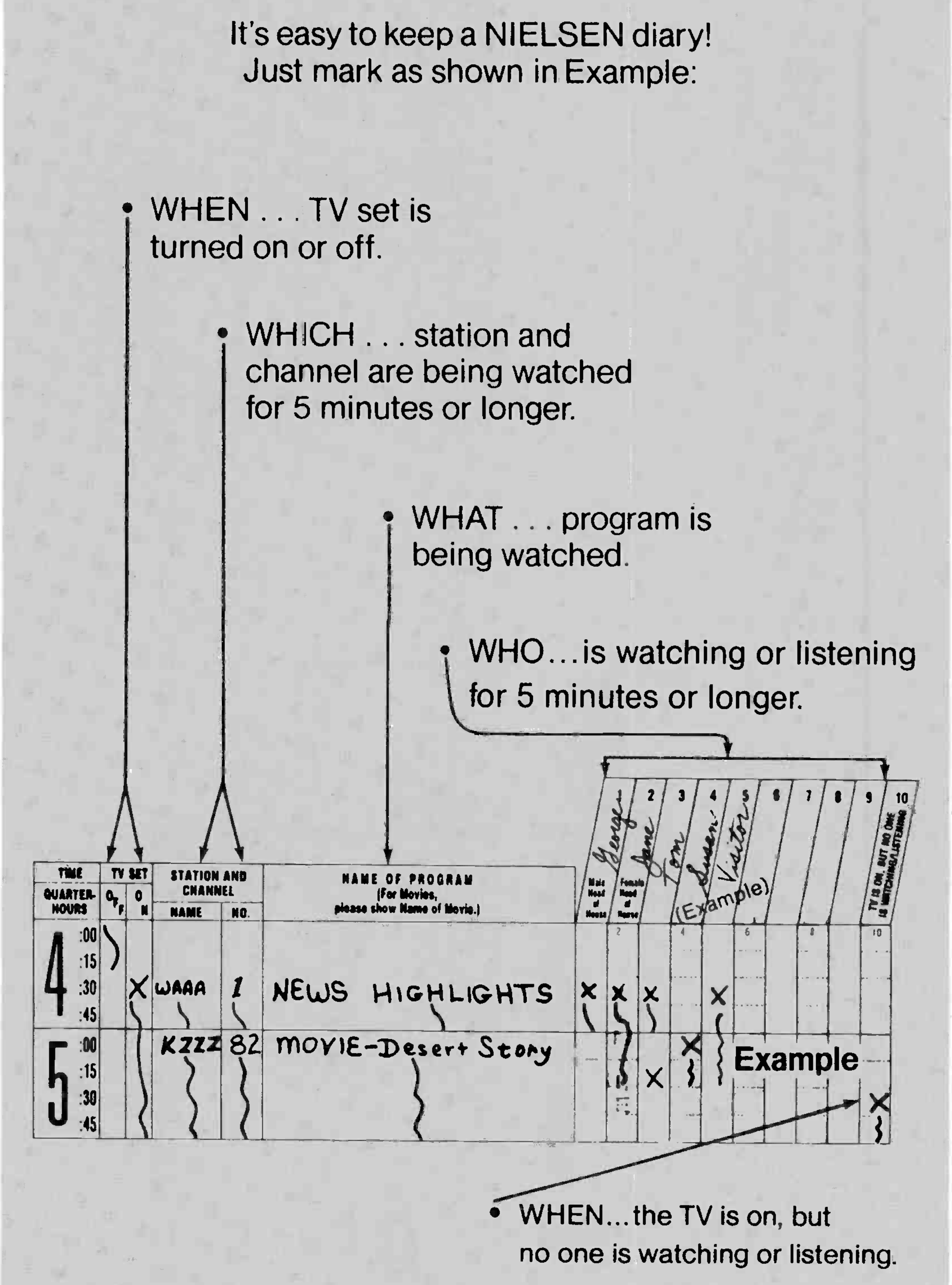
# THURSDAY

| | Time | | Station | | | Place | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Start | Stop | Call letters or station name. *Don't know? Use program name or dial setting.* | AM | FM | At Home | In a Car | At Work | Other Place |
| Early Morning (from 5 AM) | | | | | | | | | |
| Midday | | | | | | | | | |
| Late Afternoon | | | | | | | | | |
| Night (to 5 AM Friday) | | | | | | | | | |

(Check (✓) one)

If you didn't hear a radio today, please check here. ☐

Figure 15.2 *Nielsen TV Ratings Diary Instruction Page*



there are no data about who is watching. Such information must be obtained by pooling TV meter data with information from households in the diary samples. People meters attempt to simplify this data collection task by requiring each person in the household, as well as all visitors, to push a specific button on a mechanical unit that records the viewing. Each person in the home is assigned a button on the meter. The meter instantaneously records information about how many people in the household are watching and the identity of each viewer. The data from each night's viewing are collected via computer. This specific information is valuable for advertisers and their agencies, who now can more accurately target their advertising messages.

Nielsen is convinced that using people meters is the way to obtain accurate television ratings information. The company's interest in people meters was spawned in 1987, when Audits of Great Britain (AGB) introduced the meters to the United States. AGB pulled out of the U.S. people meter service in 1988, however, leaving only Nielsen to develop a universally accepted system of single-source data collection. In 1991, when Arbitron was involved in television ratings, it tried to expand the concept of single-source data with a system called ScanAmerica. The plan was to collect purchasing data and network television viewing information from the same household. ScanAmerica was unsuccessful and was discontinued in late 1992.

In theory, people meters are quite simple: When a person begins or stops watching television, he or she pushes a button to document the behavior. The button may be located on a hand-held device or enclosed in a small box mounted on top of the television set. However, theory and reality are often misaligned. In late 1989, a survey funded by ABC, CBS, and NBC found that people meters "turned off" participants, especially with children's programming on Saturday mornings. Additional criticisms about low television viewing numbers produced by the people meters continue in the mid-1990s.

The major problem with people meters is that participants tire of pushing buttons to record when they watch television, and children cannot be depended upon to push the proper buttons when they turn on the set. The reality is that television ratings produced by people meters are lower than those produced by meters and diaries. Broadcasters and advertisers are concerned. Broadcasters claim the data underestimate actual viewing; advertisers claim the data are probably correct and they are paying too much money (CPM) for their commercials.

Each of the audience-estimate procedures has its critics—simple electronic meters because they do not provide specific audience information, and diaries because participants may fail to record viewing or listening as it happens and may rely on recall to complete the diary at the end of the week. In addition, many critics contend that diaries are used to "vote" for or against specific shows and that actual viewing is not recorded. Critics of data collection by telephone say that the method favors responses by younger people who are more willing to talk on the telephone; older respondents generally do not have the patience to answer the questions about their viewing or listening habits. Finally, people meters are condemned because of participant fatigue and a failure by many participants (especially children) to remember to push the required buttons when they watch television.

One thing is certain: Debate about the accuracy of the various audience ratings methods will continue. Research companies, including Arbitron and Nielsen, will be forced to try to develop more valid and reliable research procedures. The next phase of ratings development will take the form of an electronic storage system for radio ratings. This is considered necessary by some researchers to eliminate the problems inherent in the hand-entry paper diaries used by Arbitron and Nielsen.

Several web sites provide a wealth of information about radio and television ratings and their impact. For example, see *www.variety.com* and *www.adage.com*.

### Interpreting the Ratings

The ratings interpretation process and its terminology can best be explained by an example. (This example uses television networks, but the procedures are the same for radio ratings. In addition, the example has been simplified by using only three commercial television networks; local market ratings books include many more stations.) Let's assume that Nielsen has collected the following data for a certain daypart on "traditional" network television:

| Network | Households viewing |
|---|---|
| ABC | 1,100 |
| CBS | 1,000 |
| NBC | 895 |
| Not watching | 2,005 |
| Total | 5,000 |

Recall that Nielsen's NTI sample includes about 5,000 households in the United States, and the data collected from them are generalized to the *total* population of about 99.4 million television households. The first number to compute is the rating for each network.

**Rating.** An audience rating is the percentage of people or households in a population with a television or radio tuned to a specific station, channel, or network. Thus the rating is expressed as the station or network's audience divided by the total number of television households or people in the target population:

$$\frac{\text{People or households}}{\text{Population}} = \text{Rating}$$

For example, ABC's rating using the hypothetical data is computed as

$$\frac{1{,}100}{5{,}000} = 0.22, \text{ or } 22\%$$

This indicates that approximately 22% of the sample of 5,000 households were tuned to ABC at the time of the survey. (Note that even though ratings and related statistical values are percentages, when the data are reported, the decimal points are eliminated to ease reading.)

The combined ratings of all the networks or stations during a specific time period provide an estimate of the total number of *homes using television* (HUT). Since radio ratings deal with persons rather than households, the term *persons using radio* (PUR) is used. The HUT or PUR can be found either by adding together the households or persons using radio or television or by computing the total rating and multiplying that times the sample (or population when generalized). The total rating in the sample data is 59.9, which is computed as follows:

$$\text{ABC} \quad \frac{1{,}100}{5{,}000} = 0.22, \text{ or } 22\%$$

$$\text{CBS} \quad \frac{1{,}000}{5{,}000} = 0.20, \text{ or } 20\%$$

$$\text{NBC} \quad \frac{895}{5{,}000} = 0.179, \text{ or } 17.9\%$$

$$\text{HUT} = 2{,}995 \qquad \text{Total rating} = 59.9\%$$

In other words, about 59.9% of all households (HH) with television were watching one of the three networks at the time of the survey. As mentioned, the HUT can also be computed by multiplying the total rating times the sample size: $0.599 \times 5{,}000 = 2{,}995$. The same formula is used to project to the population. The population HUT is computed as $0.599 \times 99.4$ million = 59,540,600.

| Network | Rating | × | Population | = | Population HH estimate |
|---|---|---|---|---|---|
| ABC | .220 | × | 99.4 million | = | 21,868,000 |
| CBS | .200 | × | 99.4 million | = | 19,880,000 |
| NBC | .179 | × | 99.4 million | = | 17,792,600 |

| Network share | × | HUT | = | Population HH exact | Rough Estimate |
|---|---|---|---|---|---|
| ABC: 36.7 | × | 59,540,600 | | 21,851,400 | 21,868,000 |
| CBS: 33.4 | × | 59,540,600 | | 19,886,560 | 19,880,000 |
| NBC: 29.9 | × | 59,540,600 | | 17,802,639 | 17,792,600 |
| | | | | 59,540,599 | 59,540,600 |

Stations, networks, and advertisers naturally wish to know the estimated number of households in the HUT tuned to specific channels. The data from the sample of 5,000 households are again generalized to find a rough estimate of the households viewing each network (or station).

***Share.*** A share of the audience is the percentage of the HUT or PUR that is tuned to a specific station, channel, or network. It is determined by dividing the number of households or persons tuned to a station or network by the number of households or persons using their sets:

$$\frac{\text{People or households}}{\text{HUT or PUR}} = \text{Share}$$

In the example, the sample HUT is 2,995 (1,100 + 1,000 + 895), or 59.9% of 5,000. The audience share for ABC would thus be

$$\frac{1{,}100}{2{,}995} = 0.367, \text{ or } 36.7\%$$

That is, of the households in the sample whose television sets were turned on at the time of the survey, 36.7% were tuned to ABC. (People may not have been watching the set but recorded that they did.) The shares for CBS and NBC are computed in the same manner: CBS share = 1,000/2,995, or 33.4%; NBC share = 895/2,995, or 29.9%.

Shares are also used to estimate the number of households in the target population. The preceding example demonstrating how to compute households is considered a rough estimate. There is often need for a more exact method. This is achieved by multiplying the share times the HUT or PUR. The exact household estimates for each network are shown in the accompanying box (rough estimates are for comparison).

***Cost Per Thousand (CPM).*** Stations, networks, and advertisers need to be able to assess the efficiency of advertising on radio and television so that they can determine which advertising buy is the most cost effective. One common way to express advertising efficiency is in cost per thousand (CPM), or what it costs an advertiser to reach 1,000 households or persons. The CPM provides no information about the effectiveness of a commercial message, only a dollar estimate of its reach. It is computed according to the following formula:

$$\text{CPM} = \frac{\text{Cost of advertisement}}{\text{Audience size (in thousands)}}$$

With the hypothetical television survey, assume that a single 30-second commercial on ABC costs $275,000. The CPM for such a commercial is

$$\text{ABC CPM} = \frac{\$275{,}000}{21{,}868(000)} = \$12.57$$

Computing the CPM in the same manner for CBS and NBC, we find CBS = $13.83 and NBC = $15.47.

The CPM is used regularly when advertisers buy commercial time. Advertisers and stations or networks often negotiate an advertising contract using CPM figures; the advertiser might agree to pay $11.50 per thousand households. In some cases, no negotiation is involved; a station or network simply offers a program to advertisers at a specified CPM.

The CPM is seldom the only criterion used in purchasing commercial time. Other information, such as audience demographics and the type of program on which the advertisement will be aired, is considered before a contract is signed. An advertiser may be willing to pay a higher CPM to a network or station that is reaching an audience that is more desirable for its product. Cost per thousand should be used as the sole purchasing criterion only when all else is equal: demographics, programming, advertising strategy, and so on. Search the Internet for numerous interesting articles and examples of "cost per thousand."

## Related Ratings Concepts

Although ratings and shares are important in audience research, a number of other computations can be performed with the data. In addition, ratings, shares, and other figures are computed for a variety of survey areas and are split into several demographic categories. For an additional fee, ratings companies also provide custom information such as ratings according to zip codes.

A metro survey area (MSA) generally corresponds to the Consolidated Metropolitan Statistical Areas (CMSA) for the country, as defined by the U.S. Office of Management and Budget. The MSA generally includes the town, the county, or some other designated area closest to the station's transmitter. The designated market area (DMA), another area for which ratings data are gathered, defines each television or radio market in exclusive terms. (At one time Arbitron used the term *area of dominant influence*, or ADI, to describe the DMA, but has since changed to Nielsen's designation.) Each county in the United States belongs to one and only one DMA, and rankings are determined by the number of television households in the DMA. Radio ratings use the DMAs established from television households; they are not computed separately.

The total survey area (TSA) includes the DMA and MSA as well as some other areas the market's stations reach (known as *adjacent DMAs*). Broadcasters are most interested in TSA data because they represent the largest number of households or persons. In reality, however, advertising agencies look at DMA figures when purchasing commercial time for television stations, and MSA figures when purchasing radio time. The TSA is used infrequently in the sale or purchase of advertising time; it serves primarily to determine the reach of the station, or the total number of people or households that listened to or watched a station or a channel. Nielsen's equivalent to Arbitron's TSA is the *NSI area*.

Ratings books contain information about the TSA/NSI, DMA, and MSA. Each area is important to stations and advertisers for various reasons, depending on the type of product or service being advertised and the goals

Table 15.1 *Calculation of GRP for Five Dayparts*

| Daypart | Number of spots | | Station rating | | GRP (%) |
|---|---|---|---|---|---|
| M–F, 6 A.M.–9 A.M. | 2 | × | 3.1 | = | 6.2 |
| M–F, 12 P.M.–3 P.M. | 2 | × | 2.9 | = | 5.8 |
| M–F, 1 P.M.–6 P.M. | 2 | × | 3.6 | = | 7.2 |
| Sat, 6 A.M.–9 A.M. | 2 | × | 2.5 | = | 5.0 |
| Sun, 3 P.M.–6 P.M. | 2 | × | 4.1 | = | 8.2 |
| | 10 | | | | 32.4 |

of the advertising campaign. For instance, a new business that places a large number of spots on several local stations may be interested in reaching as many people in the area as possible. In this case, the advertising agency or individual client may ask for TSA/NSI numbers only, disregarding the DMA and metro data.

The average **quarter-hour** (AQH) is an estimate of the number of persons or households tuned to a specific station for at least 5 minutes during a 15-minute time segment. These estimates are provided for the TSA/NSI, DMA, and MSA in all ratings books. Stations are obviously interested in obtaining high AQH figures in all demographic areas because these figures indicate how long an audience is tuned in, and thus how loyal the audience is to the station. The AQH data are used to determine the average listener's **time spent listening** (TSL) during a given day or daypart. All stations try to increase their audience TSL because it means that the audience is not continually switching to other stations. (See the Internet for hundreds of references for "average quarter hour" and "time spent listening.")

The **cume** (cumulative audience) or **reach** is an estimate of the number of persons who listened to or viewed at least 5 minutes within a given daypart. The cume is also referred to as the "unduplicated audience." For example, a person who watches a soap opera at least 5 minutes a day Monday through Friday would be counted only once in a cume rating, whereas his or her viewing would be "duplicated" five times in determining average quarter-hours.

The **gross rating points** (GRPs) are a total of a station's ratings during two or more dayparts and represent the size of the gross audience. Advertising purchases are often made based on GRPs. For example, a radio advertiser who purchases 10 commercials on a station may wish to know the gross audience he or she will reach. Using hypothetical data, we can calculate the GRP as shown in Table 15.1. The gross rating point indicates that about 32.4% of the listening audience will be exposed to the 10 commercials. (An Internet search for "gross rating point" provides hundreds of examples of how the term is used in the industry.)

A useful figure for radio stations is the **audience turnover**, or the number of times the audience changes during a given daypart. A high turnover is not always a negative factor in advertising sales; some stations have naturally high turnover (such as "Top 40" stations, whose audiences comprise mostly younger people who tend to change stations frequently). A high turnover simply means that an advertiser needs to run more spots to reach

Table 15.2 *Computation of Turnover for Three Stations*

| Station | Cume audience | | Average persons | | Turnover |
|---|---|---|---|---|---|
| A | 2,900 | ÷ | 850 | = | 3.4 |
| B | 1,750 | ÷ | 850 | = | 3.4 |
| C | 960 | ÷ | 190 | = | 5.1 |

the station's audience. Usually such stations compensate by charging less for commercial spots than stations with low turnovers.

Turnover is computed by dividing a station's cume audience by its average persons total. (Both these figures are reported in ratings books.) Consider three stations in the Monday–Friday, 3:00–6:00 P.M. daypart, as shown in Table 15.2. In this market, an advertiser on Station C would need to run more commercials to reach all listeners than one who uses Station A. However, Station C, in addition to having a smaller audience, may have the demographic audience most suitable for the advertiser's product.

## *Reading a Ratings Book*

Reading a radio or TV ratings book is relatively simple. As mentioned earlier, all decimal points are deleted and all numbers are rounded. A sample page from Nielsen's May 1998 Denver NSI ratings book is shown in Figure 15.3. The page is taken from the "Program Averages" section of the book. Only a portion of this page is shown because the numbers in the actual book are very small. The page shows the 5:00 P.M. time period. On page 1 of the report, Nielsen states that the DMA audience estimates were based on an average in-tab sample of 363 DMA television households in which meter equipment provided information matching Nielsen's reporting standards.

We will use KCNC-TV to describe how to read the data. (Incidentally, to see how TV stations are using the Internet, see KCNC's web site at *www.kcncnews4.com*.) First, notice that each column is numbered, beginning with columns 1 and 2 at the left under "Metro HH." During the 4-week rating period, KCNC aired "News 4 at 5." The "AV5" line shows the average rating and share information for "News 4 at 5" during the 4 weeks: Columns 1 and 2 show the average metro rating and share as 8 and 19; the DMA multiweek averages for the program are listed as a 6 rating and a 15 share.

Columns 3–6 show the DMA ratings for each of the 4 weeks, columns 7 and 8 are the averages for the DMA for the survey, and column 14 shows the DMA HUT. The remaining columns (15–43) show the DMA ratings for specific age and gender cells. Recall that this is only one page (of a total of 248 pages) from the May 1998 Denver NSI book.

Refer next to the entire Nielsen sample page. Notice that KCNC-TV places second behind KUSA for the time period (KUSA = 6 rating/16 share). The data also show that the KCNC and KUSA are in a heated battle among all the ages cells for both men and women.

Although information on ratings and shares is computed the same way for radio and television audience measurements, the information is presented very differently. Radio books usually contain more than 10 individual sections (such as Target Audience Estimates, Audience Composition, and various trend and rank data) and then concentrate on presenting

Figure 15.3 *Sample Page from Denver Nielsen NSI Ratings Book*

**DENVER, CO**

WK1 4/23-4/29 WK2 4/30-5/06 WK3 5/07-5/13 WK4 5/14-5/20

PROGRAM AVERAGES

| Metro HH RTG | Metro HH SHR | Station / Day / Program | DMA HH Ratings Wk 1 | Wk 2 | Wk 3 | Wk 4 | Multi-Week Avg RTG | Multi-Week Avg SHR | HUT | Persons 2+ | Persons 18+ | Persons 12-24 | Persons 12-34 | Persons 18-34 | Persons 18-49 | Persons 21-49 | Persons 25-54 | Persons 35+ | Persons 35-64 | Persons 50+ | Women 18+ | Women 12-24 | Women 18-34 | Women 18-49 | Women 21-49 | Women 25-49 | Women 25-54 | Women 50+ | Women WKG | Men 18+ | Men 18-34 | Men 18-49 | Men 21-49 | Men 25-49 | Men 25-54 | TNS 12-17 | Child 2-11 | Child 6-11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | | 3 | 4 | 5 | 6 | 7 | 8 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 |
| 2 | | R.S.E. THRESHOLDS 25+% | 3 | 3 | 3 | 3 | 2 | | | 2 | 2 | 7 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 10 | 7 | 3 | 3 | 4 | 3 | 4 | 3 | 2 | 9 | 4 | 4 | 4 | 3 | 12 | 8 | 11 |
| 1 | | (1 S.E.) 4 WK AVG 50+% | 1 | 1 | 1 | 1 | LT | | | LT | LT | 2 | 1 | 1 | 1 | 1 | LT | LT | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 3 | 2 | 3 |
| | | 5:00PM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | KCEC MON NOTICIAS 50 | << | << | << | << | << | | 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | TUE NOTICIAS 50 | << | << | << | << | << | | 39 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | WED NOTICIAS 50 | << | << | << | << | << | | 37 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | THU NOTICIAS 50 | << | << | << | << | << | | 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | FRI NOTICIAS 50 | << | << | << | << | << | | 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | AV5 NOTICIAS 50 | << | << | << | << | << | | 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | SAT MEJR-SR-SA-UNI | << | << | << | << | << | | 37 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | SUN MEJR-LC-SU-UNI | << | << | << | << | << | | 43 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 19 | KCNC MON NEWS 4 AT 5 | 6 | 9 | 5 | 6 | 6 | 16 | 41 | 3 | 4 | | 1 | 1 | 1 | 2 | 2 | 6 | 3 | 10 | 4 | | 1 | 1 | 1 | 1 | 2 | 11 | 3 | 4 | 1 | 2 | 2 | 2 | 3 | | | |
| 7 | 18 | TUE NEWS 4 AT 5 | 6 | 6 | 7 | 6 | 6 | 15 | 42 | 3 | 4 | | 1 | 1 | 1 | 2 | 2 | 5 | 3 | 9 | 4 | | 1 | 2 | 2 | 2 | 2 | 10 | 3 | 3 | | 1 | 2 | 2 | 2 | | 1 | 1 |
| 7 | 19 | WED NEWS 4 AT 5 | 5 | 8 | 5 | 6 | 6 | 15 | 39 | 3 | 4 | | | 1 | 1 | 1 | 2 | 5 | 3 | 8 | 4 | | 1 | 1 | 1 | 1 | 2 | 11 | 3 | 3 | 1 | 1 | 1 | 1 | 2 | | | |
| 7 | 19 | THU NEWS 4 AT 5 | 5 | 6 | 7 | 6 | 6 | 15 | 40 | 3 | 4 | | 1 | 1 | 2 | 2 | 2 | 5 | 3 | 9 | 4 | | 1 | 1 | 1 | 2 | 2 | 10 | 2 | 3 | 1 | 2 | 2 | 2 | 2 | | 1 | 1 |
| 8 | 20 | FRI NEWS 4 AT 5 | 5 | 6 | 10 | 4 | 6 | 15 | 40 | 3 | 4 | | 1 | 2 | 2 | 2 | 2 | 5 | 3 | 9 | 5 | | 3 | 2 | 2 | 2 | 3 | 11 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 |
| 8 | 19 | AV5 NEWS 4 AT 5 | 5 | 7 | 7 | 6 | 6 | 15 | 41 | 3 | 4 | | 1 | 1 | 1 | 2 | 2 | 5 | 3 | 9 | 4 | | 1 | 1 | 2 | 2 | 2 | 11 | 3 | 3 | 1 | 1 | 2 | 2 | 2 | | 1 | 1 |
| 5 | 14 | SAT NEWS 4 AT 5 | 4 | 5 | 3 | 3 | 4 | 11 | 38 | 2 | 3 | 1 | | | 1 | 1 | 2 | 4 | 3 | 7 | 3 | 1 | 1 | 2 | 1 | 1 | 2 | 7 | 2 | 2 | | 1 | 1 | 1 | 1 | | | |
| 8 | 19 | SUN NEWS 4 AT 5 | 9 | 7 | 6 | 4 | 7 | 15 | 44 | 3 | 5 | 1 | 1 | 1 | 2 | 2 | 2 | 6 | 4 | 10 | 5 | 1 | 1 | 2 | 2 | 2 | 2 | 11 | 4 | 4 | 1 | 2 | 2 | 2 | 2 | 1 | | 1 |
| 7 | 18 | AV7 NEWS 4 AT 5 | 6 | 7 | 6 | 5 | 6 | 15 | 41 | 3 | 4 | | 1 | 1 | 2 | 2 | 2 | 5 | 3 | 9 | 4 | 1 | 1 | 2 | 2 | 2 | 2 | 10 | 3 | 3 | 1 | 1 | 2 | 2 | 2 | | | |
| 2 | 6 | KDVR+MON AMR FUN-VIDEOS | 2 | 2 | 2 | 3 | 2 | 5 | 38 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | | 1 | 2 | 1 | 1 | 2 | 1 | 1 | | | | | | | | | 1 | | 1 |
| 2 | 5 | TUE AMR FUN-VIDEOS | 1 | 2 | 2 | 1 | 2 | 4 | 39 | | | 1 | | | | | | | | | | | | | | | | | | | 1 | | | | | | | |
| 2 | 6 | WED AMR FUN-VIDEOS | 2 | 2 | 2 | 2 | 2 | 5 | 37 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | | 1 | 1 | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 |
| 2 | 6 | THU AMR FUN-VIDEOS | 2 | 2 | 3 | | 2 | 6 | 38 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| 5 | 12 | THU SIMPSONS B | | | | 4 | 4 | 9 | 39 | 2 | 3 | 12 | 7 | 9 | 4 | 5 | 1 | | | | | | | | | | | | | 6 | 19 | 9 | 9 | 2 | 1 | | | |
| 2 | 6 | FRI AMR FUN-VIDEOS | 2 | 2 | 1 | 2 | 2 | 5 | 38 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | | | | | 1 | 2 | 2 | 1 |
| 2 | 6 | AV5 AMR FUN-VIDEOS | 2 | 2 | 2 | 2 | 2 | 5 | 38 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | | | | 1 | 1 | 1 | 1 |
| 2 | 6 | SAT AMR-VIDEOS WK | 3 | 2 | 2 | 2 | 2 | 6 | 37 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | 1 | | | 1 | 2 |
| 2 | 5 | SUN AMR-VIDEOS WK | 3 | 2 | 2 | 1 | 2 | 5 | 43 | 1 | 1 | 1 | | | | | | 1 | 2 | 2 | 1 | 2 | | | | | | 2 | 1 | 1 | | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| 4 | 10 | KMGH MON KMGH 7 NWS-5 | 4 | 3 | 6 | 4 | 4 | 11 | 38 | 2 | 2 | 1 | | | 1 | 1 | 1 | 3 | 3 | 5 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 6 | 2 | 2 | | 1 | 1 | 1 | 1 | | | |
| 4 | 11 | TUE KMGH 7 NWS-5 | 6 | 4 | 5 | 5 | 5 | 13 | 39 | 2 | 3 | 1 | | 1 | 1 | 1 | 1 | 4 | 3 | 7 | 4 | 2 | 1 | 2 | 1 | 1 | 2 | 9 | 2 | 2 | | 1 | 1 | 1 | 1 | | | |
| 5 | 13 | WED KMGH 7 NWS-5 | 7 | 4 | 5 | 4 | 5 | 13 | 37 | 2 | 3 | 1 | 1 | | 1 | 1 | 1 | 4 | 3 | 7 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 7 | 2 | 2 | | | 1 | 1 | 1 | 1 | | |
| 4 | 11 | THU KMGH 7 NWS-5 | 5 | 3 | 3 | 6 | 4 | 12 | 38 | 2 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 4 | 3 | 6 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 7 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | | | |
| 4 | 10 | FRI KMGH 7 NWS-5 | 4 | 4 | 5 | 3 | 4 | 11 | 38 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 6 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | | | |
| 4 | 11 | AV5 KMGH 7 NWS-5 | 5 | 4 | 5 | 4 | 4 | 12 | 38 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 3 | 6 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 7 | 2 | 2 | | 1 | 1 | 1 | 1 | | | |
| 3 | 10 | SAT KMGH 7 NWS-5 | 3 | 5 | 3 | 3 | 3 | 9 | 38 | 2 | 2 | | | 1 | 1 | 1 | 1 | 3 | 2 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | | 2 | 1 | 1 | 1 | 1 | 1 | | | |
| 3 | 10 | NOR KMGH 7 NWS-5 | 3 | 4 | 4 | 2 | 3 | 9 | 37 | 2 | 2 | | | 1 | 1 | 1 | 1 | 3 | 2 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | | 2 | 1 | 1 | 1 | 1 | 1 | | | |
| 4 | 10 | SUN KMGH 7 NWS-5 | 5 | 4 | 3 | 3 | 4 | 9 | 44 | 2 | 2 | | | 1 | 1 | 1 | 2 | 3 | 2 | 5 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 5 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | | | |
| 4 | 10 | NOR KMGH 7 NWS-5 | 5 | 4 | 3 | 3 | 4 | 9 | 43 | 2 | 2 | | | | 1 | 1 | 2 | 3 | 2 | 5 | 3 | 1 | | 2 | 2 | 2 | 2 | 5 | 2 | 2 | | 1 | 1 | 1 | 1 | | | 1 |
| 4 | 10 | AV7 KMGH 7 NWS-5 | 5 | 4 | 4 | 4 | 4 | 10 | 40 | 2 | 2 | 1 | | 1 | 1 | 1 | 1 | 3 | 2 | 6 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 7 | 2 | 2 | | 1 | 1 | 1 | 1 | | | |
| 4 | 11 | NOR KMGH 7 NWS-5 | 5 | 4 | 4 | 4 | 4 | 11 | 39 | 2 | 3 | 1 | | 1 | 1 | 1 | 1 | 4 | 2 | 6 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 7 | 2 | 2 | | 1 | 1 | 1 | 1 | | | |
| 6 | 15 | KTVO MON JERRY SPRINGER | 6 | 4 | 4 | 5 | 5 | 11 | 41 | 3 | 3 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 3 | 1 | 3 | 7 | 5 | 4 | 4 | 4 | 3 | 2 | 4 | 2 | 2 | 3 | 3 | 2 | 2 | 4 | 1 | 2 |
| 6 | 15 | TUE JERRY SPRINGER | 6 | 5 | 4 | 5 | 5 | 12 | 42 | 2 | 2 | 4 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 4 | 2 | 3 | 2 | 2 | 2 | | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | |
| 6 | 17 | WED JERRY SPRINGER | 4 | 6 | 4 | 6 | 5 | 13 | 39 | 3 | 3 | 10 | 8 | 6 | 4 | 4 | 3 | 2 | 2 | 2 | 4 | 16 | 7 | 4 | 4 | 3 | 3 | 2 | 4 | 3 | 5 | 3 | 4 | 3 | 3 | 12 | | 1 |
| 6 | 16 | THU JERRY SPRINGER | 5 | 4 | 5 | 5 | 5 | 12 | 40 | 3 | 3 | 5 | 5 | 5 | 4 | 4 | 3 | 2 | 2 | 1 | 3 | 6 | 5 | 4 | 4 | 3 | 3 | 1 | 4 | 3 | 6 | 4 | 5 | 4 | 3 | 3 | 2 | 1 |
| 6 | 17 | FRI JERRY SPRINGER | 6 | 5 | 5 | 5 | 5 | 13 | 40 | 3 | 3 | 7 | 6 | 7 | 4 | 4 | 3 | 2 | 2 | 2 | 4 | 8 | 7 | 5 | 4 | 4 | 5 | 3 | 5 | 3 | 6 | 3 | 3 | 2 | 2 | 5 | 2 | 4 |
| 6 | 16 | AV5 JERRY SPRINGER | 5 | 5 | 4 | 5 | 5 | 12 | 41 | 3 | 3 | 6 | 5 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 8 | 5 | 4 | 3 | 3 | 3 | 2 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 6 | 1 | 2 |
| 3 | 8 | SAT BAYWATCH | 3 | 2 | 2 | 1 | 2 | 6 | 37 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | | 2 | 2 | 2 | 2 | 2 | | 1 | 1 | | 1 | 1 | 1 | 1 | | 1 | |
| 3 | 8 | NOR BAYWATCH | 3 | | 2 | 1 | 2 | 6 | 39 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 2 | 1 | 1 | 2 | 1 | | | 1 | | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| 7 | 18 | KUSA MON 9NWS-500PM | 9 | 6 | 5 | 5 | 6 | 17 | 38 | 3 | 4 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 6 | 4 | 1 | 3 | 2 | 2 | 2 | 3 | 7 | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 1 | | |
| 7 | 19 | TUE 9NWS-500PM | 8 | 7 | 5 | 7 | 7 | 17 | 39 | 3 | 4 | | 1 | 1 | 2 | 2 | 3 | 5 | 4 | 8 | 4 | | 2 | 2 | 2 | 3 | 3 | 8 | 4 | 4 | 1 | 2 | 2 | 3 | 3 | | | |
| 7 | 19 | WED 9NWS-500PM | 5 | 10 | 4 | 6 | 6 | 17 | 37 | 3 | 4 | | 1 | 2 | 2 | 2 | 3 | 5 | 4 | 8 | 4 | | 3 | 3 | 3 | 3 | 3 | 8 | 4 | 3 | | 2 | 2 | 2 | 2 | | | |
| 7 | 19 | THU 9NWS-500PM | 5 | 7 | 6 | 5 | 6 | 16 | 38 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 6 | 4 | | 2 | 3 | 3 | 4 | 4 | 7 | 3 | 2 | | 1 | 1 | 2 | 2 | 1 | 1 | |
| 6 | 16 | FRI 9NWS-500PM | 4 | 6 | 7 | 5 | 6 | 15 | 38 | 3 | 4 | | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 6 | 4 | | 4 | 3 | 3 | 4 | 4 | 6 | 3 | 3 | 1 | 2 | 2 | 2 | 2 | | 1 | |
| 7 | 18 | AV5 9NWS-500PM | 6 | 7 | 6 | 6 | 6 | 16 | 38 | 3 | 4 | | 1 | 2 | 2 | 2 | 3 | 5 | 4 | 7 | 4 | | 3 | 3 | 3 | 3 | 3 | 7 | 3 | 3 | 1 | 2 | 2 | 2 | 2 | | | |
| 6 | 16 | SAT 9NWS-500PM | 5 | 5 | 4 | 6 | 5 | 13 | 38 | 2 | 3 | | 1 | 1 | 2 | 2 | 2 | 4 | 4 | 5 | 4 | | 2 | 2 | 2 | 3 | 3 | 7 | 4 | 2 | | 2 | 2 | 2 | 2 | | 1 | |
| 6 | 16 | NOR 9NWS-500PM | 5 | 4 | 4 | 5 | 5 | 13 | 37 | 2 | 3 | | 1 | 1 | 2 | 2 | 3 | 4 | 3 | 5 | 4 | | 2 | 2 | 3 | 3 | 3 | 7 | 4 | 2 | 1 | 2 | 2 | 2 | 2 | | | |
| 6 | 15 | SUN 9NWS-500PM | | | | 5 | 5 | 14 | 41 | 3 | 3 | | | | 1 | 1 | 2 | 5 | 4 | 9 | 3 | | | | | | 2 | 10 | 3 | 3 | | 2 | 2 | 2 | 3 | | | |
| 6 | 17 | AV7 9NWS-500PM | 6 | 6 | 5 | 6 | 6 | 15 | 38 | 3 | 3 | | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 6 | 4 | | 2 | 2 | 3 | 3 | 3 | 7 | 3 | 3 | 1 | 2 | 2 | 2 | 2 | | | |
| 6 | 18 | NOR 9NWS-500PM | 6 | 7 | 5 | 6 | 6 | 16 | 38 | 3 | 4 | | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 7 | 4 | | 3 | 3 | 3 | 3 | 3 | 7 | 3 | 3 | 1 | 2 | 2 | 2 | 2 | | | |
| 4 | 10 | KWGN MON FULL HOUSE | 3 | 3 | 4 | 3 | 3 | 8 | 38 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 2 | 2 | 2 | 2 | 2 | 1 | 1 | | | | | | | 2 | 7 | 8 |
| 2 | 7 | TUE FULL HOUSE | 2 | 2 | 3 | 3 | 2 | 6 | 39 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 2 | 1 | 1 | 2 | 2 | 2 | 2 | | 2 | | | | | | | 2 | 3 | 4 |
| 3 | 8 | WED FULL HOUSE | 2 | 3 | 3 | 3 | 3 | 7 | 37 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | | | | 1 | 2 | 2 | 1 | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | | | 2 | 7 | 10 |
| 4 | 9 | THU FULL HOUSE | 3 | 4 | 3 | 2 | 3 | 8 | 38 | 2 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | | | 1 | 6 | 9 |
| 4 | 11 | FRI FULL HOUSE | | 4 | | 2 | 3 | 9 | 35 | 2 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | | 1 | | | 1 | 2 | 2 | 2 | 1 | 2 | | | | | | | 2 | 7 | 12 |
| 7 | 15 | FRI ROCKIES BSBL | 5 | | 6 | 9 | 7 | 15 | 48 | 4 | 4 | 1 | 1 | 1 | 2 | 2 | 3 | 6 | 4 | 9 | 4 | 1 | 1 | 2 | 2 | 1 | 2 | 9 | 2 | 5 | 2 | 3 | 3 | 4 | 4 | 1 | 3 | 4 |
| 6 | 14 | NOR ROCKIES BSBL | 5 | | 7 | 8 | 6 | 14 | 46 | 3 | 4 | 1 | 1 | 1 | 2 | 2 | 3 | 5 | 4 | 8 | 3 | 1 | | 1 | 1 | 1 | 2 | 7 | 1 | 4 | 2 | 3 | 3 | 3 | 4 | 2 | 3 | 4 |
| 3 | 9 | AV5 FULL HOUSE | 3 | 3 | 3 | 3 | 3 | 7 | 38 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | | 1 | | 1 | | | 2 | 8 | 8 |
| 8 | 19 | SAT ROCKIES BSBL | 9 | | 7 | | 8 | 18 | 48 | 5 | 5 | 4 | 2 | 1 | 3 | 3 | 4 | 6 | 5 | 9 | 3 | 3 | | 1 | 1 | 1 | 2 | 8 | 2 | 6 | 1 | 4 | 4 | 5 | 5 | 7 | 5 | 5 |
| 3 | 7 | SUN HERCULES | 3 | 4 | 2 | 2 | 3 | 6 | 44 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 4 | 3 | 3 | 3 | 3 | 1 | 3 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| | | 5:30PM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | KCEC MON NOTICRO UNIVSN | << | << | << | << | << | | 44 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | TUE NOTICRO UNIVSN | << | << | << | << | << | | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | WED NOTICRO UNIVSN | << | << | << | << | << | | 42 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | THU NOTICRO UNIVSN | 1 | << | << | << | << | | 42 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | FRI NOTICRO UNIVSN | 1 | << | << | << | << | | 42 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | AV5 NOTICRO UNIVSN | << | << | << | << | << | | 43 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | SAT NOTCRO UNI SA | << | << | << | << | << | | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| << | | SUN NOTCRO UNI SU | << | << | << | << | << | | 46 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | | 3 | 4 | 5 | 6 | 7 | 8 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 |

audience estimates in terms of dayparts, not individual programs. Also, because there are so many radio stations in any given market, the emphasis in radio books is on shares, not ratings. Radio broadcasters rarely, if ever, use ratings to sell advertising; audience share is the key to radio advertising sales. In addition, metro shares, not DMA or TSA shares, are the most important numbers in radio.

A sample page from an Arbitron radio book (for the Denver–Boulder area in Spring 1998) is shown in Figure 15.4. The page is taken from the Target Listener Trends—Persons 12+ (not all of the stations in the Denver market are shown on this sample page). Reading a radio ratings book is somewhat different from reading a television ratings book. We will use KOA, an AM news/talk station, to describe how to read this page.

First, notice that the stations are listed from top to bottom in alphabetical order. Next, the data are listed in five major columns for five different radio dayparts. The first column shows the total week data (Monday–Sunday 6 A.M. -MID), while the remaining four columns shows other specific dayparts during the week.

Notice that listed for each column are four pieces of information: Average Quarter-Hour people, shown as AQH (00), Average Quarter-Hour Cume, shown as Cume (00), followed by AQH rating and AQH share. Note that AQH (average quarter-hour) is listed in 100s; that is, "00" is eliminated from the reported data. For example, KOA's AQH for Spring 98 is listed as 242. This means that about 24,200 people age 12 and over were listening for at least 5 minutes during any given quarter-hour between 6 A.M. and midnight (this is up from 19,300 in the Winter 98 book).

The AQH RTG (or rating) for KOA's Spring 98 book is 1.4, which means that the station attracts about 1.4% of all quarter-hour listening by people 12+ Monday–Sunday, 6 A.M. to midnight (this is also up from the Winter 98 book). KOA's audience share for Spring 98 is 8.5, up from 6.7 in the Winter book.

The Spring 98 Arbitron book shows that KOA has made a recovery from its performance in Spring 97, when its share was 8.6. For some reason, the station slipped in Summer 97 but has steadily increased its numbers to get back to its Spring 97 performance. The station management must be pleased to see this progress.

### Adjusting for Unrepresentative Samples

Since ratings are computed using samples from the population, a certain amount of error is always associated with the data. This error, designated by the notation *SE(p)*, is known as standard error (introduced in Chapter 6). Standard error must always be considered before ratings are interpreted, to determine whether a certain gender/age group has been undersampled or oversampled.

There are numerous approaches to calculating standard error. One of the simpler formulas is

$$SE(p) = \sqrt{\frac{p(100 - p)}{n}}$$

where $p$ is the sample percentage or rating, $n$ is sample size, and $SE$ is the standard error. For example, suppose a random sample of 1,200 households produces a rating of 20. The standard error can be expressed as follows:

$$\begin{aligned} SE(p) &= \sqrt{\frac{20(100 - 20)}{1{,}200}} \\ &= \sqrt{\frac{20(80)}{1{,}200}} \\ &= \sqrt{1.33} \\ &= \pm 1.15 \end{aligned}$$

The rating of 20 has a standard error of ±1.15 points, which means the rating actually ranges from 18.85 to 21.15. Standard error formulas are included in all ratings

Figure 15.4 *Sample Page from Denver–Boulder Spring 1998 Arbitron Ratings Book*

# Target Listener Trends

## Persons 12+

| | Monday-Sunday 6AM-MID | | | | Monday-Friday 6AM-10AM | | | | Monday-Friday 10AM-3PM | | | | Monday-Friday 3PM-7PM | | | | Monday-Friday 7PM-MID | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AQH (00) | Cume (00) | AQH Rtg | AQH Shr | AQH (00) | Cume (00) | AQH Rtg | AQH Shr | AQH (00) | Cume (00) | AQH Rtg | AQH Shr | AQH (00) | Cume (00) | AQH Rtg | AQH Shr | AQH (00) | Cume (00) | AQH Rtg | AQH Shr |
| **KIMN-FM** | | | | | | | | | | | | | | | | | | | | |
| SP '98 | 92 | 1859 | .5 | 3.2 | 154 | 1029 | .9 | 3.6 | 140 | 845 | .8 | 3.4 | 111 | 939 | .6 | 3.3 | 44 | 443 | .2 | 3.3 |
| WI '98 | 106 | 1824 | .6 | 3.7 | 174 | 1011 | 1.0 | 4.0 | 191 | 955 | 1.1 | 4.5 | 122 | 1015 | .7 | 3.5 | 29 | 408 | .2 | 2.5 |
| FA '97 | 99 | 1902 | .6 | 3.4 | 145 | 1000 | .8 | 3.2 | 169 | 878 | 1.0 | 3.9 | 122 | 1062 | .7 | 3.4 | 34 | 497 | .2 | 2.8 |
| SU '97 | 101 | 1915 | .6 | 3.5 | 128 | 979 | .7 | 3.2 | 165 | 1007 | .9 | 4.0 | 142 | 1064 | .8 | 4.2 | 36 | 481 | .2 | 2.7 |
| *4-Book* | *100* | *1875* | *.6* | *3.5* | *150* | *1005* | *.9* | *3.5* | *166* | *921* | *1.0* | *4.0* | *124* | *1020* | *.7* | *3.6* | *36* | *457* | *.2* | *2.8* |
| SP '97 | 76 | 1586 | .4 | 2.7 | 132 | 801 | .8 | 3.1 | 130 | 754 | .7 | 3.3 | 93 | 870 | .5 | 2.8 | 17 | 333 | .1 | 1.5 |
| **KJME-AM** | | | | | | | | | | | | | | | | | | | | |
| SP '98 | 11 | 152 | .1 | .4 | 15 | 60 | .1 | .4 | 18 | 57 | .1 | .4 | 13 | 71 | .1 | .4 | 2 | 35 | | .2 |
| WI '98 | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** |
| FA '97 | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** |
| SU '97 | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** |
| *4-Book* | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** |
| SP '97 | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** |
| **KJMN-FM** | | | | | | | | | | | | | | | | | | | | |
| SP '98 | 19 | 297 | .1 | .7 | 17 | 162 | .1 | [illegible] | 37 | 181 | .2 | .9 | 21 | 183 | 1 | .6 | 9 | 101 | .1 | .7 |
| WI '98 | 17 | 306 | .1 | .6 | 18 | 160 | .1 | .4 | 23 | 179 | .1 | .5 | 16 | 166 | 1 | .5 | 13 | 102 | .1 | 1.1 |
| FA '97 | 11 | 233 | .1 | .4 | 8 | 67 | | .3 | 15 | 134 | .1 | .3 | 14 | 122 | 1 | .4 | 7 | 104 | | .6 |
| SU '97 | 21 | 345 | .1 | .7 | 18 | 132 | .1 | .5 | 33 | 199 | .2 | .8 | 27 | 208 | 2 | .8 | 16 | 132 | .1 | 1.2 |
| *4-Book* | *17* | *295* | *.1* | *.6* | *15* | *130* | *.1* | *.4* | *27* | *173* | *.2* | *.6* | *20* | *170* | *1* | *.6* | *11* | *110* | *.1* | *.9* |
| SP '97 | 36 | 519 | .2 | 1.3 | 48 | 261 | .3 | 1. | 51 | 272 | .3 | 1.3 | 32 | 252 | 2 | 1.0 | 19 | 233 | .1 | 1.6 |
| **KKFN-AM** | | | | | | | | | | | | | | | | | | | | |
| SP '98 | 31 | 896 | .2 | 1.1 | 51 | 350 | .3 | 1.2 | 43 | 319 | .2 | 1.1 | 45 | 438 | 3 | 1.3 | 15 | 262 | .1 | 1.1 |
| WI '98 | 44 | 1063 | .2 | 1.5 | 59 | 428 | .3 | 1.3 | 63 | 410 | .4 | 1.5 | 56 | 566 | 3 | 1.6 | 29 | 362 | .2 | 2.5 |
| FA '97 | 40 | 1131 | .2 | 1.4 | 35 | 322 | .2 | .3 | 50 | 398 | .3 | 1.2 | 59 | 540 | 3 | 1.6 | 27 | 377 | .2 | 2.2 |
| SU '97 | 34 | 693 | .2 | 1.2 | 50 | 296 | .3 | 1.3 | 61 | 313 | .3 | 1.5 | 51 | 368 | 3 | 1.5 | 7 | 101 | | .5 |
| *4-Book* | *37* | *946* | *.2* | *1.3* | *49* | *349* | *.3* | *1.2* | *54* | *360* | *.3* | *1.3* | *53* | *478* | *.3* | *1.5* | *20* | *276* | *.1* | *1.6* |
| SP '97 | 44 | 1352 | .3 | 1.6 | 54 | 359 | .3 | 1.3 | 48 | 396 | .3 | 1.2 | 68 | 679 | .4 | 2.0 | 31 | 505 | .2 | 2.7 |
| **KKHK-FM** | | | | | | | | | | | | | | | | | | | | |
| SP '98 | 115 | 2305 | .6 | 4.0 | 159 | 1272 | .9 | 3.7 | 194 | 1169 | 1.1 | 4.8 | 155 | 1433 | .9 | 4.6 | 38 | 636 | .2 | 2.9 |
| WI '98 | 130 | 2280 | .7 | 4.5 | 192 | 1263 | 1.1 | 4.4 | 225 | 1197 | 1.3 | 5.3 | 170 | 1402 | 1.0 | 4.9 | 36 | 546 | .2 | 3.1 |
| FA '97 | 130 | 2562 | .7 | 4.4 | 176 | 1228 | 1.0 | 3.9 | 201 | 1179 | 1.1 | 4.7 | 181 | 1553 | 1.0 | 5.0 | 43 | 604 | .2 | 3.5 |
| SU '97 | 110 | 2103 | .6 | 3.9 | 126 | 960 | .7 | 3.2 | 179 | 1174 | 1.0 | 4.3 | 153 | 1262 | .9 | 4.5 | 40 | 616 | .2 | 3.0 |
| *4-Book* | *121* | *2313* | *.7* | *4.2* | *163* | *1181* | *.9* | *3.8* | *200* | *1180* | *1.1* | *4.8* | *165* | *1413* | *1.0* | *4.8* | *39* | *601* | *.2* | *3.1* |
| SP '97 | 129 | 2229 | .7 | 4.6 | 167 | 1142 | 1.0 | 4.3 | 216 | 1262 | 1.2 | 5.4 | 172 | 1339 | 1.0 | 5.2 | 45 | 624 | .3 | 3.9 |
| **KMXA-AM** | | | | | | | | | | | | | | | | | | | | |
| SP '98 | 28 | 292 | .2 | 1.0 | 36 | 163 | .2 | .8 | 35 | 189 | .2 | .9 | 34 | 181 | .2 | 1.0 | 19 | 108 | .1 | 1.4 |
| WI '98 | 19 | 280 | .1 | .7 | 30 | 152 | .2 | .7 | 27 | 177 | .2 | .6 | 20 | 122 | .1 | .6 | 9 | 85 | .1 | .8 |
| FA '97 | 25 | 210 | .1 | .9 | 36 | 160 | .2 | .8 | 36 | 113 | .2 | .8 | 35 | 115 | .2 | 1.0 | 10 | 80 | .1 | .8 |
| SU '97 | 26 | 243 | .1 | .9 | 37 | 147 | .2 | .9 | 34 | 140 | .2 | .8 | 31 | 172 | .2 | .9 | 9 | 85 | .1 | .7 |
| *4-Book* | *25* | *256* | *.1* | *.9* | *35* | *156* | *.2* | *.8* | *33* | *155* | *.2* | *.8* | *30* | *148* | *.2* | *.9* | *12* | *90* | *.1* | *.9* |
| SP '97 | 35 | 361 | .2 | 1.3 | 50 | 203 | .3 | 1.2 | 41 | 197 | .2 | 1.0 | 42 | 198 | .2 | 1.3 | 20 | 123 | .1 | 1.7 |
| **KNUS-AM** | | | | | | | | | | | | | | | | | | | | |
| SP '98 | 15 | 339 | .1 | .5 | 25 | 162 | .1 | .6 | 28 | 148 | .2 | .7 | 14 | 156 | .1 | .4 | 8 | 53 | | .6 |
| WI '98 | 16 | 390 | .1 | .6 | 19 | 151 | .1 | .4 | 28 | 172 | .2 | .7 | 16 | 194 | .1 | .5 | 4 | 48 | | .3 |
| FA '97 | 11 | 373 | .1 | .4 | 15 | 166 | .1 | .3 | 18 | 123 | .1 | .4 | 13 | 149 | .1 | .4 | 5 | 60 | | .4 |
| SU '97 | 10 | 281 | .1 | .4 | 17 | 159 | .1 | .4 | 14 | 94 | .1 | .3 | 16 | 109 | .1 | .5 | 3 | 39 | | .2 |
| *4-Book* | *13* | *346* | *.1* | *.5* | *19* | *160* | *.1* | *.4* | *22* | *134* | *.2* | *.5* | *15* | *152* | *.1* | *.5* | *5* | *50* | | *.4* |
| SP '97 | 12 | 411 | .1 | .4 | 22 | 221 | .1 | .5 | 19 | 180 | .1 | .5 | 16 | 206 | .1 | .5 | 5 | 53 | | .4 |
| **KOA -AM** | | | | | | | | | | | | | | | | | | | | |
| SP '98 | 242 | 3933 | 1.4 | 8.5 | 350 | 1981 | 2.0 | 8.2 | 356 | 1901 | 2.0 | 8.7 | 273 | 2013 | .5 | 8.1 | 163 | 1404 | .9 | 12.3 |
| WI '98 | 193 | 3550 | 1.1 | 6.7 | 323 | 1903 | 1.8 | 7.4 | 326 | 1693 | 1.8 | 7.7 | 215 | 1775 | .2 | 6.2 | 64 | 733 | .4 | 5.6 |
| FA '97 | 231 | 4191 | 1.3 | 7.9 | 360 | 2116 | 2.0 | 8.0 | 354 | 1802 | 2.0 | 8.2 | 240 | 1812 | .4 | 6.6 | 76 | 787 | .4 | 6.2 |
| SU '97 | 223 | 3802 | 1.3 | 7.8 | 307 | 1779 | 1.7 | 7.7 | 313 | 1796 | 1.8 | 7.5 | 198 | 1683 | .1 | 5.8 | 161 | 1309 | .9 | 12.1 |
| *4-Book* | *222* | *3869* | *1.3* | *7.7* | *335* | *1945* | *1.9* | *7.8* | *337* | *1798* | *1.9* | *8.0* | *232* | *1821* | *.3* | *6.7* | *116* | *1058* | *.7* | *9.1* |
| SP '97 | 241 | 3949 | 1.4 | 3.6 | 346 | 1852 | 2.0 | 8.3 | 364 | 2153 | 2.1 | 9.1 | 263 | 2112 | .5 | 7.9 | 108 | 1100 | .6 | 9.3 |

** Station(s) not reported this survey.

* Listener estimates adjusted for reported broadcast schedule.

\+ Station(s) changed call letters – see Page 13.

4-Book: Avg. of current and previous 3 surveys.
2-Book: Avg. of most recent 2 surveys.

books; Arbitron has simplified the procedure by publishing tables in the back of each book.

Weighting is another procedure used by ratings companies to adjust for samples that are not representative of the population. In some situations, a particular gender/age group cannot be adequately sampled, and a correction must be made.

Assume that population estimates for a DMA indicate that there are 41,500 men ages 18–34 and that this group accounts for 8.3% of the population over the age of 12. The researchers distribute diaries to a sample of the DMA population, of which 950 are returned and usable (known as in-tab diaries). They would expect about 79 of these to be from men ages 18–34 (8.3% of 950). However, they find that only 63 of the diaries are from this demographic group—16 short of the anticipated number. The data must be weighted to adjust for this deficiency. The weighting formula is:

$$\text{Weight}_{\text{MSA men, } 18-34} = \frac{0.083}{0.066} = 1.25$$

This figure must be multiplied by the number of persons in the group that each diary would normally represent. That is, instead of representing 525 men (41,500 ÷ 79), each diary would represent 656 men (525 × 1.25). The ideal weighting value is 1.00, indicating that the group was adequately represented in the sample. On occasion, a group may be oversampled, in which case the weighting value is a number less than 1.00.

Both Arbitron and Nielsen provide detailed explanations of error rates, weighting, and other methodological considerations. Each company includes pages of information in ratings books on how to interpret the data considering different sample sizes and weighting. In reality, however, the vast majority of people who interpret and use broadcast and cable ratings consider the printed numbers as gospel. If they are considered at all, error rates, sample sizes, and other problems are important only when an owner or manager's station performs poorly in the ratings.

## ▪ Nonratings Research

Although audience ratings are the most visible research data used in broadcasting, broadcasters, production companies, advertisers, and broadcast consultants use numerous other methodologies. Ratings yield estimates of audience size and composition. Nonratings research provides information about what the audience likes and dislikes, analyses of different types of programming, demographic and lifestyle information about the audience, and much more. All these data are intended to furnish decision makers in the industry with information they can use to eliminate some of the guesswork.

Nonratings research cannot solve all the problems broadcasters face, but it can be used to support decisions. Nonratings research is important to broadcasters in all markets, and one characteristic of all successful broadcast or cable operations is that the management uses research in all types of decision making.

We asked Frank Bell, VP/Programming for Sinclair Communications, Inc. (see *www.sbgi.net*), to describe the importance of nonratings research to a newcomer to the broadcast field. Bell (1999) said:

> Imagine yourself as a pilot, attempting to safely guide your plane through a bank of thunderstorms and all of your navigation instruments are out of commission. As heavy turbulence bounces your craft up and down, passengers, each with a different perspective, shout suggestions: "Pull up, watch out for the mountains ahead!" "Don't fly into those clouds; they're full of lightning!" "Hey, there's another plane off to the right!" That's what it is like to program a radio or TV station today

> without the benefit of ongoing local market research.
>
> If you don't know the strengths and weaknesses of your own station and your primary competitors, if you don't have a handle on your market's tastes, if you're unsure what would happen if a new competitor signed on tomorrow, then you are truly "flying blind." Better keep your parachute packed!
>
> Local market research provides something unattainable from inside a radio or TV station: the unvarnished perspective of those wonderful people who actually tune in every week and keep us in business. As a wise man said many years ago, "The only reality that counts is that of the audience."

This section describes some of the nonratings research conducted in the electronic media.

## Program Testing

Research has become an accepted step in the development and production of programs and commercials. It is now common practice to test these productions in each of the following stages: initial idea or plan, rough cut, and postproduction. A variety of research approaches can be used in each stage, depending on the purpose of the study, the amount of time allowed for testing, and the types of decisions that will be made with the results. A research director must determine what the decision makers will need to know and design an analysis to provide that information.

Since major programs and commercials are very expensive to produce, producers and directors are interested in gathering preliminary reactions to a planned project. It would be ludicrous to spend thousands or millions of dollars on a project that would have little audience appeal.

Although most program testing is conducted by major networks, large advertising agencies, and production companies, there is an increasing interest in this area of research at the local level. Stations now test promotional campaigns, prime-time access scheduling, the acceptability of commercials, and various programming strategies.

One way to collect preliminary data is to show subjects a short statement summarizing a program or commercial and to ask them for their opinions about the idea and their willingness to watch the program or buy the product on the basis of the description. The results may provide some indication of the potential success of a show or a commercial.

However, program descriptions cannot demonstrate the characters and their relationships to other characters in the program. This can be done only through the program dialogue and the characters' on-screen performance. For example, the NBC-TV program "ER" might have been described as follows:

> *ER:* A drama about a hospital emergency room showing the "real" events faced by doctors and nurses. Each week the program concentrates on a number of emergency situations and the relationships among the personnel in the hospital.

To many people this statement might describe the type of show generally referred to as a "bomb." However, the indescribable on-screen relationships between the "doctors" and "nurses" and the other cast members, as well as the good story lines, made "ER" one of the most popular television shows in the 1990s. If producers relied totally on program descriptions in testing situations, many successful shows would never reach the air.

If an idea tests well in the preliminary stages (or if the producer or advertiser wishes to go ahead with the project regardless of what the research indicates), a model or simulation is produced. These media "hardware" items are referred to as *rough cuts, storyboards, photomatics, animatics,* or *executions.* The rough cut is a simplistic production that usually uses amateur actors, little or no editing, and makeshift sets. The other models are photographs, pictures, or drawings of major scenes designed to give the basic idea of a program or commercial to anyone who looks at them.

Rough cuts or models are tested by several companies. The tests do not involve a lot of production expense, which is especially important if the tests show a lack of acceptance or understanding of the product. The tests provide information about the script, characterizations, character relationships, settings, cinematic approach, and overall appeal. They seldom identify the causes when a program or commercial is found to be unacceptable to the test audience; rather, they provide an overall indication that something is wrong.

When the final product is available, postproduction research can be conducted. Finished products are tested in experimental theaters, in shopping centers (where mobile vans are used to show commercials or programs), at subjects' homes in cities where cable systems provide test channels, or via telephone, in the case of radio commercials. Results from postproduction research often indicate that, for example, the ending of a program is unacceptable and must be reedited or reshot. Many problems that were not foreseen during production may be encountered in postproduction research, and the data usually provide producers with an initial audience reaction to the finished, or partially finished, product.

Each of the major commercial television networks uses its own approach to testing new programs. For example, according to Alan Wurtzel (1992), former Senior Vice President of Marketing and Research for ABC, the network does not test program ideas or concepts. Wurtzel believes the approach is inadequate in evaluating a potential program. Instead, ABC begins by testing a completed pilot of the program. This is done by showing the pilot on cable television outlets throughout the country, where viewers are prerecruited to watch, or by sending viewers videotapes of the program to view at their leisure. Once a program is on the air, the show is continually tested with various qualitative and quantitative approaches such as focus groups and telephone interviews.

Other companies provide a variety of methods to test commercials or programs. Some companies test commercials and consumer products by showing different versions of commercials on cable systems. Test commercials can be cut in (that is, they can replace a regularly scheduled commercial with a test spot) in certain target households. The other households on the cable system view the regular spot. Sometime after the airing of the test commercial to the target households, follow-up research is conducted to determine the success of the commercial or the response to a new consumer product.

Commercials can also be tested in focus groups, shopping center intercepts, and auditorium-type situations. Generally speaking, commercials are not shown on television until they are tested in a variety of situations. The sponsors (even radio and television managers who wish to advertise their own station) do not want to communicate the wrong message to the audience.

## Music Research

Music is the product of a music radio station. To provide the station's listeners with music they like to hear and avoid the songs that listeners do not like or are tired of hearing (*burned out*), radio programmers use a variety of research procedures.

Two of the most widely used music testing procedures are auditorium music testing and call-out research. Auditorium tests are designed to evaluate *recurrents* (songs that were recently popular) and *oldies* (songs that have been around for years). Call-out research is used to test music on the air (*currents*). New music releases cannot be tested adequately in the auditorium or with call-out procedures. New music is often evaluated on the air during programs titled "Smash or Trash," or something similar, where listeners call in and voice their opinion about new releases.

Auditorium tests and call-out research serve the same purpose: to provide a program director or music director with information about the songs that are liked, disliked, burned, or unfamiliar. This information eliminates the gut feeling approach that many radio personnel once used in selecting music for their station.

Both music testing methods involve playing short segments, or hooks, of a number of recordings for the sample of listeners. A hook is a 5–15-second representative sample of the song—enough for respondents to identify the song if it is already familiar to them and to rate the song on some type of evaluation scale.

Several types of measurement scales are used in music testing research. For example, respondents can be asked to rate a hook on a 5- or 7-point scale, where 1 represents "hate" and 5 or 7 represents "like a lot" or "favorite." There are also choices of "unfamiliar" and "tired of hearing." Research companies and program directors have a variety of scales for listeners to use in evaluating the music they hear. Which scale is best? Research conducted over several years by the senior author indicates that the 7-point scale tends to provide the most reliable results.

Sometimes researchers ask respondents to rate whether or not each song "fits" on their favorite radio station. These additional data help program directors determine which of the tested songs might not be appropriate for their station.

In addition, some research companies ask listeners whether they would like radio stations in the area to play a particular song more, less, or the same amount as they currently do. This is a highly inefficient and inaccurate way to determine the frequency with which a song should be played. The reason is that there is no common definition of *more, less,* or *same,* and listeners are extremely poor judges of how often a station currently plays the songs.

***Auditorium Testing.*** In this method, between 75 and 200 people are invited to a large room or hall, often a hotel conference room. Subjects are invited to the test because they meet specific requirements determined by the radio station or the research company (for example, people between the ages of 25 and 40 who listen to soft rock stations in the client's market). The recruiting of subjects for auditorium testing is handled by a field service that specializes in recruiting people for focus groups or other similar research projects. Respondents are generally paid \$25–\$150 for their cooperation. The auditorium setting—usually a comfortable location away from distractions at home—enables researchers to test several hundred hooks in one 90–120-minute session. Usually between 200 and 400 hooks are tested, although some companies routinely test up to 600 hooks in a single session. After 400 songs, however, subject fatigue becomes evident by explicit physical behavior (looking around the room, fidgeting, talking to neighbors), and statistical reliability decreases. It is easy to demonstrate that scores for hooks after the 400 limit are not reliable (Wimmer, 1995), specifically in reference to unstable standard deviations for the songs.

Auditorium music testing is designed to test only songs that have been on the air for some time. It cannot be used on new releases because people cannot be expected to rate an unfamiliar recording on the basis of a 5–15-second hook.

Matt Hudson (1998), from Wimmer-Hudson Research & Development LLC, offers 10 tips to follow when conducting an auditorium music test:

1. To present a relaxed atmosphere, the moderator should dress in a casual manner and the instructions and the introduction should be entertaining.

2. Advise the respondents that talking during the session is not allowed.
3. Make sure that the room temperature is cool to help keep people awake and alert.
4. Never serve food until the session is at least two-thirds finished. Food is necessary during a music test only if you are scoring more than 500 songs during one session.
5. When men and women are tested together, assign seating so that the genders are interspersed in the room. This reduces distractions during the test.
6. After the test has begun, walk by each respondent to ensure that he or she is completing the answer sheet correctly.
7. Respondents often want to sing along with the songs being tested. Discourage this habit in the introduction by asking them to keep their singing to themselves.
8. Do not allow anyone to enter the room while the music is playing.
9. Always take breaks during a music test—at least 10 minutes every hour.
10. Always expect the unexpected, such as respondents who may become ill. If prepared, the moderator can deal with the items quickly and efficiently without disturbing the group.

In 1998 a few radio research companies developed alternative approaches to the "tried and true" auditorium music testing methodology. One method is to test music hooks over the telephone; the other tests hooks via the Internet. Both methods face the same problem of relinquishing control over the testing situation, and there is no way to know who is actually answering the questions. These methods should be used with caution because there is no publicly available research evidence to show that they are reliable and valid.

***Call-out Research.*** The purpose of call-out research is the same as that of auditorium testing; only the procedure for collecting the data is changed. Instead of people being invited to a large hall or ballroom, randomly selected or prerecruited subjects are called on the telephone. Subjects are given the same rating instructions as in the auditorium test; they listen to the hook and provide a verbal response to the researcher making the telephone call. Call-out research is used to test only newer music releases.

The major limitation of call-out research is that the number of testable hooks is limited to about 20 because subject fatigue sets in very quickly over the telephone. Other problems include the distractions that are often present in the home, the poor quality of sound transmission created by the telephone equipment, and the fact that there is no way to determine exactly who is answering the questions.

Even with such limitations, call-out research is used by many radio stations throughout the country. Since call-out research is fairly inexpensive compared with the auditorium method, the research can be conducted on a continual basis to track the performance of songs in a particular market. Auditorium research, which can cost \$20,000–\$40,000 to test approximately 800 songs, is generally conducted only once or twice per year.

## Programming Research and Consulting

Dozens of companies conduct mass media research. They can be found on the Internet by searching "television research," "radio research," or "program research." Although each company specializes in specific areas of broadcasting and uses different procedures, they all have a common goal: to provide management with data to be used in decision making. These companies offer custom research in almost any area of broadcasting—from testing call letters and slogans to air talent, commercials, music, importance of news programs, and the overall sound or look of a station.

Broadcast consultants can be equally versatile. The leading consultants have experience in broadcasting and offer their services to radio and television stations. Although some of their recommendations are based on research, many are made based on past experience. A good consultant can literally "make or break" a broadcast station, and the task of a consultant is probably best described by a real consultant. E. Karl (1992, p. 1), a leading international radio consultant, was asked to describe what a consultant does for a radio station. He states:

> A consultant works with research data to help plan a strategy for a station. A consultant puts research information into a package that will position the station correctly in listeners' minds, and helps market the station to bring listeners in to try out the station. The consultant does anything from designing music rotations, creating "clock hours" on the station, and selecting air talent . . . to developing television commercials to advertise the station, executing direct marketing campaigns to ask listeners to listen, to working with the station staff to make sure the "promise" of the station's position stays on track.

## Performer Q

Producers and directors in broadcasting naturally want to have an indication of the popularity of various performers and entertainers. A basic question in the planning stage of any program is, What performer or group of performers should be used to give the show the greatest appeal? Not unreasonably, producers prefer to use the most popular and likable performers in the industry rather than taking a chance on an unknown entertainer.

Marketing Evaluations, Inc., of Manasset, New York, meets the demand for information about performers, entertainers, and personalities (see *www.qscores.com*). The company conducts nationwide telephone surveys using three panels of about 1,250 households and interviewing about 5,400 people 6 years of age and older. The surveys are divided into three sections: Performer Q, Target Audience Rankings, and Demographic Profiles. The Performer Q portion of the analysis provides Familiarity and Appeal scores for more than 1,000 different personalities. The Target Audience Rankings provide a rank-order list of all personalities for several different target audiences, such as women aged 18–49. The target rank tells producers and directors which personalities appeal to specific demographic groups. In the third section, each personality is listed according to eight demographic profiles of the survey respondents. This section indicates the types of people who do and do not like the personalities in the survey.

## Focus Groups

The focus group, discussed in Chapter 7, is a standard procedure in electronic media research, probably due to its versatility. Focus groups are used to develop questionnaires for further research and to provide preliminary information on a variety of topics, such as format and programming changes, personalities, station images, and lifestyle characteristics of the audience. Data in the last category are particularly useful when the focus group consists of a specific demographic segment.

The popularity and use of focus groups were demonstrated in the December 13, 1998, edition of CBS's "60 Minutes," which showed how Bill Clinton used focus group information to formulate his responses to his problems with Monica Lewinsky.

## Miscellaneous Research

The electronic media are unique, and each requires a different type of research. Here are examples of research conducted by and for stations:

1. *Market studies.* A market study investigates the opinions and perceptions of the

entire market, usually within a specific age range such as 25- to 54-year-olds. There are no requirements for respondents to meet in terms of station listening or viewing, and the sample matches the population distribution and makeup of the market.

2. *Format studies.* A format study for a radio station involves a sample of respondents who listen to or prefer a certain type of music. These respondents are asked a series of questions to determine which stations provide the best service in a variety of areas, such as music, news, traffic reports, and community activities.

3. *Format search studies.* The title of the study explains its purpose—to find an available radio format in a given market.

4. *Program element importance.* A program element importance study identifies the specific elements on radio or television that are most important to a specific audience. Station managers use this information to ensure that they are providing what the audience wants.

5. *Station image.* It is important for a station's management to know how the public perceives the station and its services; hence "station image" has been mentioned throughout this chapter. Public misperception of management's purpose can decrease an audience's size and, consequently, advertising revenue. For example, suppose a radio station has been CHR (contemporary hits radio) for 10 years and switches to a country format. It is important that the audience and advertisers be aware of this change and have a chance to voice their opinions. This can be accomplished through a station image study, in which respondents to telephone calls are asked questions such as "What type of music does radio station WAAA play?" "What types of people do you think listen to WAAA radio?" and "Did you know that WAAA now plays country music?" If research reveals that few people are aware of the change in format, management can develop a new promotional strategy. Or the station might find that the current promotional efforts have been successful and should not be changed. Station image studies are conducted periodically by most larger stations to acquire current information on how the audience perceives each station in the market. If station managers are to provide the services that listeners and viewers want, they must keep up to date with audience trends and social changes.

6. *Personality (talent) studies.* Radio and television managers of successful stations constantly test the on-air personalities. Announcers (DJs), news anchors, and all other personalities are tested for their overall appeal and fit with other station personalities. Personality studies are often conducted for stations to find new talent from other markets, or even to test personalities who are on other stations in the market with the intent of hiring them in the future.

7. *Advertiser (account) analysis.* To increase the value of their service to advertisers, many stations administer questionnaires to local business executives. Some typical questions are, "When did your business open?" "How many people own this business?" "How much do you invest in advertising per year?" "When are advertising purchase decisions made?" and "What do you expect from your advertising?" Information obtained from client questionnaires is used to help write more effective advertising copy, to develop better advertising proposals, and to allow the sales staff to know more about each client. Generally, the questionnaires are administered before a business becomes an advertiser on the station, but they can also be used for advertisers who have done business with the station for several years.

8. *Account executive research.* Radio and television station managers throughout the country conduct surveys of advertising agency personnel, usually buyers, to determine how their sales executives are per-

ceived. It is vitally important to know how the buyers perceive the salespeople. The results of the survey indicate which salespeople are performing very well and which ones may need additional help. Many times a survey discloses that a problem between a sales executive and a buyer is purely a personality difference, and the station can easily correct the problem by assigning another salesperson to the advertising agency.

9. *Sales research*. In an effort to increase sales, many stations themselves conduct research for local clients. For example, a station may conduct a "banking image" study of all banks in the area to determine how residents perceive each bank and the service it provides. The results from such a study are then used in an advertising proposal for the banks in the area. For example, if it is discovered that First National Bank's 24-hour automatic teller service is not well understood by local residents, the station might develop an advertising proposal to concentrate on this point.

10. *Diversification analyses*. The goals of any business are to expand and to achieve higher profits. In an effort to reach these goals, most larger stations, partnerships, and companies engage in a variety of studies to determine where investments should be made. Should other stations be purchased? What other types of activity should the business invest in? Such studies are used for forecasting and represent a major portion of the research undertaken by larger stations and companies. The changes in broadcast ownership rules made by the FCC have significantly increased the amount of acquisition research conducted by individuals, group owners, and other large companies in the broadcasting industry.

11. *Qualitative research*. Managers of successful broadcasting and cable operations leave nothing to chance; they test every aspect of their station. Research is conducted to test billboard advertising, logo designs, bumper stickers, bus advertising, direct mail campaigns, and programming interests.

12. *TV programming research*. This is a broad category that includes testing local news programs, promotional materials used by the station, entertainment programming, and everything else that might appear on the station.

## ▪ ▪ ▪ Summary

This chapter has introduced some of the more common methodologies used in broadcast research. Ratings are the most visible form of research used in broadcasting as well as the most influential in the decision-making process. However, nonratings approaches such as focus groups, music research, image studies, and program testing are all used frequently to collect data. The importance of research is fueled by an ever-increasing desire by management to learn more about broadcast audiences and their uses of the media.

Audience fragmentation is now an accepted phenomenon of the electronic media, and this competition for viewers and listeners has created a need for research data. Broadcast owners and managers realize that they can no longer rely on gut feelings when making programming, sales, and marketing decisions. The discussions in this chapter have been designed to emphasize the importance of research in all areas of broadcasting.

### Questions and Problems for Further Investigation

1. Assume that a local television market has three stations: Channel 2, Channel 7, and Channel 9. There are 200,000 television households in the market. A ratings company samples 1,200 households at random and finds that 25% of the sample is watching Channel 2; 15%, Channel 7; and 10%, Channel 9.
   a. Calculate each station's share of the audience.
   b. Project the total number of households in the population that watch each channel.

c. Calculate the CPM for a $1,000, 30-second spot on Channel 2.

d. Calculate the standard error involved in Channel 2's rating.

2. What are the major data-gathering problems associated with each instrument?

   a. Electronic meters

   b. Diaries

   c. Telephone interviews

   d. People meters

3. Find out what is happening in the development of electronic diaries. This information is available in several of the weekly broadcasting trade publications. If you can develop a replacement for the paper diary on your own, please be sure to send an e-mail letter to us!

4. Search the Internet for web sites for radio and TV stations in your market. Can you detect any type of research the station may have used in designing its site?

5. Perform your own music call-out research. Edit several 15-second selections of recordings on a reel or cassette and ask people to rate them on a 7-point scale. Compute means and standard deviations for the results. What can you conclude?

6. If you are using *InfoTrac College Edition,* you can keep up to date on the latest Nielsen TV ratings by simply doing a key word search on "Nielsen ratings."

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# Chapter 16

# Research in Advertising and Public Relations


- Copy Testing
- Media Research
- Campaign Assessment Research
- Public Relations Research

Summary

Questions and Problems for Further Investigation

References and Suggested Readings

For many years, research was not widely used in advertising and public relations; decisions were made on a more or less intuitive basis. With increased competition, mass markets, and mounting costs, however, more and more advertisers and public relations specialists have come to rely on research as a basic management tool (Haskins & Kendrick, 1993).

Much of the research in advertising and public relations is applied research, which attempts to solve a specific problem and is not concerned with theorizing or generalizing to other situations. Advertising and public relations researchers want to answer questions such as Should a certain product be packaged in blue or red? Is *Cosmopolitan* a better advertising buy than *Vogue?* and Should a company stress its environmental protection program in a planned publicity campaign?

Advertising and public relations research does not involve any special techniques; the methods discussed earlier—laboratory, survey, field research, focus groups, and content analysis—are in common use. They have been adapted, however, to provide specific types of information that meet the needs of these industries.

This chapter discusses the more common areas of advertising and public relations research and the types of studies they entail. In describing these research studies, we aim to convey the facts the reader must know to understand the methods and to use them intelligently. Also, search the Internet for "advertising research" and "public relations."

A significant portion of the research in these areas involves market studies conducted by commercial research firms; these studies form the basis for much of the more specific research that follows in either the academic sector or the private sector. The importance of market research notwithstanding, this chapter does not have sufficient space to address this topic. Readers who want additional information about market research techniques should consult Boyd, Westfall, and Stasch (1989) and McQuarrie (1996), and see *www.vmr.com/research* for a large bibliography of advertising research.

The three functional research areas in advertising are copy research, media research, and campaign assessment research. Each is discussed in turn, and the syndicated research available in each case is described when appropriate.

## Copy Testing

Everyone who does advertising research agrees that the term *copy testing* is misleading. The word *copy* implies that only the words in the ad are tested. This, of course, is not the case: Every element in an ad (layout, narration, music, illustration, size, length, and so on) is a possible variable in copy testing. Leckenby (1984) has suggested that the term *advertising stimulus measurement and research* (ASMAR) be substituted for *copy testing,* but the term has not gained wide use. Likewise, the term *message research* is a less frequently used synonym. Thus we continue to use the traditional term despite its shortcomings. (An Internet search for "copy testing" will verify the importance of this methodology; numerous examples are available.)

Copy testing refers to research that helps develop effective advertisements and then determines which of several advertisements is the most effective. Copy testing takes place at every stage of the advertising process. Before a campaign starts, copy pretesting indicates what to stress and what to avoid. Once the content of the ad has been established, tests must be performed to ascertain the most effective way to structure these ideas. For example, in studying the illustration copy of a proposed magazine spread, a researcher might show to two or more groups of subjects an illustration of the product photographed from different angles. The headline might be evaluated by having potential users rate the typefaces used in several versions of the ad. The copy might be tested for readability and recall. In all cases, the aim is to determine whether the variable tested significantly affects the liking or the recall of the ad.

In TV a rough cut of an entire commercial might be produced. The rough cut is a filmed or taped version of the ad in which amateur actors are used, locations are simplified, and the editing and narration lack the smoothness characteristic of broadcast (final cut) commercials. In this way, variations in the ad can be tested without incurring great expense.

The final phase of copy testing, which occurs after the finished commercials have appeared, serves to determine whether the campaign is having the desired effects. Any negative or unintended effects can be corrected before serious damage is done to a company's sales or reputation. This type of copy testing requires precisely defined goals. Some campaigns, for example, are designed to draw customers away from competitors; others are conducted to retain a company's present customers. Still others are intended to enhance the image of a firm and may not be concerned with consumers' purchase preferences. As we discuss later, this type of copy testing blends in with campaign assessment research.

There are several different ways to categorize copy testing methods. Perhaps the most useful, summarized by Leckenby and Wedding (1982), suggests that there are appropriate copy testing methods for each of the three dimensions of impact in the persuasion process. Although the model suggests a linear process starting with the cognitive dimension (knowing) and continuing through the affective dimension (feeling) to the conative dimension (doing), it is not necessary for the steps to occur in this order. See Table 16.1. In any event, the model does serve as a convenient guide for discussing copy research testing methods.

Table 16.1 *Typology of Copy Testing Effects*

| Dimension of impact | Typical dependent variables |
|---|---|
| Cognitive | Attention |
| | Exposure |
| | Awareness |
| | Recognition |
| | Comprehension |
| | Recall |
| Affective | Attitude change |
| | Liking/disliking |
| | Involvement |
| Conative | Intention to buy |
| | Purchase behavior |

## The Cognitive Dimension

In the cognitive dimension, the key dependent variables are attention, awareness, exposure, recognition, comprehension, and recall. Studies that measure attention to advertising can use various methods. One strategy involves a consumer jury. A group of 50–100 consumers are shown test ads and then asked which ad was best at catching their attention. A physiological measurement technique, known as an eye-tracking study, is also used to determine what parts of an ad are noticed. An eye camera records the movement of the eye as it scans printed and graphic material. By analyzing the path the eye follows, researchers can determine which parts of the ad attracted initial attention.

A tachistoscope (or T-scope) is one way to measure recognition of an ad. The T-scope is actually a slide projector with adjustable levels of illumination and with projection speeds that can be adjusted down to a tiny fraction of a second. Ads are tested to determine how long it takes a consumer to recognize the product, the headline, or the brand name.

Ad comprehension is an important factor in advertising research. One study found that all 60 commercials used in a given test were miscomprehended by viewers (Jacoby & Hofer, 1982). To guard against results such as these, advertising researchers typically test new ads with focus groups (see Chapter 6) to make sure their message is getting across as intended. The T-scope is also used to see how long it takes subjects to comprehend the theme of an ad—an important consideration for outdoor advertising, where drivers may have only a second or two of exposure.

Awareness, exposure, and recall are determined by several related methods. Primarily the print media use one measurement technique that taps these variables: Subjects are shown a copy of a newspaper or magazine and are asked which advertisements they remember seeing or reading. The results are used to tabulate a "reader traffic score" for each ad.

This method is open to criticism, however, because some respondents confuse the advertisements or the publications in which they saw the ads, and some try to please the interviewer by reporting that they saw more than they actually did. To control this problem, researchers often make use of aided recall techniques; for instance, they might also show the respondent a list of advertisers, some of whose advertisements actually appeared in the publication and some of whose did not. (Search for "aided recall" on the Internet for several dozen interesting articles.) For obvious reasons, this type of **recall study** is not entirely suitable for testing radio and television commercials; a more commonly used method in such cases is the telephone survey. Two variations of this approach are sometimes used. In aided recall, the interviewer mentions a general class of products and asks whether the respondent remembers an ad for a specific brand. A typical question might be "Have you seen or heard any ads for soft drinks lately?" In the unaided recall technique, researchers ask a general question such as "Have you seen any ads that interested you lately?" Obviously, it is harder for the consumer to respond to the second type of question. Only truly memorable ads score high on this form of measurement. Some researchers suggest that the most sensitive way to measure recall is to ask consumers whether they remember any recent advertising for each particular brand whose advertising is of interest (Haskins & Kendrick, 1993).

Perhaps a better understanding can be gained by looking at the several research companies that offer syndicated services in this area. For example, Perception Research Services (PRS) uses an eye-tracking camera to measure which parts of an ad were most noticed and the sequence in which consumers viewed the various elements of the ad. This is followed up by an interview in which respondents report their feelings and attitudes toward the ad (see *www.prsresearch.com*). Davis (1997) describes a PRS study for Bombay Gin that disclosed that respondents were not reading the ad copy and not looking at the Bombay bottle pictured in the ad. The interviews revealed that respondents found the ad confusing and did not understand the connection between the message and the artwork. The ad agency subsequently redesigned the ad to clear up these problems.

Gallup & Robinson conducts pilot testing of ads with their Rapid Ad Measurement (RAM) service. The ads to be tested are placed in special test issues of *Time* or *People,* and copies of the magazines are delivered to respondents in five urban areas. A phone interview takes place the following day, and the respondents are asked questions about the content of the ad, how much they remembered, and whether or not the ad changed their attitudes toward buying the product.

Video Storyboard Tests (VST) offers research concerning both print and television ads. For print, test ads are inserted into a specially prepared magazine that contains several articles and a number of control ads. Interviews with potential customers are conducted at shopping malls and focus on such topics as awareness and recall. For TV ads, VST conducts one-on-one interviews in central locations in several markets. Respondents are shown either a rough cut of the ad or a storyboard that depicts key scenes from the ad and are asked questions similar to those used in tests of print ads.

Another method of posttesting television commercials is the InTeleTest service provided by Gallup & Robinson (see *www.gallup-robinson.com*). Gallup & Robinson measures the percentage of respondents who remember seeing the commercial and the percentage of those who can remember specific points. Additionally, they provide a score indicating the degree of favorable attitude toward the product, based on positive statements made by the subjects during the interview. Gallup & Robinson also conducts pretests and posttests of magazine advertisements. Their Magazine Impact Research Service (MIRS) measures the recall of advertisements that appear in general-interest magazines. Copies of a particular issue containing the advertisement under study are mailed to approximately 150 readers. (In the case of a pretest, the MIRS binds the proposed advertisement into each magazine.) The day after delivery of the magazines, respondents are telephoned and asked which advertisements they noticed in the magazine and what details they can remember about them. These results are reported to the advertiser.

One of the best known professional research firms is Starch INRA Hooper, Inc., which conducts posttest recall research. The company's Message Report Service routinely measures advertising readership in more than 100 magazines and newspapers. Using a sample of approximately 300 people, Starch interviewers take a copy of the periodical under study to respondents' homes. If a subject has already looked through that particular publication, he or she is questioned at length. The interviewer shows the respondent an advertisement and asks whether he or she has seen or read any part of it. If the answer is no, the interviewer moves on to another advertisement; if the answer is yes, more questions are asked to determine how much was read. This procedure continues until the respondent has been questioned about every advertisement in that issue up to 90 (at which point the interview is terminated to avoid subject fatigue). Starch places each respondent into one of four categories for each advertisement:

1. *Nonreader* (did not recall seeing the advertisement)
2. *Noted reader* (remembered seeing the advertisement)
3. *Associated reader* (not only saw the advertisement but also read some part

of it that clearly indicated the brand name)

4. *Read most reader* (read more than half the written material in the advertisement)

The Starch organization reports the findings of its recall studies in a novel manner. Advertisers are given a copy of the magazine in which readership scores printed on yellow stickers have been attached to each advertisement. Figure 16.1 is an example of a "Starched" advertisement.

The Starch Message Report Service provides a measurement of recognition only; for an indication of an advertisement's success in getting its message across, advertisers can request a Starch Reader Impression Study. Such studies involve in-depth interviews with readers who have seen an advertisement in a particular newspaper or magazine and are asked a series of detailed questions about it, such as these:

> In your own words, what did this ad tell you about the product?
> What did the pictures tell you?
> What did the written material tell you?

The responses are subjected to content analysis, and the results are summarized for clients. Additionally, Starch reports the percentage of favorable and unfavorable comments about each advertisement.

### The Affective Dimension

The affective dimension usually involves research into whether a consumer's attitudes toward a particular product have changed because of exposure to an ad or a campaign. The techniques used to study the affective dimension include projective tests, theater testing, physiological measures, semantic differential scales, and rating scales. Projective tests provide an alternative to the straightforward "Do you like this ad?" approach. Instead, respondents are asked to draw a picture or complete a story that involves the ad or the product mentioned in the ad. Analysis of these responses provides additional insight and depth into the consumer's feelings. Davis (1997) describes other projective procedures including the personification technique in which the respondent is asked to relate a product to a well-known person. For example, "Think about vacuum cleaners. If the Oreck vacuum could turn into a celebrity or famous person, who would it be?" The answers might reveal something about brand image that could not be tapped through other measures.

Theater tests involve bringing an audience to a special facility where they are shown television commercials that are embedded in a TV show. Respondents are given electronic response indicators (similar to hand-held calculators) that allow them to instantaneously rate each commercial they see. Fenwick and Rice (1991) describe five continuous measurement systems currently available and report the results of a reliability test using the Program Evaluation Analysis Computer (PEAC), a device with five buttons ranging from one labeled "feel very positive" to one labeled "feel very negative." The respondents press these buttons while watching a commercial. Fenwick and Rice report that the PEAC achieved high levels of test–retest reliability. The miniaturization of these hand-held rating devices allows tests to be conducted in focus room facilities or in specially equipped vans parked outside shopping malls. These tests have been criticized because they require respondents to make too many responses, analyze content that may be too minute to be put into practical use, and do not allow respondents to change their answers since they are recorded instantaneously in a computer. Sometimes a researcher's desire to use technology to impress

Figure 16.1 A "Starched" Ad

clients overshadows the validity and reliability of a research approach.

Three physiological tests are used in this area. In the pupilometer test, a tiny camera focused on the subject's eye measures the amount of pupil dilation that occurs while the person is looking at an ad. Changes in pupil diameter are recorded because findings from psychophysiology suggest that people tend to respond to appealing stimuli with dilation (enlargement) of their pupils. Conversely, when unappealing, disagreeable stimuli are shown, the pupil narrows. The second test measures galvanic skin response, or GSR (that is, changes in the electrical conductance of the surface of the skin). A change in GSR rating while the subject is looking at an ad is taken to signify emotional involvement or arousal. The third technique, brain wave analysis, monitors brain activity during exposure to a television commercial in order to measure the level of interest and involvement by a viewer (Percy & Rossiter, 1997).

Semantic differential scales and rating scales (see Chapter 3) are used most often to measure attitude change. For these measurements to be most useful, it is necessary to (1) obtain a picture of the consumer's attitudes before exposure to the ad, (2) expose the consumer to the ad or ads under examination, and (3) remeasure the attitude after exposure. To diminish the difficulties associated with achieving all three of these goals in testing television ads, many researchers prefer a forced-exposure method. In this technique, respondents are invited to a theater for a special screening of a TV program. Before viewing the program, they are asked to fill out questionnaires concerning their attitudes toward several different products, one of which is of interest to the researchers. Next, everyone watches the TV show, which contains one or more commercials for the product under investigation as well as ads for other products. When the show is over, all respondents again fill out the questionnaire concerning product attitudes. Change in evaluation is the essential variable of interest. The same basic method can be used in testing attitudes toward print ads except that the testing is done individually, in each respondent's home. Typically, a consumer is interviewed about product attitudes, a copy of a magazine that includes the test ad (or ads) is left at the house, and the respondent is asked to read or look through the publication before the next interview. A short time later, the interviewer calls the respondent and asks whether the magazine has been read. If it has, product attitudes are once again measured.

The importance of the affective dimension was emphasized by Walker and Dubitsky (1994), who noted that the degree of liking expressed by consumers toward a commercial was significantly related to awareness, recall, and greater persuasive impact. Indeed, several advertising researchers have suggested that liking an ad is one of the most important factors in determining its impact (Haley, 1994).

Several research companies offer services designed to measure attitudes. As part of their In-View service, Gallup & Robinson test attitude change by calling eligible respondents and inviting them to participate in viewing a test program. During this call, the interviewer records attitudes about six products, three of which will be advertised on the test show. Comparison data are collected from nonviewers of the program. After they view the program, respondents are called back and asked the same attitude questions. Changes in attitude are presumed to be the result of viewing the commercial. In magazine measurement, Gallup & Robinson constructs a special issue of a magazine containing the ads under consideration. Respondents are selected randomly from the phone book, visited at home, and given a copy of the magazine. The next day, to establish readership, respondents are asked questions about the magazine's contents. The interviewer next reads a list of products and asks whether the magazine contained ads for each product. Each time a respondent remembers seeing a product ad, the interviewer asks for a description of the ad as well as the respondent's attitudes toward the product after reading the ad.

### *The Conative Dimension*

The conative dimension deals with actual consumer behavior, and, in many instances, it is the most pertinent of all dependent variables. The two main categories of behavior usually measured are buying predisposition and actual purchasing behavior. In the first category, the usual design is to gather precampaign predisposition data and reinterview the subjects after the advertising has been in place. Subjects are typically asked a question along these lines: "If you were going shopping tomorrow to buy breakfast cereal, which brand would you buy?" This might be followed by "Would you consider buying any other brands?" and "Are there any cereals you would definitely not buy?" (The last question is included to determine whether the advertising campaign has had any negative effects.) Additionally, some researchers (Haskins, 1976) suggest using a buying intention scale and instructing respondents to check the one position on the scale that best fits their intention. Such a scale might look like this:

_____ I'll definitely buy this cereal as soon as I can.

_____ I'll probably buy this cereal sometime.

_____ I might buy this cereal, but I don't know when.

_____ I'll probably never buy this cereal.

_____ I wouldn't eat this cereal even if somebody gave it to me.

The scale allows advertisers to see how consumers' buying preferences change during and after the campaign.

Perhaps the most reliable methods of posttesting are those that measure actual sales, direct response, and other easily quantifiable behavior. In the print media, direct response might be measured by inserting a coupon that readers can mail in for a free sample. Different forms of an ad might be run in different publications to determine which elicits the most inquiries. Another alternative suitable for use in both print media advertising and electronic media advertising is to include a toll-free 800 number that consumers can call for more information or to order the product.

Some research companies measure direct response by means of a laboratory store. Usually used in conjunction with theater testing, this technique involves giving people chits with which they can buy products in a special store. (Most of the time this is a special trailer or field service conference room furnished to look like a store.) Subjects are then shown a program containing some test commercials, given more chits, and allowed to shop again. Changes in pre- and postexposure choices are recorded.

Actual sales data can be obtained in many ways. Consumers may be asked directly: "What brand of breakfast cereal did you most recently purchase?" The findings from this would be subject to error, however, due to faulty recall, courtesy bias, and so forth; for this reason, more direct methods are generally preferred. If enough time and money are available, direct observation of people's selections in the cereal aisles at a sample of supermarkets can be a useful source of data. Store audits that list the total number of boxes sold at predetermined times are another possibility. Last, and possibly most expensive, is the household audit technique, in which an interviewer visits the homes of a sample of consumers and actually inspects their kitchen cupboards to see what brands of cereals are there. In addition to the audit, a traditional questionnaire is used to gather further information about the respondents' feelings toward the commercials.

Many professional research firms conduct surveys that deal with purchasing behavior. The A. C. Nielsen Company uses advanced computer technology to monitor the viewing behavior of 4,000 households. The research company can electronically cut in test commercials without viewers being aware that something different is inserted. A tiny device attached to the TV set allows the set to accept these test commercials and to store viewing data for later retrieval. At the supermarket, members of Nielsen's sample present an ID card, and through the use of the UPC, all their purchases are electronically recorded and tabulated. Thus clients are able to monitor actual buying behavior changes in response to test commercials. Nielsen also offers a Scantrack service that monitors the TV viewing behavior of a panel of 40,000 households whose members have their purchases recorded via electronic scanner. Information Resources Inc. (IRI) has a similar service called Infoscan.

In the print area, ASI-Market Research, Inc. (see *www.asiresearch.com*), uses a less expensive technique that measures pseudopurchase behavior. A test magazine containing the client's ad is left at the house. The respondent is asked to read the magazine, told there will be a prize for participation, and asked which brands would be preferred if he or she is a grand prize winner. After the test ads have been looked at, the respondent is again asked about prize preferences. Changes in pre- and postexposure scores are carefully noted. In the television area, ASI offers Apex, an ad-testing system that uses cable television. Respondents are contacted and asked to screen a new TV program over one of their cable channels. The day after, respondents are telephoned and asked questions about commercial recall and their intention to buy the product under examination. Finally, they are asked to select a brand that they would most like to receive as a prize.

Cook and Dunn (1996) surveyed advertisers and ad agencies and found a wide range of copy testing procedures in use. Around 70% of those surveyed used aided or unaided recall, and more than 50% reported using a form of ad recognition testing. Brand attitude and intention to buy were other widely used affective measures.

## Copy Research and Validity

All of the above methods of copy research are based on the assumption that this research identifies ads that will work well in the marketplace. To test this assumption, the Advertising Research Foundation (ARF) sponsored a research validity project to determine which copy testing measures were effective (Haley & Baldinger, 1991). To begin, ARF selected five pairs of TV commercials. Since one of the ads in each of these pairs had already been shown to produce major sales differences in test markets, ARF researchers used the ads in a field experiment that included many common copy testing measures (see *www.arf.amic.com* for more information).

The experiment revealed a strong correlation between ads that copy tested well and ads that performed well in the marketplace. For example, measuring reaction to commercials on an affective scale (like/dislike) predicted the more effective ad of the pair 87% of the time. Top-of-mind awareness (unaided recall) measures correctly classified the more effective ad 73% of the time. Less effective were measures that asked respondents to recall the main point of the ad. In a reanalysis of the ARF data, Rossiter and Eagleson (1994) suggested that another measure—a pretest–posttest difference in replies to the item "I will definitely buy this product"—is also useful. In sum, it appears that copy testing research can help predict what ad will be most effective in generating sales.

The current trend in copy testing is multiple measures of copy research effectiveness.

A technique called Advertising Response Modeling (ARM) provides a conceptual model that integrates several measurements to evaluate ad effectiveness (Mehta & Purvis, 1997). ARM differentiates between high and low involvement situations and includes measures such as recall, liking, buying interest, and brand rating. The technique highlights that different ads can be successful for a variety of reasons.

## ▪ *Media Research*

The two important terms in media research are *reach* and *frequency*. Reach is the total number of households or persons that will be exposed to a message in a particular medium at least once over a certain period (usually 4 weeks). Reach can be thought of as the cumulative audience, and it is usually expressed as a percentage of the total universe of households that have been exposed to a message. For example, if 25 of a possible 100 households are exposed to a message, then the reach is 25%. Frequency refers to the number of exposures to the same message that each household receives. Of course, not every household in the sample will receive exactly the same number of messages. Consequently, advertisers prefer to use the average frequency of exposure, expressed by this formula:

$$\frac{\text{Total exposures for all households}}{\text{Reach}} = \text{Average frequency}$$

Thus, if the total number of exposures for a sample of households is 400 and the reach is 25, the average frequency is 16. In other words, the average household was exposed 16 times. Notice that if the reach were 80%, the frequency would be 5. As reach increases, average frequency drops. (Maximizing both reach and frequency would require an unlimited budget, something most advertisers lack.)

A concept closely related to reach and frequency is **gross rating points** (GRPs), introduced in Chapter 15. GRPs are useful when it comes to deciding between two media alternatives. For example, suppose Program A has a reach of 30% and an average frequency of 2.5, whereas Program B has a reach of 45% and a frequency of 1.25. Which program offers a better reach–frequency relationship? First, determine the GRPs of each program using the following formula:

$$\text{GRPs} = \text{Reach} \times \text{Average frequency}$$

For A:

$$\text{GRPs} = 30 \times 2.5 = 75.00$$

For B:

$$\text{GRPs} = 45 \times 1.25 = 56.25$$

In this example, Program A scores better in the reach–frequency combination, and this would probably be a factor in deciding which was the better buy.

Media research falls into three general categories: studies of the size and composition of an audience of a particular medium or media (reach studies), studies of the relative efficiency of advertising exposures provided by various combinations of media (reach and frequency studies), and studies of the advertising activities of competitors.

Search the Internet for "reach and frequency" for more than 500 references and examples of the terms.

### *Audience Size and Composition*

Analyses of audiences are probably the most commonly used advertising studies in print and electronic media research. Since advertisers spend large amounts of money in the print and electronic media, they have an understandable interest in the audiences for those

Table 16.2 *Determining Advertising Efficiency from Ad Cost and Circulation Data*

| | Newspaper X | Newspaper Y |
|---|---|---|
| Ad cost | $1,800 | $2,700 |
| Circulation | 180,000 | 300,000 |
| Cost per thousand circulated copies | $\frac{\$1,800}{180} = \$10.00$ | $\frac{\$2,700}{300} = \$9.00$ |

messages. In most cases, audience information is gathered using techniques that are compromises between the practical and the ideal.

The audience size of a newspaper or magazine is commonly measured in terms of the number of copies distributed per issue. This number, which is called the publication's **circulation**, includes all copies delivered to subscribers as well as those bought at newsstands or from other sellers. Because a publication's advertising rate is determined directly by its circulation, the print media have developed a standardized method of measuring circulation and have instituted an organization, the Audit Bureau of Circulations (ABC), to verify that a publication actually distributes the number of copies per issue that it claims. (The specific procedures used by the ABC are discussed later in this chapter.)

Circulation figures are used to compute the CPMs of various publications. For example, suppose Newspaper X charges $1,800 for an advertisement and has an ABC-verified circulation of 180,000, whereas Newspaper Y, with a circulation of 300,000, charges $2,700 for the same size space. Table 16.2 shows that Newspaper Y is the more efficient advertising vehicle.

Note that this method considers only the number of circulated copies of a newspaper or magazine. This information is useful, but it does not necessarily indicate the total number of readers of the publication. To estimate the total audience, the circulation figure must be multiplied by the average number of readers of each copy of an issue. This information is obtained by performing audience surveys.

A preliminary step in conducting such surveys is to define operationally the concept *magazine reader* or *newspaper reader.* There are many possible definitions, but the one most commonly used is fairly liberal: A *reader* is a person who has read or at least looked through an issue.

Three techniques are used to measure readership. The most rigorous is the **unaided recall** method, in which respondents are asked whether they have read any newspapers or magazines in the past month (or other time period). If the answer is yes, subjects are asked to specify the magazines or newspapers they read. When a publication is named, the interviewer attempts to verify reading by asking questions about the contents of that publication. The reliability of the unaided recall method is open to question (as has been discussed) because of the difficulty respondents often have in recalling specific content.

A second technique is **aided recall.** In this method, the interviewer names several publications and asks whether the respondent has read any of them lately. Each time the respondent claims to have read a publication, the interviewer asks whether he or she remembers seeing the most recent copy. The interviewer may jog a respondent's memory by

Table 16.3 *Determining Ad Efficiency from an Extended Database*

| | Newspaper X | Newspaper Y |
|---|---|---|
| Ad cost | $1,800 | $2,700 |
| Circulation | 180,000 | 300,000 |
| CPM | $10.00 | $9.00 |
| Number of people who read the issue | 630,000 (3.5 readers per copy) | 540,000 (1.8 readers per copy) |
| Revised CPM | $2.86 | $5.00 |

describing the front page or the cover. Finally, the respondent is asked to recall anything that was seen or read in that particular issue. (In a variation on this process, masked recall, respondents are shown the front page or the cover of a publication with the name blacked out and are asked whether they remember reading that particular issue. Those who respond in the affirmative are asked to recall any items they have seen or read.)

The third technique, called the recognition method, entails showing respondents the logo or cover of a publication. For each publication the respondent has seen or read, the interviewer produces a copy and the respondent leafs through it to identify the articles or stories he or she recognizes. All respondents who definitely remember reading the publication are counted in its audience. To check the accuracy of the respondent's memory, dummy articles may be inserted into the interviewer's copy of the publication; respondents who claim to have read the dummy items thus may be eliminated from the sample or given less weight in the analysis. Many advertising researchers consider the recognition technique to be the most accurate predictor of readership scores.

Once the total audience for each magazine or newspaper has been tabulated, the advertiser can determine which publication is the most efficient buy. For example, returning to the example of Table 16.2, let us suppose that Newspaper X and Newspaper Y have the audience figures listed in Table 16.3. Based on these figures, Newspaper X is seen to be the more efficient choice.

Another variable to be considered in determining the advertising efficiency (or media efficiency) of a newspaper or magazine is the number of times a person reads each issue. For example, imagine two newspapers or magazines that have exactly the same number of readers per issue. Publication A consists primarily of pictures and contains little text; people tend to read it once and not look at it again. Publication B, on the other hand, contains several lengthy and interesting articles; people pick it up several times. Publication B would seem to be a more efficient advertising vehicle because it provides several possible exposures to an advertisement for the same cost as Publication A. Unfortunately, a practical and reliable method for measuring the number of exposures per issue has yet to be developed.

Perhaps the most important gauge of advertising efficiency is the composition of the audience. (Search the Internet for numerous references for "audience composition.") It matters little if 100,000 people see an advertisement for

Table 16.4 *Calculation of Ad Efficiency Incorporating Demographic Survey Results*

| | Newspaper X | Newspaper Y |
|---|---|---|
| Ad cost | $1,800 | $2,700 |
| Circulation | 180,000 | 300,000 |
| CPM | $10.00 | $9.00 |
| Number of people who read average issue | 630,000 | 540,000 |
| Number of potential beer drinkers | 150,000 | 220,000 |
| Number of potential fast-food customers | 300,000 | 200,000 |
| CPM (beer drinkers) | $12.00 | $12.27 |
| CPM (fast-food customers) | $6.00 | $13.50 |

farm equipment if only a few of them are in the market for such products. To evaluate the number of potential customers in the audience, an advertiser must first conduct a survey to determine certain demographic characteristics of the people who tend to purchase a particular product. For example, potential customers for beer might be described typically as males between the ages of 18 and 49; those for fast-food restaurants might be households in which the primary wage earner is between ages 18 and 35 and there are at least two children under 12. These demographic characteristics of the typical consumer are then compared with the characteristics of a publication's audience for the product. The cost of reaching this audience is also expressed in CPM units, as shown in Table 16.4. An examination of these figures indicates that Newspaper X is slightly more efficient as a vehicle for reaching potential beer customers and much more efficient in reaching fast-food restaurant patrons.

Due to the ephemeral nature of radio and television broadcasts, determining audience size and composition in the electronic media poses special problems for advertising researchers. One problem in particular involves the use of the CPM measure for media planning. The various measures of program audience discussed in Chapter 15 may or may not reflect the number of people who actually view a TV program. Lloyd and Clancy (1991) suggest a new measure, the CMPI, or cost per thousand involved persons, as a solution. Constructing this measure consists of asking viewers to respond to statements about their viewing, such as:

> There were parts in this show that really touched my feelings.
> I was really involved in the program. I wished it had lasted longer.

Answers to these items reveal audience differences in program involvement, and the authors suggest that a program whose audience is small but involved might be a better advertising buy than a program with a large but marginally involved audience.

## Frequency of Exposure in Media Schedules

An advertiser working within a strict budget to promote a product or service may be limited to the use of a single vehicle or medium. Often, however, an advertising campaign is conducted via several advertising vehicles simultaneously. But which combination of vehicles and media will provide the greatest reach and frequency for the advertiser's product? A substantial amount of recent media research has been devoted to this question, much of it concentrated on the development of mathematical models of advertising media and their audiences. The mathematical derivations of these models are beyond the scope of this book. However, the following material describes in simplified form the concepts underlying two models: stepwise analysis and decision calculus. Readers who wish to pursue these topics in more rigorous detail should consult Rust (1986).

*Stepwise analysis* is called an iterative model because the same series of instructions to the computer is repeated over and over again with slight modifications until a predetermined best or optimal solution is reached. The Young & Rubicam agency pioneered development in this area with its stepwise "high-assay" model. Stepwise analysis constructs a media schedule in increments, initially choosing a particular vehicle based on the lowest cost per potential customer reached. After this selection has been made, all the remaining media vehicles are reevaluated to determine whether the optimal advertising exposure rate has been achieved. If not, the second most efficient vehicle is chosen and the process is repeated until the optimal exposure rate is reached. This method is called the "high-assay" model because it is analogous to gold mining. The easiest-to-get gold is mined first, followed by less accessible ore. In like manner, the consumers who are the easiest to reach are targeted first, followed by those consumers who are harder to find and more costly to reach.

*Decision calculus* models make use of an objective function, a mathematical statement that provides a quantitative value for a given media combination (also known as a schedule). This value represents the schedule's effectiveness in providing advertising exposure. The advertising researcher determines which schedule offers the maximum exposure for a given product by calculating the objective functions of various media schedules.

Calculations of objective functions are based on values generated by studies of audience size and composition for each vehicle or medium. In addition, a schedule's objective function value takes into account such variables as the probability that the advertisement will be forgotten, the total cost of the media schedule compared with the advertiser's budget, and the "media option source effect"—that is, the relative impact of exposure in a particular advertising vehicle. (For example, an advertisement for men's clothes is likely to have more impact in *Gentlemen's Quarterly* than in *True Detective*.) Many software programs are available for media planners that help them determine the most effective media combinations (search the Internet for "media planning software").

### Media Research by Private Firms

As mentioned earlier, the Audit Bureau of Circulations (ABC) supplies advertisers with data on the circulation figures of newspapers and magazines (see *www.auditbureau.org.au*). As of 1998, ABC measured the circulation of about 75% of all print media vehicles in the United States and Canada. ABC requires publishers to submit a detailed report of their circulation every 6 months; it verifies these reports by sending field workers to conduct an audit at each publication. The auditors typically examine records of the publications' press runs, newsprint bills, or other invoices for paper, as well as transcripts of circulation records and related files.

The ABC audit results, as well as overall circulation data, coverage maps, press times, and market data, are published in an annual report and distributed to ABC members and advertisers. ABC now reports data on audience size for certain selected newspapers. Called the "Newspaper Audience Research Data Bank," this report is a collection of audience surveys conducted by newspapers in the top 100 markets.

The Simmons Market Research Bureau and Mediamark Research Inc. (MRI) provide comprehensive feedback about magazine readership. Both firms now use the same measurement technique, called the recent reading method. Each selects a large random sample of readers and shows them the logos of about 70 magazines to determine which ones they have recently read or looked through. At the same time, data are gathered about the ownership, purchase, and use of a variety of products and services. This information is tabulated by Simmons and MRI and released in a series of detailed reports on the demographic makeup and purchasing behavior of each magazine's audience. Using these data, advertisers can determine the cost of reaching potential buyers of their products or services. A portion of an MRI Magazine Total Audience Report is reproduced in Table 16.5.

Two companies—Arbitron and A. C. Nielsen—supply broadcast audience data for advertisers. Arbitron measures radio listening in about 270 markets across the United States, and A. C. Nielsen provides audience estimates for network TV and local television markets. (Chapter 15 has more information on the methods used by these two companies and others.)

### Measuring the Internet Audience

The World Wide Web poses special problems for audience measurement. The older, more established media have research organizations, such as the ABC for print media and Nielsen for television, which provide audience data that are generally accepted as an industry standard. Such a situation has yet to develop for the web. Reliable data on who is looking at web pages and banner advertising are important because without such data advertisers are reluctant to spend money on net advertising. As in other media, advertisers want to know who is visiting a web site, how often they visit, and whether the CPM is reasonable. Obtaining such data, however, is difficult.

The first attempts to monitor web page traffic consisted of software programs that measured the number of "hits," or the number of times someone logs onto the page. These numbers were unreliable because the programs measured hits in different ways depending on the server. Moreover, there were programs available that called web sites over and over and could be used to inflate the number of hits. Advertisers preferred an independent organization to count the numbers (Green, 1998).

One of the first companies to provide these data was Nielsen I/PRO. This company provided information by monitoring the web sites themselves to count total hits and time spent reading each page and to collect limited demographic data about the visitors. Although this was useful, advertisers needed more detailed information about site visitors. Media Metrix (formerly PC Meter) used a different approach. It recruited 30,000 computer users from random samples of phone numbers and mailing lists. Each participant was mailed software that runs in the background whenever the participant uses the computer. Each month respondents send back to the company a disk that contains a record of all programs that are run, use of on-line services such as America Online, visits to web sites, and demographic information about the users.

A competitor, RelevantKnowledge, bases its web statistics on a panel of 11,000 who are recruited through a random sample of telephone numbers. RelevantKnowledge tracks only web activity and gathers its data directly over the Internet using software that respon-

Table 16.5 *Example of Mediamark Report*

| | AUDIENCE (000) | | | MEDIAN AGE | | | MEDIAN H/D INCOME | | | CIRCU-LATION | READERS PER COPY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOTAL ADULTS | TOTAL MEN | TOTAL WOMEN | ADULTS | MEN | WOMEN | ADULTS | MEN | WOMEN | (000) | ADULTS | MEN | WOMEN |
| TOTAL ADULT POPULATION | 180.974 | 86,307 | 94.667 | 40.8 | 39.9 | 41.7 | 31.717 | 33.829 | 29.538 | . | . | . | . |
| AIR GROUP ONE (GR) | 1.882 | 1.075 | 807 | 39.0 | 37.9 | 40.0 | 57.245 | 61.194 | 55.116 | 659 | 2.86 | 1.63 | 1.22 |
| AMERICAN BABY | 3.557 | 558 | 2.999 | 29.5 | 31.3 | 29.2 | 33.146 | 39,515 | 31.852 | 1.143 | 3.11 | .49 | 2.62 |
| AMERICAN HEALTH | 3.851 | 1.175 | 2.676 | 40.8 | 42.7 | 40.2 | 37.115 | 35.287 | 37.483 | 1.102 | 3.49 | 1.07 | 2.43 |
| AMERICAN LEGION | 3.313 | 2.031 | 1.282 | 59.1 | 61.3 | 56.3 | 28.074 | 27.734 | 28.641 | 2.825* | 1.17 | .72 | .45 |
| AMERICAN WAY | 1.062 | 528 | 534 | 45.2 | 44.3 | 47.7 | 59.750 | 61.967 | 52.500 | 245* | 4.33 | 2.16 | 2.18 |
| ARCHITECTURAL DIGEST | 3.147 | 1.607 | 1.540 | 38.2 | 37.7 | 38.7 | 56.446 | 57.248 | 55.685 | 624 | 5.04 | 2.58 | 2.47 |
| AUDUBON | 1.580 | 616 | 964 | 42.7 | 41.7 | 44.5 | 38.528 | 33.737 | 43.117 | 453* | 3.49 | 1.36 | 2.13 |
| BABY TALK | 2.258 | 403 | 1.855 | 27.9 | 31.6 | 27.2 | 23.636 | 33.096 | 21.667 | 964* | 2.34 | .42 | 1.92 |
| BASSMASTER | 3.202 | 2.742 | 460 | 34.9 | 35.6 | 31.7 | 34.747 | 34,986 | 32.031 | 539 | 5.94 | 5.09 | .85 |
| BETTER HOMES & GARDENS | 31.367 | 7.527 | 23.840 | 42.5 | 41.8 | 42.9 | 34.643 | 37.057 | 33.855 | 8.078 | 3.88 | .93 | 2.95 |
| BHG/LHJ COMBO (GR) | 49.749 | 9.264 | 40.485 | 42.8 | 42.1 | 42.9 | 33.924 | 36.290 | 33.430 | 13,169 | 3.78 | .70 | 3.08 |
| BLACK ENTERPRISE | 1.904 | 983 | 921 | 37.6 | 36.2 | 38.9 | 26.061 | 33.476 | 17.443 | 239 | 7.97 | 4.11 | 3.85 |
| BON APPETIT | 4.631 | 1.111 | 3.520 | 40.0 | 38.2 | 40.6 | 41.081 | 41.389 | 41.027 | 1.369 | 3.33 | .80 | 2.53 |
| BRIDE'S MAGAZINE | 3.957 | 592 | 3.365 | 25.7 | 25.8 | 25.7 | 33.170 | 34.097 | 33.076 | 390 | 10.15 | 1.52 | 8.63 |
| BUSINESS WEEK | 6.136 | 4.341 | 1.795 | 37.4 | 38.1 | 36.3 | 45.881 | 48.094 | 42.012 | 929 | 6.60 | 4.67 | 1.93 |
| THE CABLE GUIDE | 14.852 | 7,401 | 7.451 | 36.5 | 35.5 | 37.3 | 39.966 | 40.799 | 39.102 | 7.684* | 1.93 | .96 | .97 |
| CAR & DRIVER | 5.327 | 4.641 | 686 | 29.5 | 29.3 | 30.7 | 38.282 | 38.237 | 38.632 | 870* | 6.12 | 5.33 | .79 |
| CAR CRAFT | 2.506 | 2.257 | 249 | 29.1 | 28.4 | 33.7 | 31.271 | 31.576 | 28.092 | 435 | 5.76 | 5.19 | .57 |
| CHANGING TIMES | 3.426 | 1.886 | 1.540 | 49.1 | 46.9 | 51.0 | 40.650 | 40.014 | 41.530 | 1.250 | 2.74 | 1.51 | 1.23 |
| CHICAGO TRIBUNE MAGAZINE | 2.336 | 1.143 | 1.193 | 42.7 | 42.4 | 43.0 | 44.888 | 46.855 | 43.154 | 1.130 | 2.07 | 1.01 | 1.06 |
| COLONIAL HOMES | 2.294 | 772 | 1.522 | 38.8 | 36.2 | 40.6 | 36.067 | 38.259 | 34.372 | 581* | 3.95 | 1.33 | 2.62 |
| CONDE NAST LIMITED (GR) | 21.230 | 6.201 | 15.029 | 34.1 | 31.1 | 35.8 | 39.487 | 40.174 | 39.224 | 3.835 | 5.54 | 1.62 | 3.92 |
| CONDE NAST WOMEN (GR) | 28.258 | 3.178 | 25.080 | 30.0 | 30.5 | 29.9 | 36.392 | 42.740 | 36.035 | 5.936 | 4.76 | .54 | 4.23 |
| CONSUMERS DIGEST | 4.676 | 2.682 | 1.994 | 40.7 | 40.9 | 40.4 | 39.012 | 38.900 | 39.132 | 935 | 5.00 | 2.87 | 2.13 |
| COSMOPOLITAN | 12.118 | 1.916 | 10.202 | 30.9 | 31.9 | 30.7 | 34.449 | 34.659 | 34.410 | 2.512 | 4.82 | .76 | 4.06 |
| COUNTRY HOME | 5.762 | 1.563 | 4.199 | 38.3 | 37.5 | 38.6 | 38.741 | 42.211 | 37.851 | 976* | 5.90 | 1.60 | 4.30 |
| COUNTRY LIVING | 10.372 | 2.700 | 7.672 | 39.5 | 38.0 | 40.1 | 37.262 | 40.876 | 36.359 | 1,748 | 5.93 | 1.54 | 4.39 |
| CREATIVE IDEAS FOR LIVING | 2.310 | 339 | 1.971 | 38.4 | 36.1 | 38.9 | 31.024 | 34.432 | 30.120 | 725 | 3.19 | .47 | 2.72 |
| DELTA SKY | 1.255 | 691 | 564 | 40.2 | 38.2 | 41.6 | 57.540 | 56.905 | 57.861 | 397* | 3.16 | 1.74 | 1.42 |
| DIAMANDIS MAGAZINE NTWK (GR) | 22.748 | 18.733 | 4.015 | 31.4 | 30.8 | 33.3 | 38.800 | 38.970 | 37,951 | 4.273 | 5.32 | 4.38 | .94 |
| DISCOVER | 5.132 | 3.207 | 1.925 | 35.8 | 34.3 | 39.1 | 37.500 | 38.527 | 36.250 | 948 | 5.41 | 3.38 | 2.03 |
| DISNEY CHANNEL MAGAZINE | 5.710 | 2.389 | 3.321 | 36.2 | 36.5 | 36.0 | 40.547 | 43.816 | 37.874 | 4.664* | 1.22 | .51 | .71 |
| EAST/WEST NETWORK (GR) | 3.849 | 2.244 | 1.605 | 39.1 | 38.7 | 39.6 | 52.133 | 58.272 | 43.262 | 1.329 | 2.90 | 1.69 | 1.21 |
| EBONY | 9.519 | 4.120 | 5.399 | 36.2 | 35.4 | 36.7 | 22.466 | 28.044 | 18.754 | 1.774 | 5.37 | 2.32 | 3.04 |
| ELLE | 2.298 | 299 | 1.999 | 29.7 | 36.1 | 29.1 | 45.038 | 47.961 | 43.562 | 751 | 3.06 | .40 | 2.66 |
| ESQUIRE | 3.672 | 2.230 | 1.442 | 34.3 | 33.9 | 35.4 | 36.020 | 37.716 | 30.097 | 734 | 5.07 | 3.08 | 1.99 |
| ESSENCE | 3.484 | 987 | 2.497 | 34.3 | 32.0 | 35.0 | 25.205 | 31.369 | 22.592 | 921* | 3.78 | 1.07 | 2.71 |
| FAMILY CIRCLE | 24.570 | 3.240 | 21.330 | 43.5 | 42.4 | 43.6 | 33.527 | 37.948 | 32.797 | 5.195 | 4.73 | .62 | 4.11 |
| FAMILY CIRCLE/MCCALLS (GR) | 41.859 | 5.100 | 36.759 | 43.5 | 42.1 | 43.7 | 32.821 | 35.579 | 32.439 | 10.384 | 4.03 | .49 | 3.54 |
| FAMILY HANDYMAN | 4.022 | 2.546 | 1.476 | 44.6 | 43.7 | 46.8 | 35.380 | 36.231 | 33.490 | 1.494 | 2.69 | 1.70 | .99 |
| FIELD & STREAM | 13.794 | 10.385 | 3.409 | 37.0 | 37.0 | 37.0 | 32.582 | 33.363 | 29.889 | 2.104 | 6.56 | 4.94 | 1.62 |
| FLOWER & GARDEN | 3.620 | 1.007 | 2.613 | 43.1 | 42.9 | 43.1 | 28.540 | 29.911 | 27.370 | 646 | 5.97 | 1.66 | 4.31 |
| FLOWER & GRDN/WORKBENCH (GR) | 6.366 | 2.854 | 3.512 | 42.9 | 43.2 | 42.5 | 31.312 | 33.116 | 29.494 | 1.498 | 4.25 | 1.91 | 2.34 |
| FOOD & WINE | 2.722 | 1.184 | 1.538 | 38.7 | 38.3 | 38.9 | 40.618 | 43.936 | 39.581 | 884 | 3.08 | 1.34 | 1.74 |
| FORBES | 3.284 | 2.229 | 1.055 | 42.1 | 40.3 | 46.3 | 52.252 | 54.021 | 48.828 | 777 | 4.23 | 2.87 | 1.36 |
| FORTUNE | 3.307 | 2.254 | 1.053 | 38.5 | 36.6 | 42.5 | 51.495 | 50.956 | 52.516 | 794 | 4.70 | 3.20 | 1.50 |
| 4 WHEEL & OFF ROAD | 2.816 | 2.423 | 393 | 25.7 | 26.0 | 24.4 | 32.862 | 33.353 | 28.786 | 341 | 8.51 | 7.32 | 1.19 |
| FOUR WHEELER | 2.046 | 1.799 | 247 | 25.9 | 25.3 | 31.8 | 34.565 | 35.342 | 23.565 | 311 | 6.58 | 5.78 | .79 |
| GAMES | 1.648 | 816 | 832 | 36.1 | 32.6 | 39.1 | 34.495 | 34.035 | 35.000 | 682 | 2.42 | 1.20 | 1.22 |
| GLAMOUR | 8.984 | 768 | 8.216 | 30.6 | 31.4 | 30.5 | 35.591 | 47.444 | 34.890 | 2.141 | 4.20 | .36 | 3.84 |
| GOLF DIGEST | 4.449 | 3.599 | 850 | 42.1 | 41.3 | 46.6 | 45.188 | 44.478 | 51.768 | 1.284 | 3.46 | 2.80 | .66 |
| GOLF DIGEST/TENNIS (GR) | 6.076 | 4.618 | 1.458 | 40.1 | 39.2 | 42.6 | 44.297 | 43.726 | 47.703 | 1.826 | 3.33 | 2.53 | .80 |
| GOLF MAGAZINE | 3.804 | 2.937 | 867 | 40.0 | 39.7 | 41.7 | 44.017 | 42.925 | 48.889 | 987 | 3.85 | 2.98 | .88 |
| GOOD HOUSEKEEPING | 24.811 | 3.699 | 21.112 | 43.1 | 43.6 | 42.9 | 32.695 | 34.647 | 32.298 | 4.880 | 5.08 | .76 | 4.33 |
| GOURMET | 2.850 | 741 | 2.109 | 43.0 | 41.2 | 43.9 | 47.023 | 50.198 | 45.833 | 767 | 3.72 | .97 | 2.75 |
| GQ (GENTLEMEN'S QUARTERLY) | 4.369 | 3.185 | 1.184 | 26.1 | 26.3 | 25.7 | 37.190 | 38.196 | 33.278 | 633 | 6.90 | 5.03 | 1.87 |

dents download from its web site. This allows the company to provide overnight ratings on specific web sites to some of its clients. Like Media Metrix, RelevantKnowledge also collects detailed information about its panelists. In late 1998, Media Metrix announced plans to merge with RelevantKnowledge.

A third company, NetRatings, uses a panel of 2,000 recruited from the web itself. NetRatings measures only net activity and has detailed lifestyle profiles on all of its respondents. In late 1998, these three were joined by another formidable competitor, the A. C. Nielsen Company. Nielsen's service, NielsenNet, uses a sample of about 10,000 recruited through random digit dialing. In addition to the usual data reports, Nielsen measures net usage on noncomputer devices, such as WebTV. In late 1998, Nielsen and NetRatings announced plans to merge.

All of these firms face two difficult problems in gathering accurate web data. First, much web surfing is done at work and many businesses have been reluctant to allow ratings companies to install tracking software on office computers because they fear the software might also be used to access confidential memos or sales data. As a result, all research firms probably underreport office use. Second, there are so many web sites that it is necessary to draw huge samples to get reliable data on some of the lesser used sites. Current sample sizes are adequate for only the top 200 sites. Ad agencies suggest that the minimum sample size for reliable results is 12,000.

All of these companies are working to improve their methods and to solve these problems because they know that the rewards will be great for the company that becomes the industry standard.

### Competitors' Activities

It is often helpful to advertisers to know the media choices of their competitors. This information can help the advertiser to avoid making the mistakes of less successful competitors and to imitate the strategies of more successful competitors. Moreover, an advertiser seeking to promote a new product who knows that the three leading competitors are using basically the same media mix might feel that their consensus is worthy of consideration.

An advertiser can collect data on competitors' activity either by setting up a special research team or by subscribing to the services of a syndicated research company. Since the job of monitoring the media activity of a large number of firms advertising in several media is so difficult, most advertisers rely on the syndicated service. Such services gather data by direct observation—that is, by tabulating the advertisements that appear in a given medium. In addition to information about the frequency of advertisements, cost figures are helpful; these estimates are obtained from the published rate cards of the various media vehicles.

Advertisers also find it helpful to know what competitors are saying. To acquire this information, many advertising agencies conduct systematic content analyses of the messages in a sample of the competitors' advertisements. The results often provide insight into the persuasive themes, strategies, and goals of competitors' advertising. It is because of such studies that many commercials look and sound alike: Successful commercial approaches are often mimicked.

The most comprehensive information about advertisers' activities and expenditures is provided by Competitive Media Reporting (CMR), a joint venture between VNU, a Dutch firm, and Arbitron. CMR tracks ad spending in 11 national consumer media. For the electronic media, CMR's MediaWatch ranks spending on ads in network TV, national spot TV, cable TV, network radio, and spot radio. For network TV, MediaWatch tabulates every broadcast commercial minute on CBS, NBC, ABC, and Fox. Cable TV estimates come from observing 17 cable networks, such as CNN, USA, and MTV. Spot television estimates are obtained from monitoring the major stations in the top 75 markets. To obtain comparative advertising data about radio networks, MediaWatch monitors 13 networks. Spot radio data come from an examination of 3,500 radio stations in more than 200 markets. CMR recently began reporting on advertising activity on the Internet.

Data for the print media are gathered by Leading National Advertisers (LNA), another division of CMR. LNA measures ad space in 129 newspapers in 50 of the country's top markets. National newspaper spending is determined by examining copies of *USA Today* and *The Wall Street Journal.* Comparative ad data for magazines come from the Publisher's Information Bureau (PIB), which measures ads in 210 consumer magazines and four Sunday supplements. The publishers of magazines that belong to the PIB mark all paid advertising in each issue and send the marked copies to LNA, where trained coders record detailed information about each advertisement. This information is recorded in a report sent to LNA subscribers. The data are arranged according to product type and brand name. By scanning the LNA reports, advertisers can determine which magazines competitors are using, the size of the advertisements they purchase, when they appear, and their approximate cost. CMR also provides data on outdoor and Yellow Pages advertising.

## ▪ Campaign Assessment Research

Campaign assessment research builds on copy and media research, but its research strategies are generally different from those used in the other areas. In general, there are two kinds of assessment research. The *pretest/posttest method* takes measurements both before and after the campaign, and *tracking studies* assess the impact of the campaign by measuring effects at several times during the progress of the campaign. (Search the Internet for "campaign assessment" for several interesting articles and on-line software.)

The major advantage of a tracking study is that it provides important feedback to the advertiser while the campaign is still in progress. This feedback might lead to changes in the creative strategy or the media strategy. No matter what type of assessment research is chosen, one of the problems is deciding upon the dependent variable. The objective of the campaign should be spelled out before the campaign is executed so that assessment research is most useful. For example, if the objective of the campaign is to increase brand awareness, this measure should be the dependent variable rather than recall of ad content or actual sales increases. Schultz and Barnes (1994) list several campaign objectives that might be examined, including liking for the brand, ad recall, brand preference, and purchasing behavior.

Pretest/posttest studies typically use personal interviews to collect data. At times, the same people are interviewed before the campaign starts and again after its close (a panel study), or two groups are chosen and asked the same questions (a trend study; see Chapter 9). In any case, measures before and after the campaign are examined to gauge the effects of advertising. Winters (1983) reports several pretest/posttest studies done for a major oil company. In one study a pretest showed that about 80% of the sample agreed that a particular oil company made too much profit. Five months later a posttest revealed that the percentage had dropped slightly among those who had seen an oil company newspaper ad but had remained the same among those who had not seen the ad. Additionally, the study disclosed that people who saw both print ads and TV ads showed less attitude change than those who saw only the TV ads, suggesting that the print ad might have had a dampening effect.

Tracking studies also rely on personal or telephone interviews as their main data collection devices. Thomas (1997) notes that tracking studies can be continuous (a certain number of interviews are conducted every day or every week for a certain time period) or pulsed (the interviews are conducted in waves, perhaps every 3 or 6 months). Continuous tracking is more expensive but it smoothes out the effect of short-term factors, such as bad weather or bad publicity. Pulsed tracking can be timed to coincide with specific schedules of ads, thus offering a more precise before–after comparison.

Technological developments have allowed researchers to track advertising and sales volume in a way not thought possible a few years ago. Of particular value are single-source research techniques. A single-source service, such as A. C. Nielsen, provides an advertiser with information on a household's exposure to advertising for a product and the purchases of that product by that household. See the Internet for "tracking studies" for many interesting examples of the procedure.

For example, Block and Brezen (1990) analyzed a tracking study of 223 households over 88 weeks concerning their spaghetti sauce purchases. They discovered that brand loyalty was the most important variable in predicting buying behavior. More recently, Jones (1995) reported the results of an elaborate tracking study of the advertising and purchasing behavior of 2,000 homes and 142 brands over an entire year. The study found evidence of pronounced short-term effects of advertising, but long-term effects were more difficult to isolate. Browne (1997) described the tracking study done by Boston Market. The company began a new advertising push in 1996 and found that sandwich sales increased by 20%, but that did not help the company—it declared bankruptcy in mid-1998.

Tracking studies are tremendously useful, but they are not without drawbacks. Perhaps the biggest problem is cost. Tracking studies typically require large samples; in fact, a sample of less than 1,500 cases per year is unusual. If a detailed analysis of subgroups is needed, the sample must be much larger. Furthermore, if the product is a national one, test markets across the country might be necessary to present a complete picture of the results. Finally, the use of sophisticated research methods, such as single-source data, makes the research even more expensive. For those who can afford it, however, the tracking study provides continuous measurement of the effects of a campaign and an opportunity to fine-tune the copy and the media schedule.

## ▪ Public Relations Research

Much like advertising, public relations, or PR, has become more research-oriented in recent years. As a leading text points out (Cutlip, Center & Broom, 1994, p. 320):

> [A] research orientation is necessary for those practicing public relations in the information age. . . . Modern managers are a fact-minded lot. . . . When the public relations aspect of organizational problems must be brought home to them, the research-based approach is most effective.

This trend toward research is continuing. A 1990 issue of *Public Relations Review* was devoted to research, and several books concentrating on public relations research have been published in recent years. A study by Lindenmann (1990) found that 75% of public relations practitioners agreed that research was an integral part of the public relations process. Wiesendanger (1994) reported that of the 80 projects completed in 1993 by Ketchum Public Relations, 57% pertained specifically to PR evaluation research, up from 24% in 1988. Hon (1998) reported that most of the public relations practitioners she interviewed favored more systematic PR research. In early 1999, an Internet search of "public relations" produced nearly 3,000 references.

Today techniques such as survey research, content analysis, and focus groups are widely used in this field. A survey by Ryan and Martinson (1990) found that focus groups were used the most by PR professionals (61%), followed by mail surveys (60%), telephone surveys (57%), and personal interviews (55%). Used the least were content analysis (29%) and participant observation (23%). A more recent survey done by the industry newsletter *pr reporter* found that focus groups, surveys, and personal interviews were the three most frequently used techniques in 1993 (Wiesendanger, 1994). Public relations researchers, however, use these methods for a highly specific reason: to improve communication with various publics.

## Types of Public Relations Research

Pavlik (1987) delineated three major types of public relations research: applied, basic, and introspective. *Applied research* examines specific practical issues; in many instances it is done to solve a specific problem. A branch of applied research, strategic research, is used to develop PR campaigns and programs. According to Broom and Dozier (1990), strategic research is "deciding where you want to be in the future . . . and how to get there." A second branch, evaluation research, is done to assess the effectiveness of a PR program and is discussed in more detail later.

*Basic research* in public relations creates knowledge that cuts across PR situations. It is most interested in examining the underlying processes and in constructing theories that explain the public relations process. For example, Hallahan (1993) argued for consensus from PR practitioners and researchers concerning a dominant paradigm to be used in public relations theory and practice. Moffitt (1994) examined the utility of collapsing the concepts of "public" and "image" into a new theory. Finally, Broom, Casey, and Ritchey (1997) examined the concept of public relationships across all areas of PR study. They developed a theoretical model for measuring and describing public organizational relationships.

The third major type of PR research is *introspective research,* which examines the field of public relations. Of all the media professions discussed in this book, public relations tends to be the most self-analytical. To illustrate, Lauzen (1995) compared the management attitudes of PR educators and practitioners and found that educators were more likely than professionals to hold an "outer-directed" view of management. Kinnick and Cameron (1994) examined the efforts of PR educators to integrate management courses into their curriculum, and Neupauer (1998) examined the percentages of women in the sports information field.

## Corporate Uses of Public Relations Research

As pointed out by Brody and Stone (1989), informal or exploratory methods are still widely used in public relations research despite the availability of highly developed social science methods. Lindenmann (1990) found that about 70% of the respondents to his survey of PR professionals reported that they thought most research on the subject was informal rather than scientific. The major problem associated with these informal techniques lies in the selection of respondents. The representativeness of the samples is often questionable. In any event, these methods can be useful provided the researcher recognizes and appreciates their weaknesses. Some more common informal methods used in public relations research are personal contacts, expert opinion, focus groups, community forums, call-in telephone lines, mail analysis, and examination of media content.

The more formal methods of research provide objective and systematic information from representative samples. These methods include the familiar survey, tracking study, content analysis, secondary analysis of existing data, and panel studies. Table 16.6 is a listing of the types of research done by PR professionals. The six major categories of public relations research are environmental monitoring programs, public relations audits, communication audits, social audits, evaluation research, and gatekeeping

Table 16.6 *Types of Research Done by PR Practitioners*

| Research conducting | Percent |
|---|---|
| Evaluating attitudes toward organization or issue | 67 |
| Identifying target audience | 65 |
| Identifying a program | 58 |
| Issue tracking | 52 |
| Measuring media use | 38 |
| Measuring changes in behavior | 33 |
| Pretesting messages | 33 |

Abridged from Ryan & Martinson (1990)

research. The first four were identified by Lerbinger (1977).

***Environmental Monitoring Programs.*** Researchers use environmental monitoring programs to observe trends in public opinion and social events that may have a significant impact on an organization. Generally, two phases are involved. The "early warning" phase, an attempt to identify emerging issues, often takes the form of a systematic content analysis of publications likely to herald new developments. For example, one corporation conducts a content analysis of scholarly journals in the fields of economics, politics, and science; another company sponsors a continuing analysis of trade and general newspapers. An alternative method is to perform panel studies of community leaders or other influential and knowledgeable citizens. These individuals are surveyed regularly about the ideas they perceive to be important, and the interviews are analyzed to pick out new topics of interest.

Brody and Stone (1989) list other forms of monitoring. One technique is to have the people doing the monitoring look for a trigger event, an event or activity that might focus public concern on a topic or issue. For example, the Exxon oil spill in Alaska brought heavy visibility to environmental concerns, and the O. J. Simpson trial in Los Angeles focused public attention on racial relations. There is no scientific way, however, of determining what is or what may become a trigger event. Monitors are left to trust their instincts and judgment. Dyer (1996) presented a conceptual model of environmental monitoring that takes into account the salience of the issue, the type of media coverage, and the amount of coverage. Such a model is useful to practitioners in structuring their monitoring.

The technique of precursor analysis is similar to trigger events analysis. Precursor analysis assumes that leaders establish trends and that these trends ultimately trickle down to the rest of society. For example, Japanese businesses tend to lead in innovative management techniques, many of which have caught on in the United States. At home, California tends to be a leader in insurance concerns and Florida in health issues. Monitors are instructed to pay particular attention to developments in these states.

The second phase of environmental monitoring consists of tracking public opinion on major issues. Typically this involves either a longitudinal panel study, in which the same respondents are interviewed several times during a specified interval, or a cross-sectional opinion poll, in which a random sample is surveyed only once. To illustrate, since 1959 the Roper organization has surveyed public attitudes about media credibility. AT&T, General Electric, General Motors, and the Dow Chemical Company have also conducted elaborate tracking studies. Most recently, DDB Needham reported the latest installment of its 16-year trend study of American lifestyles (Winski, 1992). Their data failed to support the popular idea that Americans were returning to traditional family values.

Monitoring studies have been made more efficient by the advent of on-line databases. Thomsen (1995) interviewed personnel at 12 PR firms to determine how these new research tools were used. He found that databases were most valuable to practitioners who specialized in issues management. Masterson (1992) lists seven databases that are useful for those doing monitoring studies, and Hauss (1995) describes how the new on-line technologies can be used to track news events.

The Internet has given a new dimension to environmental monitoring. PR researchers often scan relevant newsgroups for mentions of their clients and to anticipate social trends. On-line clipping services catalog mentions of a company or an issue in various electronic media. Additionally, PR firms are using on-line surveys and on-line focus groups to gather data (Johnson, 1997).

***Public Relations Audits.*** The public relations audit, as the name suggests, is a comprehensive study of the public relations position of an organization. Such studies are used to measure a company's standing both internally (in the eyes of its employees) and externally (concerning opinions of customers, stockholders, community leaders, and so on). In short, as summarized by Simon (1986, p. 150), the public relations audit is a "research tool used specifically to describe, measure and assess an organization's public relations activities and to provide guidelines for future public relations programming." (Search the Internet for "public relations audit" for several interesting examples of the procedure.)

The first step in a public relations audit is to list the segments of the public that are most important to the organization. This is generally accomplished through personal interviews with key management personnel in each department and by a content analysis of the company's external communications. The second step is to determine how the organization is viewed by each of these audiences. This involves conducting a corporate image study—that is, a survey of audience samples. The questions are designed to measure familiarity with the organization (Can the respondents recognize the company logo? Identify a product it manufactures? Remember the president's name?) as well as attitudes and perceptions toward it.

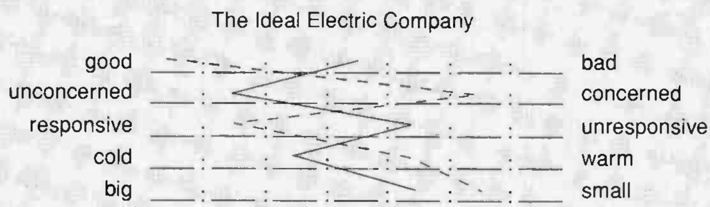
Ratings scales are often used. For example, respondents might be asked to rank their perceptions of the ideal electric company on a seven-point scale for a series of adjective pairs, as shown in Figure 16.2. Later the respondents would rate a specific electric company on the same scale. The average score for each item would be tabulated and the means connected by a zigzag line to form a composite profile. Thus, in Figure 16.3, the ideal electric company's profile is represented by a broken line and the actual electric company's standing by a solid line. By comparing the two lines, public relations researchers can readily identify the areas in which a company falls short of the ideal. Corporate image studies can be conducted before the beginning of a public relations campaign and again at the

Figure 16.2 *A Semantic Differential Scale for Eliciting Perceptions of Electric Companies*

The Ideal Electric Company

good ___ : ___ : ___ : ___ : ___ : ___ : ___ bad
unconcerned ___ : ___ : ___ : ___ : ___ : ___ : ___ concerned
responsive ___ : ___ : ___ : ___ : ___ : ___ : ___ unresponsive
cold ___ : ___ : ___ : ___ : ___ : ___ : ___ warm
big ___ : ___ : ___ : ___ : ___ : ___ : ___ small

Figure 16.3 *Profiles of Ideal (Broken Line) and Actual (Solid Line) Electric Companies Resulting from Ratings Study*




conclusion of the campaign to evaluate its effectiveness. An example of a public relations audit is described in Croft (1996).

***Communication Audits.*** The communication audit resembles a public relations audit but has narrower goals; it concerns the internal and external means of communication used by an organization, rather than the company's entire public relations program. The three research techniques generally used in conducting such an audit are readership surveys, content analyses, and readability studies. Readership studies are designed to measure how many people read certain publications (such as employee newsletters or annual reports) and remember the messages they contain. The results are used to improve the content, appearance, and method of distribution of the publications. For example, Pincus, Rayfield, and Cozzens (1991) audited the communication behaviors of corporate chief executive officers (CEOs) and found that CEOs spent about 20% of their working time communicating with their employees, favored face-to-face communication more than written memos or videotaped messages, and did most of their communication with top management. Sparks (1997) measured the attitudes of employees and retirees of a large public utility toward its newsletter. She found several areas where readers thought the publication might improve.

Content analyses reveal how the media are handling news and other information about and from the organization; they may be conducted in-house or by private firms that provide computerized studies of press coverage. Readability studies help a company gauge the ease with which its employee publications and press releases can be read. An internal audit would also include an analysis of channels of communication within the organization.

***Social Audits.*** A social audit is a small-scale environmental monitoring program designed to measure an organization's social performance—that is, how well it is living up to its public responsibilities. The audit provides feedback on company-sponsored social action programs such as minority hiring, environmental cleanup, and employee safety. This is the newest form of public relations research and the most challenging.

Researchers are currently studying such questions as what activities to audit, how to collect data, and how to measure the effects of the programs. Nevertheless, several large companies, including General Motors and Celanese, have already conducted lengthy social audits.

***Evaluation Research.*** A fifth major category of public relations research has recently achieved prominence and needs to be added to Lerbinger's list: evaluation research. **Evaluation research** refers to the process of judging the effectiveness of program planning, implementation, and impact. Rossi and Freeman (1982) have outlined some basic questions that occur at each of these stages. Here are three examples:

1. *Planning.* What is the extent of the target program? How do the costs of the program relate to the potential benefits?
2. *Implementation.* Is the program reaching the target population or target area?
3. *Impact.* Is the program effective in achieving its intended goals? Is the program having some effects that were not intended?

Lindenmann (1990) found that 75% of PR practitioners reported that they did research at the planning phase, while 58% did implementation research and 56% did evaluation research. The specific research methods used at each of the three stages listed have been mentioned in other chapters. For example, at the planning stage, content analysis (see Chapter 7) is used to determine how closely program efforts coincide with the actual plan. Readability tests (see Chapter 14) are frequently used to determine whether the messages can be read and understood by the target group. During the implementation stage, content analysis is used again to count the number of messages that are placed in the media. Next, the number of people actually exposed to the message is determined by the methods of audience research mentioned earlier in this chapter. Circulation figures and audience estimates from the Audit Bureau of Circulations, Simmons Market Research Bureau, A. C. Nielsen, and Arbitron are helpful in measuring exposure.

At the impact level, public relations researchers are interested in the same three levels of effect that were mentioned in the discussion of copy research: cognitive, affective, and conative. At the cognitive level, researchers attempt to find out how much people learned from the public relations campaign. At the affective level, measures of changes in attitudes, opinions, or perceptions are used quite frequently. Finally, behavioral change, at the conative level, is an important way to gauge public relations impact. Obviously, the techniques used in advertising campaign effectiveness studies—pretest/posttest and tracking studies—can be applied in measuring the impact dimension of public relations campaigns.

Public relations professionals are relying more on the techniques of social science in their evaluation efforts. Bissland (1990) analyzed the evaluation techniques used by "Silver Anvil" award winners (the Silver Anvil is PR's equivalent of the Oscar). He found that only 25% of the winners used social science methods in 1980–1981 compared to more than 40% in 1988–1989.

Lindenmann (1988) discusses several examples of evaluation research used by corporations. The Aetna Life and Casualty Company has used before-and-after polling during the last few years as part of a campaign to introduce a long-term health care plan for elderly Americans. The company's precampaign polling revealed that a large majority of Americans incorrectly believed that Medicare coverage routinely extended to nursing home stays. After a communication campaign, the company's polls found that more people were aware of Medicare's limitations than had been before. The California Prune Board used the day-after recall method to gauge the effectiveness of its media campaign designed to promote prunes as a high-fiber food source (see *www.prunes.org*). A survey of women in Detroit revealed that awareness of prunes as a fiber source increased from 50% to 65%. Rosser, Flora, Chaffee, and Farquar (1990) found that exposure to a PR campaign on reducing the risk of heart disease made a significant contribution to knowledge.

In 1997 the Institute for Public Relations Research and Education (see *www.instituteforpr.com*) published "Guidelines and Standards for Measuring and Evaluating Public Relations Effectiveness," a document that sought to develop minimum ground rules for measuring the impact of public relations. The guidelines differentiated between the measurement of public relations outputs—how well an organization presents itself to others or the amount of exposure the organization receives—and public relations outcomes—if the public relations effort resulted in any change in opinion, attitude, or behavior. In general, measuring public relations outcomes is more difficult than measuring PR outputs (Lindenman, 1997). PR outputs may be measured by content analysis, attendance figures at trade shows, and analysis of Internet communications. PR outcomes are more often measured by surveys, experiments, focus groups, and direct observation.

**Gatekeeping Research.** A final area of PR research that has recently gained popularity can be termed *gatekeeping research*. This technique analyzes the characteristics of press releases and video news releases that allow them to "pass through the gate" and appear in a mass medium. Both content and style variables are typically examined. For example, Morton and Ramsey (1994) studied 129 national news releases carried over a PR wire service and found that 22 were carried by newspapers and that releases dealing with financial matters were more likely to be used than those dealing with other topics. News releases with localized facts—that is, rewritten to be of interest to the paper where it is being sent—were more apt to be published than general releases (Morton & Warren, 1992). The same authors also examined which type of artwork was preferred by newspaper gatekeepers. They found that hometown photos were favored, particularly by smaller-circulation newspapers. Finally, Walters, Walters, and Starr (1994) examined the differences between the grammar and syntax of original news releases and published versions. They found that editors typically shorten the releases and make them easier to read before publication. In sum, it appears that the news release most likely to pass through the gate is one that is short, is simply written, deals with localized financial matters, and is accompanied by a hometown photo. Last, McCleneghan (1997/98) examined data on what type of video news releases were used by local television stations.

## ▪▪▪ Summary

The three main areas of advertising research are copy testing, media research, and campaign assessment research. Copy testing consists of studies that examine the advertisement or the commercial itself. The three main dimensions of impact examined by copy testing are cognitive (knowing), affective (feeling), and conative (doing). Media research helps determine which advertising vehicles are the most efficient and what type of media schedule will have the greatest impact. Campaign assessment studies examine the overall response of consumers to a complete campaign. The two main types of campaign assessment research are the pretest/posttest and the tracking study. Many private firms specialize in supplying copy, media, and assessment data to advertisers.

Research in public relations involves monitoring relevant developments and trends, studying the public relations position of an organization, examining the messages produced by an organization, measuring how well an organization is living up to its social responsibilities, evaluating public relations campaigns, and determining what factors make it more likely for PR material to be published.

## Questions and Problems for Further Investigation

1. Suppose you have developed a new diet soft drink and are ready to market it. Develop a research study for identifying the elements and topics that should be stressed in your advertising.
2. A full-page advertisement costs $16,000 in Magazine A and $26,000 in Magazine B. Magazine A has a circulation of 100,000 and 2.5 readers per copy, whereas Magazine B has a circulation of 150,000 and 1.8 readers per copy. In terms of CPM readers, which magazine is the most efficient advertising vehicle?
3. Visit the Internet site *www.vmr.com* to see a broad range of advertising research information. You will not be disappointed.
4. Select a sample of newspaper and magazine advertisements for two airlines. Conduct a content analysis of the themes or major selling points in each advertisement. What similarities and differences are there?
5. Assume you are the public relations director for a major automobile manufacturer. How would you go about conducting an environmental monitoring study?
6. How would you assess the public relations impact of an information campaign designed to persuade people to conserve water?
7. If you are using *InfoTrac College Edition,* several articles are available that examine the copy testing issue. Do a title search using "copy testing" and read the most recent conclusions.

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Chapter 17

# Research in Media Effects


- *Antisocial and Prosocial Effects of Media Content*
- *Uses and Gratifications*
- *Agenda Setting by the Media*
- *Cultivation of Perceptions of Social Reality*
- *Social Impact of the Internet*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

Chapters 14–16 focused on research conducted in a professional or industry setting; however, a great deal of mass media research is done at colleges and universities. As we mentioned in Chapter 1, there are several differences between research in the academic and the private sectors. To summarize briefly:

- Academic research tends to be more theoretical in nature; private sector research is generally more applied.
- The data used in academic research are public, whereas much industry research is based on proprietary data.
- Top management often determines private sector research topics; academic researchers have more freedom in their choice of topics.
- Projects in private sector research usually cost more to conduct than do academic investigations.

The two research settings also have some common features:

- Many research techniques and approaches used in the private sector emerged from academic research.
- Industry and academic researchers use the same basic research methodologies and approaches.
- The goal of research is often the same in both settings—to explain and predict audience and consumer behavior.

This chapter describes some of the more popular types of research carried out by academic investigators and shows how this work relates to private sector research.

Obviously, not every type of scholarly research used in colleges and universities can be covered in one chapter. What follows is not an exhaustive survey but rather an illustrative overview of the history, methods, and theoretical development of five research areas: antisocial and prosocial effects of specific media content, uses and gratifications, agenda setting by the media, cultivation of perceptions of social reality, and the social impact of the Internet.

## Antisocial and Prosocial Effects of Media Content

The antisocial effect of viewing television and motion pictures is one of the most heavily researched areas in all mass media studies. Comstock, Chaffee, and Katzman (1978) reported that empirical studies focusing on this topic outnumbered work in all other problem areas by four to one, and this emphasis is still apparent more than a decade later. Paik and Comstock (1994) reviewed the results of 217 studies conducted between 1959 and 1990. Search the Internet for "antisocial effects" and "violence research" for hundreds of references and research reports.

The impact of prosocial content is a newer area and grew out of the recognition that the same principles underlying the learning of antisocial activities ought to apply to more positive behavior. Applied and academic researchers share an interest in this area: All the major networks have sponsored such research, and the effects of antisocial and prosocial content have been popular topics on college and university campuses for the past 30 years. It is not surprising that there has been a certain amount of friction between academic researchers and industry executives.

### History

Concern over the social impact of the mass media was evident as far back as the 1920s, when many critics charged that motion pictures had a negative influence on children. In 1928 the Motion Picture Research Council, with support from the Payne Fund, a private philanthropic organization, sponsored a series of 13 studies on the movies' influence on children. After examination of film content, information gain, attitude change, and influence on behavior, it was concluded that the movies were potent sources of information, attitudes, and behavior for children. Furthermore, many of the things that children learned had antisocial overtones. In the early 1950s, another medium, the comic book, was chastised for its alleged harmful effects (Wertham, 1954).

In 1960 Joseph Klapper (1960) summarized what was then known about the social impact of mass communication. In contrast to many researchers, Klapper downplayed the potential harmful effects of the media. He concluded that the media most often reinforced an individual's existing attitudes and predispositions. Klapper's viewpoint, which became known as the minimal effects position, was influential in the development of a theory of media effects.

In the late 1950s and early 1960s, concern over the antisocial impact of the media shifted to television. Experiments on college campuses by Bandura and Berkowitz (summarized in Comstock & Paik, 1991) showed that aggressive behavior could be learned by viewing violent media content and that a stimulation effect was more probable than a cathartic (or cleansing) effect. (Although it may seem odd, search the Internet for "bobo doll" to learn about Bandura's experiments.) Senate subcommittees examined possible links between viewing violence on television and juvenile delinquency, and in 1965 one subcommittee concluded that televised crime and violence were related to antisocial behaviors among juvenile viewers. The civil unrest and assassinations in the middle and late 1960s prompted the formation of the National Commission on the Causes and Prevention of Violence, chaired by Milton Eisenhower. The staff report of the Eisenhower Commission, which concluded that television violence taught the viewer how to engage in violence, included a series of recommendations about reducing the impact of television violence.

The early 1970s saw extensive research on the social effects of the mass media. Just 3 years after the publication of the Eisenhower Commission report came the release of a multivolume report sponsored by the Surgeon General's Scientific Advisory Committee on Television and Social Behavior (1972, p. 10). In *Television and Growing Up,* the committee cautiously summarized its research evidence:

> There is a convergence of fairly substantial evidence on short-run causation of aggression among children by viewing violence . . . and the much less certain evidence from field studies that . . . violence viewing precedes some long-run manifestation of aggressive behavior. This convergence . . . constitutes some preliminary evidence of a causal relationship.

The committee tempered this conclusion by noting that in accordance with the reinforcement notion, "any sequence by which viewing television violence causes aggressive behavior is most likely applicable only to some children who are predisposed in that direction" (p. 10).

At about the same time, the three television networks were sponsoring research in this area. CBS commissioned two studies: a field experiment that found no link between television viewing and subsequent imitation of antisocial behavior (Milgram & Shotland, 1973) and a longitudinal study in Great Britain that found an association between viewing violence on television and committing antisocial acts such as damaging property and hurting others (Belson, 1978). ABC sponsored a series of studies by two mental health consultants who concluded that television stimulated aggression to only a tiny extent in children (Heller & Polsky, 1976). NBC began a large-scale panel study, but results were not released until 1983. In addition to television violence, the potential antisocial impact of pornography was under scrutiny. The Commission on Obscenity and Pornography (1970), however, reported that such material was not a factor in determining antisocial behavior. The commission's conclusions were somewhat controversial in political circles, but in general they supported the findings of other researchers in human sexuality (Tan, 1986). Subsequent efforts in this area were directed primarily toward examining links between pornography and aggression.

Along with violence and pornography, the contrasting prosocial effect of television was investigated as well. One stimulus for this research was the success of the television series "Sesame Street." A substantial research effort went into the preparation and evaluation of these children's programs. It was found that the series was helpful in preparing young children for school but not very successful in narrowing the information gap between advantaged and disadvantaged children (Minton, 1975). Other studies by both academic researchers and industry researchers demonstrated the prosocial impact of other programs. For example, the series "Fat Albert and the Cosby Kids" was found to be helpful in teaching prosocial lessons to children (CBS Broadcast Group, 1974).

Studies of these topics continued between 1975 and 1985, although there were far fewer than in the early 1970s. An update to the 1972 Surgeon General's Report, issued in 1982, reflected a broader research focus than the original document; it incorporated investigations of socialization, mental health, and perceptions of social reality. Nonetheless, its conclusions were even stronger than those of its predecessor: "The consensus among most of the research community is that violence on television does lead to aggressive behavior" (National Institute of Mental Health, 1982, p. 8). Other researchers, notably Wurtzel and Lometti (1984) and Bear (1984), argue that the report does not support the conclusion of a causal relationship, whereas Chaffee (1984) and Murray (1984), among others, contend that the conclusions are valid. Not long after the Surgeon General's report was updated, the results of the NBC panel study begun in the early 1970s were published (Milavsky, Kessler, Stipp & Rubens, 1983). This panel study, which used state-of-the-art statistical analyses, found a nonsignificant relationship between viewing television violence during the early phases of the study and subsequent aggression. The NBC data have been reexamined by others, and at least one article suggests that the data from this survey do show a slight relationship between violence viewing and aggression among at least one demographic subgroup—middle-class girls (Cook, Kendzierski & Thomas, 1983). From 1985 to 1996 the controversy subsided, but this topic remained popular among academic researchers. Williams (1986) conducted an elaborate field experiment in three Canadian communities. One town was about to receive television for the first time, another received Canadian TV, and the third received both Canadian and U.S. programs. Two years later, Williams and her colleagues found that when compared to children in the other two communities, children in the town that had just received TV scored higher on measures of physical and verbal aggression.

Additional evidence on the topic of television and violence comes from a series of panel studies conducted by an international team of researchers (Huesmann & Eron, 1986). Data were gathered from young people in the United States, Finland, Australia, Israel, and Poland. Findings from the U.S. and Polish studies reached a similar conclusion: Early TV viewing was related to later aggression. The Finnish study found this relationship for boys but not for girls. The Israeli study found that TV viewing seemed to be related to aggression for children living in urban areas but not for those in rural areas. The Australian study failed to find a relationship. In all countries where a relationship between TV viewing and violence was found, the relationship was relatively weak. Rosenthal (1986), who concluded that even a weak relationship could have substantial social consequences, examined the practical implications of this weak relationship.

More recently Congress passed the Telecommunications Act of 1996. Part of the act specified that newly manufactured TV sets had to contain a V-chip, a computer chip that allows parents to block out violent and other objectionable programming from their TV sets. The chip would work in concert with a ratings system developed by the industry. Despite this renewed attention to violent television, the number of studies examining the topic has decreased in the last few years. *Communication Abstracts* listed only three audience studies in 1996 and 1997 that addressed this issue. (See the Internet for "telecommunications act" for nearly 24,000 references and discussions.)

The increasing popularity of video games during the early years of this decade opened up another avenue of inquiry for researchers. Since more than 90% of young people report that they sometimes play these games, and since some of the more popular games feature graphic and explicit violence, social concern over their impact was widespread. Results of some of the early studies in this area (for example, Silvern & Williamson, 1987) suggest that playing video games can lead to increased aggression levels in young children and is related to their self-concepts (Funk & Buchman, 1996).

Research interest in the antisocial effects of pornography increased in the late 1980s—averaging approximately eight studies per year as listed in *Communication Abstracts*—but declined by the late 1990s, averaging only four studies. The most controversial research in this area examined whether prolonged exposure to nonviolent pornography had any antisocial effects (Donnerstein, Linz & Penrod, 1987; Zillmann & Bryant, 1989; Allen, D'Alessio & Brezgel, 1995).

Research interest in the prosocial effects of media exposure decreased in the 1980s and mid-1990s. Sprafkin and Rubinstein (1979) reported on a correlational study in which the viewing of prosocial television programs accounted for only 1% of the variance in an index of prosocial behavior exhibited in school. The apparent lack of a strong relationship between these two variables, coupled with the absence of general agreement on a definition of *prosocial content,* might have discouraged researchers from selecting this area. In any case, an average of only one study per year appears in the 1986–1998 editions of *Communication Abstracts,* and many of these are content analyses (for example, Potter & Ware, 1989).

## Methods

Researchers who study the effects of mass media have used most of the techniques discussed in this book: content analysis, laboratory experiments, surveys, field experiments, observations, and panels. In addition, they have used some advanced techniques, such as meta-analysis, that have not been discussed.

Given the variety of methods used, it is not possible to describe a typical approach. Instead, this section focuses on five different methods as illustrations of some research strategies.

***The Experimental Method.*** A common design used to study the antisocial impact of the media is to show one group of subjects violent media content, while a control group sees nonviolent content. This was the approach used by Berkowitz and Bandura in their early work. The dependent variable, aggression, is measured immediately after exposure—either by a pencil-and-paper test or by a mechanical device like the one described below. For example, Liebert and Baron (1972) divided children into two groups. The first group saw a 3.5-minute segment from a television show depicting a chase, two fistfights, two shootings, and a knifing. Children in the control group saw a segment of similar length in which athletes competed in track and field events. After viewing, the children were taken one at a time into another room that contained an apparatus with two buttons, one labeled "Help" and the other labeled "Hurt." An experimenter explained to the children that wires from the device were connected to a game in an adjacent room. The subjects were told that in the adjacent room, another child was starting to play a game. (There was, in fact, no other child.) At various times, by pressing the appropriate buttons, each child was given a chance either to help the unseen child win the game or to hurt the child. The results showed that children who had seen the violent segment were significantly more likely than the control group to press the "Hurt" button. Of course, there are many variations on this basic design. For example, the type of violent content shown to the subjects can be manipulated (cartoon versus live violence, entertainment versus newscast violence, justified versus unjustified violence). Also, some subjects may be frustrated before exposure. The degree of association between the media violence and the subsequent testing situation may be high or low. Subjects can watch alone or with others who praise or condemn the media violence. Media exposure can be a one-time event, or it can be manipulated over time. For a thorough summary of this research, see Comstock and Paik (1991) and Liebert and Sprafkin (1992).

Experimental studies to examine the impact of media exposure on prosocial behavior have used essentially the same approach. Subjects see a televised segment that is either prosocial or neutral, and the dependent variable is then assessed. For example, Forge and Phemister (1987) randomly assigned preschoolers to one of four conditions: prosocial animated program ("The Get-along Gang"), neutral animated ("Alvin and the Chipmunks"), prosocial nonanimated ("Mr. Rogers' Neighborhood"), and neutral nonanimated ("Animal Express"). The children watched the program and were then placed in a free-play situation where their prosocial behaviors were observed and recorded. The results demonstrated an effect for the program variable (prosocial programs prompted more prosocial behaviors than did neutral programs) but no effect for the animated versus nonanimated variable.

The operational definitions of *prosocial behavior* have varied widely: Studies have examined cooperative behaviors, sharing, kindness, altruism, friendliness, creativity, and absence of stereotyping. Almost any behavior with a positive social value seems to be a candidate for study, as exemplified by the experiment by Baran, Chase, and Courtright (1979). Third-graders were assigned to one of three treatment conditions. One group saw a condensed version of a segment of "The Waltons" demonstrating cooperative behavior, the second group saw a program portraying noncooperative behavior, and the third group saw no program. After answering a few written questions dealing with the program, each subject left the viewing room only to encounter a confederate of the experimenter who passed the doorway and dropped an armload of books. There were two dependent measures: whether the subject attempted to retrieve the books, and how much time elapsed until the subject began to help. The group that saw the cooperative content was more likely to help, and their responses were quicker than those of the control group. It is interesting that there was no difference in helping behavior or in time elapsed between the group that saw "The Waltons" and the group that saw the noncooperative content.

***The Survey Approach.*** Most survey studies have used questionnaires that incorporate measures of media exposure (such as viewing television violence or exposure to pornography) and a pencil-and-paper measure of antisocial behavior or attitudes. In addition, many recent studies have included measures of demographic and sociographic variables that mediate the exposure–antisocial behavior relationship. Results are usually expressed as a series of correlations.

A survey by McLeod, Atkin, and Chaffee (1972) illustrates this approach. Their questionnaire contained measures of violence viewing, aggression, and family environment. They tabulated viewing by giving respondents a list of 65 prime-time television programs with a scale measuring how often each was viewed. An index of overall violence viewing was obtained by using an independent rating of the violence level of each show and multiplying it by the frequency of viewing. Aggression was measured by seven scales. One measured respondents' approval of manifest physical aggression (sample item: "Whoever insults me or my family is looking for a fight"). Another examined approval of aggression ("It's all right to hurt an enemy if you are mad at him"). Respondents indicated their degree of agreement with each of the items on the separate scales. Family environment was measured by asking about parental control over television, parental emphasis on nonaggression punishment (such as withdrawal of privileges), and other variables. The researchers found a moderate positive relationship between the respondents' level of violence viewing and their self-reports of aggression. Family environment showed no consistent association with either of the two variables.

Sprafkin and Rubinstein (1979) used the survey method to examine the relationship between television viewing and prosocial behavior. They used basically the same approach as McLeod, Atkin, and Chaffee (1972), except their viewing measure was designed to assess exposure to television programs established as prosocial by prior content analysis. Their measure of prosocial behaviors was based on peer nominations of persons who reflected 12 prosocial behaviors, including helping, sharing, following rules, staying out of fights, and being nice. The researchers found that when the influence of the child's gender, the parents' educational level, and the child's academic level were statistically controlled, exposure to prosocial television explained only 1% of the variance in prosocial behaviors.

Prosocial effects are not limited to children. Brown (1990) studied the impact of an Indian TV show that was specifically produced to promote the status of women in Indian society. Frequent watchers of the program were aware of the show's prosocial messages and were more likely to believe in women's equality than were infrequent viewers.

***Field Experiments.*** The imaginative and elaborate field work used to study the antisocial effects of the media by Milgram and Shotland (1973) was discussed in Chapter 11. Parke, Berkowitz, and Leyens (1977) conducted a field experiment in a minimum-security penal institution for juveniles. The researchers exposed groups to unedited feature-length films that were either aggressive or nonaggressive. On the day after the last film was shown, in the context of a bogus learning experiment, the boys were told they had a chance to hurt a confederate of the experimenters who had insulted one group of boys and had been neutral to the other. The results on an electric shock measure similar to the one described previously revealed that the most aggressive of all the experimental groups were the boys who had seen the aggressive films and had been insulted. In addition to this laboratory measure, the investigators collected observational data on the boys' aggressive interpersonal behavior in their everyday environment. These data showed that boys who saw the violent movies were more interpersonally aggressive. However, there was no apparent cumulative effect of movies on aggression. The boys who watched the diet of aggressive films were just as aggressive after the first film as after the last.

Figure 10.11 (page 227) illustrates the design of the Canadian field experiment (Williams, 1986) discussed earlier. The dependent variable of aggression was measured in three ways: observations of behavior on school playgrounds, peer ratings, and teacher ratings. On the observational measure, the aggressive acts of children in the town labeled A (the town that just received TV) increased from an average of 0.43 per minute in Phase 1 to 1.1 per minute in Phase 2. Children in the other towns showed only a slight and statistically insignificant increase in the same period. Peer and teacher ratings tended to support the behavioral data. As yet, there have been no large-scale field experiments examining prosocial behavior.

***Panel Studies.*** Primarily because of the time and expense involved in panel studies, this method is seldom used to examine the antisocial effects of the media. Three studies relevant to this topic are briefly reviewed here. Lefkowitz, Eron, Waldner, and Huesmann (1972), using a catch-up panel design, reinterviewed 427 of 875 youthful subjects 10 years after they had participated in a study of mental health. Measures of television viewing and aggression had been administered to these subjects when they were in the third grade, and data on the two variables were gathered again a decade later. Slightly different methods were used to measure television viewing on the two occasions. Viewing in the third grade was established on the basis of mothers' reports of their children's three favorite television shows. Ten years later, respondents rated their own frequency of viewing. The data were subjected to cross-lagged correlations and path analysis. The results supported the hypothesis that aggression in later life was caused in part by television viewing during early years. However, the panel study by Milavsky and colleagues (1983), sponsored by NBC, found no evidence of a relationship.

The difference between the results of these studies might be due to several factors. The Milavsky study did not vary its measure of "violent television viewing" throughout its duration. In addition, the NBC researchers used LISREL (linear structural equations), a more powerful statistical technique, which was not available at the time of the Lefkowitz study. Finally, the Lefkowitz measures were taken 10 years apart; the maximum time lag in the NBC study was 3 years.

Another panel study of the media and possible antisocial effects was conducted by Huesmann and Eron (1986). The investigators followed 758 children who were in the first and third grades in 1977 and reinterviewed them in 1978 and 1979. Aggression was measured by both peer nominations and self-ratings. Multiple regression analyses disclosed that, for both boys and girls, watching TV violence was a significant predictor of the aggression they would later demonstrate. Other significant variables were the degree to which children identified with violent TV characters, the perceived reality of the violence, and the amount of a child's aggressive fantasizing. More recently, Valkenburg and Van der Voort (1995) conducted a 1-year panel study that examined the influence of viewing TV violence on children's daydreaming. They found that exposure to violent programs stimulated an aggressive-heroic daydreaming style.

***Meta-analysis.*** A complete description of the techniques of meta-analysis is beyond the scope of this book. For our purposes, meta-analysis is defined as the quantitative aggregation of many research findings and their interpretations. It allows researchers to draw general conclusions from an analysis of many studies that have been conducted concerning a definable research topic. Its goal is to provide a synthesis of an existing body of research. Given the large number of research studies that have been conducted concerning antisocial and prosocial behavior, it is not surprising that the mid- to late 1990s saw the growth in popularity of meta-analytic research. Five examples of meta-analysis are mentioned next.

Paik and Comstock (1994) performed a meta-analysis on 217 studies from 1959 to 1990 that tested 1,142 hypotheses. They concluded that the magnitude of the impact of exposure to media violence varied with the method used to study it. Experiments produced the strongest effects, and time-series studies the weakest. Nonetheless, there was overall a highly significant positive association between exposures to portrayals of violence and antisocial behavior. In addition, they found that males were affected by exposure to media violence only slightly more than females and that violent cartoons and fantasy programs produced the greatest magnitude of effects. This latter finding is at odds with the conventional argument that cartoon violence does not affect viewers because it is unrealistic.

A second meta-analysis on the impact of exposure to pornography and subsequent aggressive behavior was done by Allen, D'Alessio and Brezgel (1995). They analyzed the results of 30 studies and found that there was indeed a connection between exposure to pornography and subsequent antisocial behavior. More specifically, they noted that exposure to nudity actually decreased aggressive behavior. In contrast, consumption of material depicting nonviolent sexual activity increased aggressive behavior, while exposure to violent sexual activity generated the highest levels of aggression. These latter findings are in accord with those discussed by Paik and Comstock (1994). A meta-analysis of studies examining exposure to pornography and acceptance of rape myths (Allen, Emmers, Gebhardt & Geiry, 1995) revealed that experimental studies showed a positive relationship between pornography and rape myth acceptance but nonexperimental studies displayed no such effects.

Friedlander (1993) reported the results of a meta-analysis that compared the magnitude of effects reported by studies that looked at antisocial behavior with those that examined prosocial behavior. He found that, with few exceptions, the effects found for prosocial media messages were larger than the effect found for antisocial messages. Finally, Hogben (1998) looked at the results of 56 analyses from 30 studies and concluded that viewing televised violence was associated with a small increase in viewer aggression. In addition, there was a correlation between the year a study was done and the effect size; the later the study, the greater the effect size, suggesting that prolonged exposure has a greater effect on viewers. Last, justified violence and violence that did not accurately portray the consequence of violence generated greater effect sizes.

The Internet provides thousands of examples of meta-analysis research. Search for "meta-analysis" and pay attention to the broad scope of studies available.

***Summary.*** Experiments and surveys have been the most popular research strategies used to study the impact of media on antisocial and prosocial behavior. The more elaborate techniques of field experiments and panel studies have been used infrequently. Laboratory experiments have shown a stronger positive relationship between viewing media violence and aggression than have the other techniques. Meta-analyses have offered general conclusions about the scope and magnitude of these effects.

## Theoretical Developments

One of the earliest theoretical considerations in the debate on the impact of media violence was the controversy of catharsis versus stimulation. The *catharsis* approach suggests that viewing fantasy expressions of hostility reduces aggression because a person who watches filmed or televised violence is purged of his or her aggressive urges. This theory has some obvious attraction for industry executives because it implies that presenting violent television shows is a prosocial action. The *stimulation* theory argues the opposite: Viewing violence prompts more aggression on the part of the viewer. Research findings in this area have indicated little support for the catharsis position. A few studies did find a lessening of aggressive behavior after viewing violent content, but these results apparently were an artifact of the research design. The overwhelming majority of studies found evidence of a stimulation effect.

Since these early studies, many experiments and surveys have used social learning as their conceptual basis. As spelled out by Bandura (1977), the theory explains how people learn from direct experience or from observation (or modeling). Some key elements in this theory are attention, retention, motor reproduction, and motivations. According to Bandura, *attention* to an event is influenced by characteristics of the event and by characteristics of the observer. For example, repeated observation of an event by a person who has been paying close attention should increase learning. *Retention* refers to how well an individual remembers behaviors that have been observed. *Motor reproduction* is the actual behavioral enactment of the observed event. For example, some people can accurately imitate a behavior after merely observing it, but others need to experiment. The *motivational* component of the theory depends on the reinforcement or punishment that accompanies performance of the observed behavior.

Applied to the effects area, social learning theory predicts that people can learn antisocial or prosocial acts by watching films or television. The model further suggests that viewing repeated antisocial acts makes people more likely to perform these acts in real life. Another suggestion is that *desensitization* accounts for people who are heavily exposed to violence and antisocial acts becoming less anxious about the consequences.

Bandura (1977) summarized much of the research on social learning theory. In brief, some key findings in laboratory and field experiments suggest that children can easily perform new acts of aggression after a single exposure to them on television or in films. The similarity between the circumstances of the observed antisocial acts and the post-observation circumstances is important in determining whether the act is performed. If a model is positively reinforced for performing antisocial acts, the observed acts are performed more frequently in real life. Likewise, when children are promised rewards for performing antisocial acts, they exhibit more antisocial behavior. Other factors that facilitate the performance of antisocial acts include the degree to which the media behavior is perceived to be real, the emotional arousal of the subjects, and the presence of cues in the post-observation environment that elicit antisocial behavior. Finally, as predicted by the theory, desensitization to violence can occur through repeated exposure to violent acts.

Other research has continued to refine and reformulate some of the elements in social learning theory. For example, the arousal hypothesis (Tannenbaum & Zillmann, 1975) suggests that, for a portrayal to have a demonstrable effect, increased arousal may be necessary. According to this model, if an angered person is exposed to an arousing stimulus, such as a pornographic film, and is placed in a situation to which aggression is a possible response, the person will become more aggressive. (*Excitation transfer* is the term used by the researchers.)

Zillmann, Hoyt, and Day (1979) offer some support for this model. It appears that subjects in a high state of arousal after seeing a violent film will perform more prosocial acts than nonaroused subjects. Like aggressive behavior, prosocial behavior seems to be facilitated by media-induced arousal (Mueller, Donnerstein & Hallam, 1983).

Other research has shown that social learning theory can be applied to the study of the effects of viewing pornography. Zillmann and Bryant (1982) showed that heavy exposure to pornographic films apparently desensitized subjects to the seriousness of rape and led to decreased compassion for women as rape victims. A similar finding was obtained by Linz, Donnerstein, and Penrod (1984). Men who viewed five movies depicting erotic situations involving violence toward women perceived the films as less violent and less degrading to women than did a control group not exposed to the films. In sum, social learning theory is a promising framework for integrating many findings in this area.

Another promising theory, outlined by Berkowitz and Rogers (1986), is based on priming effects analysis. (Search the Internet for "priming effects" for several examples.) Drawing upon the concepts of cognitive neoassociationism, priming effects analysis posits that elements of thought or feeling or memories are parts of a network connected by associative pathways. When a thought element is activated, the activation spreads along the pathways to other parts of the network. Thus, for some time after a concept is activated, there is an increased probability that it and other associated parts of the network will come to mind again, thus creating the priming effect. As a result, aggressive ideas prompted by viewing media violence trigger other semantically related thoughts, thereby increasing the probability that associated aggressive thoughts will come to mind. Berkowitz and Rogers note that priming analysis can explain why much exposure to media violence results in short-term, transient effects. They point out that the priming effect attenuates over time to lower the probability of subsequent violent effects.

Van Evra (1990) suggests that "script theory" might also be useful in explaining the impact of viewing TV violence. Since most viewers, particularly younger ones, have little real-life experience with violence but see a lot of it on TV, their behavior patterns or scripts might be influenced by the TV exposure. Those who watch a large amount of violent TV might store these scripts in their memory and display violence when an appropriate stimulus triggers the acting out of their scripts. Moreover, Huesmann and Eron (1986) argue that if a young child learns early in his or her developmental cycle that aggression is a potent problem-solving technique, that behavior will be hard to change because the script has been well rehearsed by the child.

Drawing upon the above information, Comstock and Paik (1991) have proposed a three-factor explanation of the influence of media violence on antisocial and aggressive behavior:

1. Violent portrayals that are unique, compelling, and unusual are likely to prompt viewer aggression because of their high attention and arousal.

2. Social cognition theory suggests that repetitive and redundant portrayals of violence prompt viewers to develop expectations and perceptions of violence.
3. Violent media content encourages the early acquisition of stable and enduring traits. Some violent scripts may be learned by children who are only 3 or 4 years old.

More recently, Sander (1997) proposed a new theoretical approach, the dynamic transaction model, to explain how viewers perceive violence. The model posits that a person's reaction to media violence is a function of the precise form of the media stimulus and the interpretive ability of the receiver. A quasi-experimental study of viewers revealed that audience members and researchers perceive violence differently and that specific content variables (physical vs. psychological violence, serious vs. comic violence, real vs. fantasy violence, etc.) have the greatest influence on perceptions, followed by the emotional state of the receiver while watching violence. Krcmar's (1998) study suggested that family communication patterns are also important in determining how children perceive violence. These last two studies support the idea that perceptions of violence may be a key concept in formulating theories about the impact of this kind of material.

## ▪ Uses and Gratifications

The *uses and gratifications* perspective takes the view of the media consumer. It examines how people use the media and the gratifications they seek and receive from their media behaviors. Uses and gratifications researchers assume that audience members are aware of and can articulate their reasons for consuming various media content.

### History

The uses and gratifications approach has its roots in the 1940s, when researchers became interested in why people engaged in various forms of media behavior, such as radio listening or newspaper reading. These early studies were primarily descriptive, seeking to classify the responses of audience members into meaningful categories. For example, Herzog (1944) identified three types of gratification associated with listening to radio soap operas: emotional release, wishful thinking, and obtaining advice. Berelson (1949) took advantage of a New York newspaper strike to ask people why they read the paper. The responses fell into five major categories: reading for information, reading for social prestige, reading for escape, reading as a tool for daily living, and reading for a social context. These early studies had little theoretical coherence; in fact, many were inspired by the practical needs of newspaper publishers and radio broadcasters to know the motivations of their audience in order to serve them more efficiently. (Chapter 14 noted that the uses and gratifications approach is still one of the major types of research performed by those interested in understanding newspaper readership.)

The next step in the development of this research began during the late 1950s and continued into the 1960s. In this phase the emphasis was on identifying and operationalizing the many social and psychological variables that were presumed to be the antecedents of different patterns of consumption and gratification. For example, Schramm, Lyle, and Parker (1961), in their extensive study, found that children's use of television was influenced by individual mental ability and relationships with parents and peers, among other things. Gerson (1966) concluded that race was important in predicting how adolescents used the media. These studies and many more conducted during this

*Listening to Rap Music and Antisocial Behavior*

The 1990s saw the increasing popularity of rap music and rap music videos. Critics charged that rap music denigrated women and glorified violence. A study by Johnson, Jackson, and Gatto (1995) investigated the short-term impact of exposure to rap videos. They divided a sample of 11–16-year-old African-American males into three groups. One group saw eight videos that contained violent acts and lyrics that glorified violence, a second group saw eight rap videos that did not contain violence, while a third group saw no videos.

After viewing, the youngsters were asked a series of questions. One set of questions described a situation in which a man behaved violently toward another man and toward a woman and asked the respondents to report their attitudes toward the violent acts and whether they, the young people, would engage in similar behavior. A second set of questions was based on the description of another situation in which two friends chose different paths in life. One elected to go to law school, while the other decided to stay home. When the person in law school came home to visit his friend, he found that his friend was unemployed but was mysteriously able to afford an expensive car, expensive clothes, and other extravagant items. The youngsters were asked to indicate which friend they wanted to be like and whether the one friend would ever complete law school.

The results showed that the group that saw the violent rap videos was more likely to approve of violence than were the other two groups. In addition, the group that saw the violent rap videos and the group that saw the nonviolent videos were both more likely than the control group to indicate they wanted to be like the friend who stayed home and acquired the expensive belongings rather than the other friend who went to law school. In addition, when compared to the control group, both groups who saw the rap videos expressed greater doubt that the one friend would ever finish law school. This study suggests that social scientists should consider content such as music videos along with conventional television programs when they investigate antisocial behavior.

period reflected a shift from the traditional effects model of mass media research to the functional perspective.

According to Windahl (1981), a primary difference between the traditional effects approach and the uses and gratifications approach is that a media effects researcher usually examines mass communication from the perspective of the communicator, whereas the uses and gratifications researcher uses the audience member as a point of departure. Windahl argues for a synthesis of the two approaches, believing that it is more beneficial to emphasize their similarities than to stress their differences. He has coined the term *conseffects* of media content and use to categorize observations that are partly results of content use in itself (a viewpoint commonly adopted by effects researchers) and partly results of content mediated by use (a viewpoint adopted by many uses and gratifications researchers).

Windahl's perspective links the earlier uses and gratifications approach to the third phase in its development. Recently, uses and gratifications research has become more conceptual and theoretical as investigators have offered data to explain the connections between audience motives, media gratifications, and outcomes. As Rubin (1985, p. 210) notes: "Several typologies of mass media motives and functions have been formulated to conceptualize the seeking of gratifications as variables that intervene before media effects." For example, Greenberg (1974) ascertained that a positive disposition to aggression characterized children who used television for arousal purposes. Rubin (1979) found a significant positive correlation between the viewing of television to learn something and the perceived reality of television content: Those who used television as a learning device thought television content was more true to life. DeBock (1980) noted that people who experienced the most frustration at being deprived of a newspaper during a strike were those who used the newspaper for information and those who viewed newspaper reading as a ritual. These and many other recent studies have revealed that a variety of audience gratifications are related to a wide range of media effects. These "uses and effects" studies (Rubin, 1985) have bridged the gap between the traditional effects approach and the uses and gratifications perspective.

In the last few years the uses and gratifications approach has been used to explore the impact of new technologies on the audience. For example, Lin (1993a) examined adolescents' viewing gratifications with the new media. She found that VCRs and remote control devices enhanced audience control of the viewing environment, which led to greater entertainment gratifications. In a similar study, Lin (1993b) posited that audience activity (planning viewing, discussing content, remembering the program) would be an important intervening variable in the gratification-seeking process because of the viewing options opened up by cable, VCRs, and remote controls. Her results supported her hypothesis. Viewers who were most active had a greater expectation of gratification and also reported obtaining greater satisfaction.

Perse and Ferguson (1993) also examined the impact of new television technologies on viewer satisfaction. They found that the use of VCRs, remote controls, and cable TV had an impact on the passing-time and companionship gratifications from TV watching. On a more general level, Perse and Courtright (1993) examined how 12 different mass and interpersonal communication channels met 11 communication needs. Interpersonal channels (conversation and telephone) were the most useful at meeting various needs, whereas the computer was rated least useful. The video and audio media were ranked highest in providing entertainment, while the print and interpersonal channels were the most useful for learning functions. Albarran and Dimmick (1993) combined the uses and gratifications approach with niche theory in their study of the utility of the video entertainment industries. They found that broadcast TV was the most diverse in serving the cognitive gratifications of the audience, whereas cable TV and the VCR were the most effective in meeting needs related to feeling and emotional states. The broad theoretical framework offered by the uses and gratifications framework makes it a popular technique for researchers interested in all forms of media content.

### Methods

Uses and gratifications researchers have relied heavily on the survey method to collect their data. As a first step, researchers have conducted focus groups or have asked respondents to write essays about their reasons for media consumption. Closed-ended Likert-type scales are then constructed based on what was said in the focus group or written in the essays. The closed-ended measures are typically subjected to multivariate statistical techniques such as factor analysis, which identifies various dimensions of gratifications.

For example, in their study of the uses and gratifications of VCRs, Rubin and Bantz (1989) first asked selected groups of respondents to list 10 ways in which they used their VCRs and to provide reasons for those uses. This procedure resulted in a list of categories and statements describing VCR usage. A questionnaire was then developed from this master list and administered to respondents who were asked to indicate how frequently they used their VCRs for these purposes and to rate how much importance they placed on the statements detailing the reasons for usage. After revisions, a final questionnaire was developed; it contained 95 motivational statements. This questionnaire was administered to a sample of 424 VCR owners.

Through factor analysis, the 95 statements were then reduced to eight main motivational categories. These are some examples of the factors and statements that went with them: "I want to keep a permanent copy of the program" (library storage); "I use music video for parties" (music videos); "I don't have to join an exercise class" (exercise tapes). Rubin and Bantz then correlated these factors with demographic and media exposure variables.

Note that this technique assumes that the audience is aware of its reasons and can report them when asked. The method also assumes that the pencil-and-paper test is a valid and reliable measurement scale. Other assumptions include an active audience with goal-directed media behavior; expectations for media use that are produced from individual predispositions, social interaction, and environmental factors; and media selection initiated by the individual. Some researchers (see Becker, 1980) suggest that reliability and validity checks should be built into the uses and gratifications approach. For an example of how this has been done, see Rubin (1985).

The experimental method has not been used widely in uses and gratifications research. When it has been chosen, investigators typically manipulated the subjects' motivations and measured differences in their media consumption. To illustrate, Bryant and Zillmann (1984) placed their subjects in either a state of boredom or a state of stress and then gave them a choice of watching a relaxing or a stimulating television program. Stressed subjects watched more tranquil programs, and bored subjects opted for the exciting fare. McLeod and Becker (1981) had their subjects sit in a lounge that contained public affairs magazines. One group of subjects was told that they would soon be tested about the current situation in Pakistan, a second group was told they would be required to write an essay on U.S. military aid to Pakistan, while a control group was given no specific instructions. As expected, subjects in the test and essay conditions made greater use of the magazines than did the control group. The two test groups also differed in the type of information they remembered from the periodicals. Experiments such as these two indicate that different cognitive or affective states facilitate the use of media for various reasons, as predicted by the uses and gratifications rationale.

## Theoretical Developments

As mentioned earlier, researchers in the academic sector are interested in developing theory concerning the topics they investigate. This tendency is well illustrated in the history of uses and gratifications research. Whereas early studies tended to be descriptive, later scholars have attempted to integrate research findings into a more theoretical context.

In an early explanation of the uses and gratifications process, Rosengren (1974) suggested that certain basic needs interact with personal characteristics and the social environment of the individual to produce perceived problems and perceived solutions. The problems and solutions constitute different motives for gratification behavior that can come from using the media or from other activities. Together the media use or other be-

*Whether the Weather Makes a Difference*

Uses and gratifications research has shed a good deal of light on viewer motivations for watching TV, but the approach has not been particularly successful in predicting the actual amount of television use. Roe and Vandebosch (1996) suggest that one reason for the inability to predict is that researchers sometimes overlook the obvious—such as the weather.

Seasonal variations in TV viewing are well documented: People watch more in the winter and less in the summer. Roe and Vandebosch, however, suggest that specific weather effects occur with each season. The researchers gathered detailed meteorological data in Belgium for a year, including temperature, precipitation amount, wind speed, cloud cover, barometric pressure, and hours of sunlight. They also collected television viewing statistics encompassing the percentage viewing and the daily average amount of time spent watching.

Their results showed strong correlations between all their weather-related measures, except for barometric pressure, and viewing with some correlations reaching as high as .75. Furthermore, there was consistency within each individual season. People watched more TV when there were fewer hours of daylight, when the temperature was low, when wind speed was high, and when there was some precipitation.

The implication in this finding for broadcasters was clear. The single most important determiner of TV audience size was wholly beyond their control.

haviors produce gratification (or nongratification) that has an impact on the individual or society, thereby starting the process anew. After reviewing the results of approximately 100 uses and gratifications studies, Palmgreen (1984) stated that "a rather complex theoretical structure . . . has begun to emerge." He proposed an integrative gratifications model that suggested a multivariate approach.

The gratifications sought by the audience form the central concept in the model. There are, however, many antecedent variables such as media structure, media technology, social circumstances, psychological variables, needs, values, and beliefs that all relate to the particular gratification pattern used by the audience. Additionally, the consequences of the gratifications relate directly to media and nonmedia consumption behaviors and the perceived gratifications that are obtained. As Palmgreen admits, this model suffers from lack of parsimony and needs strengthening in several areas, but it does represent an increase in our understanding of the mass media process. Further refinements in the model will come from surveys and experiments designed to test specific hypotheses derived from well-articulated theoretical rationales and from carefully designed descriptive studies. For example, Levy and Windahl (1984) examined the assumption of an active audience in the uses and gratifications approach. They derived a typology of audience activity and prepared a model that linked activity to various uses and gratifications, thus further clarifying one important postulate in the uses and gratifications process.

Rubin (1986) pointed out that even though theory development had progressed, the uses and gratifications approach still had a long way to go. He argued that what was needed was a clearer picture of the relationship between media and personal channels of communication and sources of potential influence. In a similar vein, Swanson (1987) called for more research to encourage the theoretical grounding of the uses and gratifications approach. Specifically, Swanson urged that research focus on (1) the role of gratification seeking in exposure to mass media, (2) the relationship between gratification and the interpretive frames through which audiences understand media content, and (3) the link between gratifications and media content. Van Evra (1990) presents an integrated theoretical model of television's impact in which the use of the medium is considered along with the amount of viewing, presence of information alternatives, and perceived reality of the medium. Her description highlights the complex interactions that need to be examined in order to understand the viewing process. Additionally, uses and gratifications researchers have recently incorporated a theory from social psychology, expectancy-value theory, into their formulations (Babrow, 1989). This theory suggests that audience attitude toward media behavior is an important factor in media use. Rubin (1994) summarizes the growth of theory in the area and concludes that single-variable explanations of media effects are inadequate. He suggests that more attention be given to antecedent, mediating, and consequent exposure conditions. Finn (1997) investigated a five-factor personality model as a correlate of mass media use. He found that persons who scored high on the extroversion and agreeableness dimensions of a personality measure were more likely to choose nonmedia activities (such as conversation) to meet their communication needs. In sum, it is likely that the next few years will see an increased emphasis on theory building by uses and gratifications researchers.

The uses and gratifications approach also illustrates the difference in emphasis between academic and applied research objectives. Newspaper publishers and broadcasting executives, who want guidance in attracting readers, viewers, and listeners, seem to be particularly interested in determining what specific content is best suited to meeting the needs of the audience. College and university researchers are interested not only in understanding content characteristics but also in developing theories that explain and predict the public's media consumption based on sociological, psychological, and structural variables.

Search the Internet for "uses and gratifications" for numerous examples of the research approach.

## ▪ Agenda Setting by the Media

Theory on agenda setting by the media proposes that "the public agenda—or what kinds of things people discuss, think, and worry about (and sometimes ultimately press for legislation about)—is powerfully shaped and directed by what the news media choose to publicize" (Larson, 1994). This means that if the news media decide to give the most time and space to covering the budget deficit, this issue will become the most important item on the audience's agenda. If the news media devote the second most coverage to unemployment, audiences will also rate unemployment as the second most important issue to them, and so on. Agenda setting research examines the relationship between media priorities and audience priorities in the relative importance of news topics.

### History

The notion of agenda setting by the media can be traced back to Walter Lippmann (1922), who suggested that the media were responsible for the "pictures in our heads." Forty years later, Cohen (1963) further articulated the idea when he argued that the media may not always be successful in telling people what to think, but they are usually successful in telling them what to think about. Lang and Lang (1966, p. 468) reinforced this notion by observing, "The mass media force attention to certain issues. . . . They are constantly presenting objects, suggesting what individuals in the mass should think about, know about, have feelings about."

The first empirical test of agenda setting came in 1972, when McCombs and Shaw (1972) reported the results of a study done during the 1968 presidential election. They found strong support for the agenda setting hypothesis. There were strong relationships between the emphasis placed on different campaign issues by the media and the judgments of voters regarding the importance of various campaign topics. This study inspired a host of others, many of them concerned with agenda setting as it occurred during political campaigns. For example, Tipton, Haney, and Baseheart (1975) used cross-lagged correlation (see Chapter 9) to analyze the impact of the media on agenda setting during statewide elections. Patterson and McClure (1976) studied the impact of television news and television commercials on agenda setting in the 1972 election. They concluded that television news had minimal impact on public awareness of issues, but that television advertising accounted for increased audience awareness of candidates' positions on issues.

Lately, agenda setting research has enjoyed greater popularity. *Communication Abstracts* has listed an average of 12 articles per year on agenda setting from 1994 to 1997. This is an increase from an average of 7.5 articles from 1978 to 1989. The more recent articles signal a shift away from the political campaign approach. In the years 1978–1981, about 30% of the agenda setting articles were analyses of political campaigns. From 1982 to 1997, about 15% were of this type. In short, the agenda setting technique is now being used in a variety of areas: history, advertising, foreign news, and medical news. McCombs (1994) and Wanta (1997) present useful summaries of this topic.

In recent years the most popular subjects in agenda setting research are (1) how the media agenda is set (this research is also called *agenda building*), and (2) how the media choose to portray the issues they cover (this is called framing analysis). With regard to agenda building, Wanta, Stephenson, Turk, and McCombs (1989) noted some correlation between issues raised in the president's State of the Union address and the media coverage of those issues. Similarly, Wanta (1991) noted that the president can have an impact on the media agenda, particularly when presidential approval ratings are high. Johnson and Wanta (1996), however, found that presidential statements on the drug issue were the result of media coverage of the issue. Turk and Franklin (1987) examined public relations efforts to set the news agenda, and Berkowitz and Adams (1990) explored how press releases and other "news subsidies" shaped the media agenda. Reese (1990) presents a thorough review of the agenda building research.

Framing analysis recognizes that the media can impart a certain perspective or "spin" to the events that they cover and this, in turn, might influence public attitudes on an issue. For example, Page and Shapiro (1992) found that television news coverage of major foreign issues over 15 years predicted shifts in public opinion. Wanta and Hu (1993) found a similar pattern in the coverage of international news. Finally, Iyengar and Simon (1993) found a framing effect in their study of news coverage of the Gulf War. Respondents who relied the most on television news, where military developments were emphasized, expressed greater support for a military rather than a diplomatic solution to the crisis.

Framing analysis has been called the second level of agenda setting. As Ghanem (1997, p. 3) put it:

> Agenda setting is now detailing a second level of effects that examines how media coverage affects both what the public thinks about and how the public thinks about it. This second level of agenda setting deals with the specific attributes of a topic and how this agenda of attributes also influences public opinion.

## Methods

The typical agenda setting study involves several of the approaches discussed in earlier chapters. Content analysis (Chapter 7) is used to define the media agenda, and surveys (Chapter 8) are used to collect data on the audience agenda. In addition, since determining the media agenda and surveying the audience are not done simultaneously, a longitudinal dimension (Chapter 9) is present. More recently, some studies have used the experimental approach (Chapter 10).

***Measuring the Media Agenda.*** Several techniques have been used to establish the media agenda. The most common method involves grouping coverage topics into broad categories and measuring the amount of time or space devoted to each category. The operational definitions of these categories are important because the more broadly a topic area is defined, the easier it is to demonstrate an agenda setting effect. Ideally, the content analysis should include all media: television, radio, newspaper, and magazines. Unfortunately, this is too large a task for most researchers to handle comfortably, and most studies have been confined to one or two media, usually television and the daily newspaper. For example, Williams and Semlak (1978) tabulated the total air time for each topic mentioned in the three television network newscasts over a 19-day period. The topics were rank-ordered according to their total time. At the same time, the newspaper agenda was constructed by measuring the total column inches devoted to each topic on the front and editorial pages of the local newspaper. McLeod, Becker, and Byrnes (1974) content analyzed local newspapers for a 6-week period, totaling the number of inches devoted to each topic, including headlines and pertinent pictures on the front and editorial pages. Among other things, they found that the front and editorial pages adequately represented the entire newspaper in their topical areas.

The development of new technologies has created problems for researchers when it comes to measuring the media agenda. Cable TV, fax machines, e-mail, on-line computer services, and the Internet have greatly expanded the information outlets available to the public. The role of these new channels of communication in agenda setting is still unclear.

***Measuring Public Agendas.*** The public agenda has been measured in at least four ways. First, respondents are asked an open-ended question such as "What do you feel is the most important political issue to you personally?" or "What is the most important political issue in your community?" The phrasing of this question can elicit either the respondent's intrapersonal agenda (as in the first example) or interpersonal agenda (the second example). A second method asks respondents to rate in importance the issues in a list compiled by the researcher. The third technique is a variation of this approach. Respondents are given a list of topics selected by the researcher and asked to rank-order them according to perceived importance. The fourth technique uses the paired-comparisons method. Each issue on a preselected list is paired with every other issue, and the respondent is asked to consider each pair and to identify the more important issue. When all the responses have been tabulated, the issues are ordered from the most important to the least important.

As with all measurement, each technique has its own advantages and disadvantages. The open-ended method gives respondents great freedom in nominating issues, but it favors those people who are better able to verbalize their thoughts. The closed-ended ranking and rating techniques make sure that all respondents have a common vocabulary, but they assume that each respondent is aware of all the public issues listed and restrict the respondent from expressing a personal point of view. The paired-comparisons method provides interval data, which allows for more sophisticated statistical techniques, but it takes longer to complete than the other methods, and this might be a problem in some forms of survey research.

Three important time frames used in collecting the data for agenda setting research are (1) the duration of the media agenda measurement period, (2) the time lag between measuring the media agenda and measuring the personal agenda, and (3) the duration of the audience agenda measurement. Unfortunately, there is little in the way of research or theory to guide the investigator in this area. To illustrate, Mullins (1977) studied media content for a week to determine the media agenda, but Gormley (1975) gathered media data for 4.5 months. Similarly, the time lag between media agenda measurement and audience agenda measurement has varied from no time at all (McLeod et al., 1974) to a lag of 5 months (Gormley, 1975). Wanta and Hu (1994a) discovered that different media have different optimum time lags. Television, for example, has a more immediate impact, whereas newspapers are more effective in the long term.

It is not surprising that the duration of the measurement period for audience agendas has also varied widely. Hilker (1976) collected a public agenda measure in a single day, whereas McLeod and colleagues (1974) took 4 weeks. Eyal, Winter, and DeGeorge (1981) suggested that methodological studies should be carried out to determine the optimal effect span or peak association period between the media emphasis and public emphasis. Winter and Eyal (1981), in an example of one of these methodological studies, found an optimal effect span of 6 weeks for agenda setting on the civil rights issue. Similarly, Salwen (1988) found that it took from 5 to 7 weeks of news media coverage of environmental issues before they became salient on the public's agenda.

In a large-scale agenda setting study of German television, Brosius and Kepplinger (1990) found that the nature of the issue had an impact on the time lag necessary to demonstrate an effect. For general issues such as environmental protection, a lag of a year or two might be appropriate. For issues raised in political campaigns, 4 to 6 weeks might be the appropriate lag. For a breaking event within an issue, such as the Chernobyl disaster, a lag of a week might be sufficient.

Agenda setting researchers are now incorporating more complicated longitudinal analysis measures into their designs. Gonzenbach and McGavin (1997), for example, present descriptions of time series analysis and time series modeling and a discussion of nonlinear analysis techniques.

Several researchers have used the experimental technique to study the causal direction in agenda setting. For example, Wanta (1988) showed groups of subjects newspaper stories with a dominant photograph, a balanced photograph, or no photograph. The results were mixed, but the dominant photograph did seem to have an effect on the subjects' agenda. Another experiment (Heeter, Brown, Soffin, Stanley & Salwen, 1989) examined the agenda setting effect of teletext. One group of subjects was instructed to abstain from all traditional news media for 5 consecutive days and instead spend 30 minutes each day with a teletext news service. The results indicated that a week's worth of exposure did little to alter subjects' agendas.

## Theoretical Developments

The theory of agenda setting is still at a formative level. In spite of the problems in method and time span mentioned earlier, the findings in agenda setting are consistent enough to permit some first steps toward theory building. To begin, longitudinal studies of agenda setting have permitted some tentative causal statements. Most of this research has supported the interpretation that the media's agenda causes the public agenda; the rival causal hypothesis—that the public agenda establishes the media agenda—has not received much support (Behr & Iyengar, 1985; Roberts & Bachen, 1981). Thus much of the recent research has attempted to specify the audience-related and media-related events that condition the agenda setting effect.

It is apparent that constructing an agenda setting theory will be a complicated task. Williams (1986), for example, posited eight antecedent variables that should have an impact on audience agendas during a political campaign. Four of these variables (voter interest, voter activity, political involvement, and civic activity) have been linked to agenda setting (Williams & Semlak, 1978). In addition, several studies have suggested that a person's "need for orientation" should be a predictor of agenda holding. (Note that such an approach incorporates uses and gratifications thinking.) For example, Weaver (1977) found a positive correlation between the need for orientation and a greater acceptance of media agendas.

These antecedent variables define the media-scanning behavior of the individual (McCombs, 1981). Important variables at this stage of the process are the use of media and the use of interpersonal communication (Winter, 1981). Other influences on the individual's agenda setting behavior are the duration and obtrusiveness of the issues themselves and the specifics of media coverage (Winter, 1981). Three other audience attributes that are influential are the credibility given to the news media, the degree to which the audience member relies on the media for information, and the level of exposure to the media (Wanta & Hu, 1994b).

Despite the tentative nature of the theory, many researchers continue to develop models of the agenda setting process. Manheim (1987), for example, developed a model of agenda setting that distinguished between content and salience of issues. VanLeuven and Ray (1988) presented a five-stage model of public issue development that includes agenda setting as one of its key dimensions.

Brosius and Kepplinger (1990) used time series analysis in their study of German news programs to test both a linear model and a nonlinear model of agenda setting. The linear model assumes a direct correlation between coverage and issue importance; an increase or decrease in coverage results in a corresponding change in issue salience. Four nonlinear models were also examined: (1) the threshold model—some minimum level of coverage is required before the agenda setting effect is seen; (2) the acceleration model—issue salience increases or decreases to a greater degree than coverage; (3) the inertia model—issue importance increases or decreases to a lesser degree than coverage; and (4) the echo model—extremely heavy media coverage prompts the agenda setting effect long after coverage recedes. Their data showed that the nature of the issue under study was related to the model that best described the results. The acceleration model worked better for issues that were considered subjectively important by the audience (taxes) and for new issues. The linear model seemed to work better with enduring issues (the environment). Some support was also found for the threshold model. There was, however, little support for the inertia model, and not enough data were available for a convincing test of the echo model. In sum, these data suggest an agenda setting process more complicated than that envisioned by the simple linear model.

An Internet search of "agenda setting" will produce hundreds of examples of the research approach.

## ▪ *Cultivation of Perceptions of Social Reality*

How do the media affect audience perceptions of the real world? The basic assumption underlying the cultivation, or enculturation, approach is that repeated exposures to consistent media portrayals and themes influence our perceptions of these items in the direction of the media portrayals. In effect, learning from the media environment is generalized, sometimes incorrectly, to the social environment.

As was the case with agenda setting research, most of the enculturation research has been conducted by investigators in the academic sector. Industry researchers are aware of this work and sometimes question its accuracy or meaning (Wurtzel & Lometti, 1984), but they seldom conduct it or sponsor it themselves.

### *History*

Some early research studies indicated that media portrayals of certain topics could have an impact on audience perceptions, particularly if the media were the main information sources. Siegel (1958) found that children's role expectations about a taxi driver could be influenced by hearing a radio program about the character. DeFleur and DeFleur (1967) found that television had a homogenizing effect on children's perceptions of occupations commonly shown on television.

The more recent research on viewer perceptions of social reality stems from the Cultural Indicators project of George Gerbner and his associates. Since 1968, they have collected data on the content of television and have analyzed the impact of heavy exposure on the audience. Some of the many variables that have been content analyzed are the demographic portraits of perpetrators and victims of television violence, the prevalence of violent acts, the types of violence portrayed, and the contexts of violence. The basic hypothesis of cultivation analysis is that the more time one spends living in the world of television, the more likely one is to report conceptions of social reality that can be traced to television portrayals (Gross & Morgan, 1985).

To test this hypothesis, Gerbner and his associates have analyzed data from adults, adolescents, and children in cities across the United States. The first cultivation data were reported more than two decades ago (Gerbner & Gross, 1976). Using data collected by the National Opinion Research Center (NORC), Gerbner found that heavy television viewers scored higher on a "mean world" index than did light viewers. [Sample items from this index are "Do you think people try to take advantage of you?" and "You can't be too careful in dealing with people (agree/disagree)."] Data from both adult and child NORC samples showed that heavy viewers were more suspicious and distrustful. Subsequent studies reinforced these findings and found that heavy television viewers were more likely to overestimate the prevalence of violence in society and their own chances of being involved in violence (Gerbner, Gross, Jackson-Beeck, Jeffries-Fox & Signorielli, 1978). In sum, their perceptions of reality were cultivated by television.

Not all researchers have accepted the cultivation hypothesis. In particular, Hughes (1980) and Hirsch (1980) reanalyzed the

*Cultivating the Paranormal*

Many television programs focus on the paranormal—"The X-Files," "Unsolved Mysteries," "Sightings," and more. Could heavy viewing of these programs have a cultivation effect? This general question was examined by Sparks, Nelson, and Campbell (1997) in a survey of 120 residents of a midwestern city. Respondents were asked to estimate the total amount of time they spent watching TV and how often they had seen specific programs that featured paranormal content. The researchers next developed a 20-item scale to assess respondents' belief in paranormal activities, including UFOs, ESP, ghosts, palm reading, telekinesis, and astrology. This scale was factor analyzed to yield two distinct elements: belief in supernatural beings and belief in psychic energy. The researchers also asked respondents to report whether they had any paranormal experiences. TV viewing was then correlated with the measures of belief in the paranormal.

The total number of hours of TV viewing was not related to either of the paranormal belief factors. Exposure to paranormal TV shows showed no correlation with belief in psychic energy. There was a significant relationship, however, between paranormal TV show viewing and belief in supernatural beings among those who had some prior experience with paranormal events. This relationship persisted even after controlling for several demographic variables. The authors suggest that this finding should have implications for journalists and program producers of content related to paranormal themes.

NORC data using simultaneous rather than individual controls for demographic variables, and they were unable to replicate Gerbner's findings. Gerbner responded by introducing *resonance* and *mainstreaming*, two new concepts to help explain inconsistencies in the results (Gerbner, Gross, Morgan & Signorielli, 1986). When the media reinforce what is seen in real life, thus giving an audience member a "double dose," the resulting increase in the cultivation effect is attributed to resonance. Mainstreaming is a leveling effect. Heavy viewing, resulting in a common viewpoint, washes out differences in perceptions of reality usually caused by demographic and social factors. These concepts refine and further elaborate the cultivation hypothesis, but they have not satisfied all the critics of this approach. Condry (1989) presents a comprehensive review of the cultivation analysis literature and of cultivation analysis and an insightful evaluation of the criticisms directed against it.

Additional research on the cultivation hypothesis indicates that the topic may be more complicated than first thought. There is evidence that cultivation may be less dependent on the total amount of TV viewing than on the specific types of programs viewed (O'Keefe & Reid-Nash, 1987). Weaver and Wakshlag (1986) found that the cultivation effect was more pronounced among active TV viewers than among low-involvement viewers, and that personal experience with crime was an important mediating variable that affected the impact of TV programs on cultivating an attitude of vulnerability toward crime. Additionally, Potter (1986) found that the perceived reality of the TV content had an impact on cultivation. Other research (Rubin, Perse & Taylor, 1988) demonstrated that the wording of the attitude and the perceptual questions used to measure cultivation influenced the results. Potter (1988) found that variables such as identification with TV characters, anomie, IQ, and informational needs of the viewer had differential effects on cultivation. In other words, different people react in different ways to TV content, and these different reactions determine the strength of the cultivation effect. In their study of possible cultivation effects following the 1989 Loma Prieta earthquake, Newhagen and Lewenstein (1992) suggested that it may be the quality of the images presented on television in addition to their quantity that prompts cultivation. Finally, Perse, Ferguson and McLeod (1994) studied the impact of the new media technologies—cable TV, VCRs, and remote control devices—on cultivation and found mixed results. Fear of crime was negatively related to VCR ownership and also negatively related to increased exposure to specialized cable channels. Watching channels that carried traditional broadcast network programs was positively related to feelings of interpersonal mistrust. The authors concluded that cable television might have altered the traditional impact of TV.

More recently, there have been three key trends in cultivation research. The first is expanding the focus of cultivation into other countries and cultures. *Cultivation Analysis: New Directions in Media Effects Research* (Signorielli & Morgan, 1990) contains chapters on research done in Britain, Sweden, Asia, and Latin America. The results regarding the cultivation effect were mixed. The second trend, discussed in more detail in the next section, is a closer examination of the measurements used in cultivation. Results suggest that the way TV viewing is quantified and the way the cultivation questions are framed all have an impact on the results. The final trend concerns the conceptual mechanisms that result in the occurrence of the cultivation effect and are discussed in the "Theoretical Developments" section that follows on page 398.

## Method

There are two discrete steps in performing a cultivation analysis. First, descriptions of the media world are obtained from periodic content analyses of large blocks of media content. The result of this content analysis is the identification of the messages of the television world. These messages represent consistent patterns in the portrayal of specific issues, policies, and topics that are often at odds with their occurrence in real life. The identification of the consistent portrayals is followed by the construction of a set of questions designed to detect a cultivation effect. Each question poses two or more alternatives. One alternative is more consistent with the world as seen on television, while another is more in line with the real world. For example, according to the content analyses performed by Gerbner and colleagues (1977), strangers commit about 60% of television homicides. In real life, according to government statistics, only 16% of homicides occur between strangers. The question based on this discrepancy was "Does fatal violence occur between strangers or between relatives and acquaintances?" The response "strangers" was considered to be the television answer. Another question was "What percentage of all males who have jobs work in law enforcement and crime detection? Is it 1% or 5%?" According to census data, 1% of men in real life have such jobs, compared with 12% in television programs. Thus 5% is the television answer.

Condry (1989) points out that the cultivation impact seems to depend upon whether respondents are making judgments about society or about themselves. Societal level judgments, such as the examples given above, seem to be more influenced by the cultivation effect, but personal judgments (such as "What is the likelihood that you will be involved in a violent crime?") seem to be harder to influence. In a related study, Sparks and Ogles (1990) demonstrated a cultivation effect when respondents were asked about their fear of crime but not when they were asked to give their personal rating of their chances of being victimized. Measures of these two concepts were not related. Related findings were reported by Shanahan, Morgan, and Stenbjerre (1997), who found that TV viewing was associated with a general state of fear about the state of the environment but not related to viewers' perceptions of specific sources of environmental threats.

The second step involves surveying audiences about their television exposure, dividing the sample into heavy and light viewers (4 hours of viewing a day is usually the dividing line), and comparing their answers to the questions that differentiate the television world from the real world. In addition, data are often collected on possible control variables such as gender, age, and socioeconomic status. The basic statistical procedure consists of correlational analysis between the amount of television viewing and the scores on an index reflecting the number of television answers to the comparison questions. Also, partial correlation is used to remove the effects of the control variables. Alternatively, sometimes the *cultivation differential* (CD) is reported. The CD is the percentage of heavy viewers minus the percentage of light viewers who gave the television answers. For example, if 73% of the heavy viewers gave the television answer to the question about violence being committed between strangers or acquaintances compared to 62% of the light viewers, the CD would be 11%. Laboratory experiments use the same general approach, but they usually manipulate the subjects' experience with the television world by showing an experimental group one or more preselected programs.

Measurement decisions can have a significant impact on cultivation. Potter and Chang (1990) gauged TV viewing using five different techniques: (1) total exposure (the traditional way used in cultivation analysis), (2) exposure to different types of television programs, (3) exposure to program types while controlling for total exposure, (4) measure of the proportion of each program type viewed, obtained by dividing the time spent per type of program by the total time spent viewing, and (5) a weighted proportion calculated by multiplying hours viewed per week by the proportional measure mentioned in the fourth technique.

The results showed that total viewing time was not a strong predictor of cultivation scores. The proportional measure proved to be the best indicator of cultivation. This suggests that a person who watches 20 hours of TV per week, with all of the hours being crime shows, will score higher on cultivation measures of fear of crime than a person who watches 80 hours of TV a week with 20 of them consisting of crime shows. The data also showed that all of the alternative measures were better than a simple measure of total TV viewing.

Potter (1991a) demonstrated that deciding where to put the dividing point between heavy viewers and light viewers is a critical choice that can influence the results of a cultivation analysis. He showed that the cultivation effect may not be linear as typically assumed. This finding may explain why cultivation effects in general are small in magnitude; simply dividing viewers into heavy and light categories cancels many differences among subgroups.

## Theoretical Developments

What does the research tell us about cultivation? After an extensive literature review in which they examined 48 studies, Hawkins and Pingree (1981) concluded that there was evidence for a link between viewing and beliefs regardless of the kind of social reality in question. Was this link real or spurious? The authors concluded that the answer did, in fact, depend on the type of belief under study. Relationships between viewing and demographic aspects of social reality held up under rigorous controls. As far as causality was concerned, the authors concluded that most of the evidence went in one direction—namely, that television causes social reality to be interpreted in certain ways. Twelve years later, Shrum and O'Guinn (1993) echoed the earlier conclusion by saying that cultivation research has demonstrated a modest but persistent effect of television viewing on what people believe the social world is like. More recently, Morgan and Shanahan (1997) performed a meta-analysis of 82 published cultivation studies and concluded that there is a small but reliable and pervasive cultivation effect that accounts for about 1% of the variance in people's perceptions of the world. The authors go on to argue that although the effect is small, it is not socially insignificant.

How does this process take place? The most recent publications in this area have focused on conceptual models that explain the cognitive processes that cause cultivation. Potter (1993) presents an extensive critique of the original cultivation formulation and offers several suggestions for future research, including developing a typology of effects and providing a long-term analysis. Van Evra (1990) posits a multivariate model of cultivation, taking into account the use to which the viewing is put (information or diversion), the perceived reality of the content, the number of information alternatives available, and the amount of viewing. She suggests that maximum cultivation occurs among heavy viewers who watch for information, believe the content to be real, and have few alternative sources of information. Potter (1991b) proposes a psychological model of cultivation incorporating the concepts of learning, construction, and generalization. He suggests that cultivation theory needs to be extended and revamped in order to explain how the effect operates.

Tapper (1995) presents a possible conceptual model of the cultivation process that is divided into two phases. Phase one deals with content acquisition and takes into account such variables as motives for viewing, selective viewing, the type of genre viewed, and perceptions of the reality of the content. Phase two is the storage phase and elaborates those constructs that might affect long-term memory. Tapper's model allows for various cultivation effects to be examined according to a person's viewing and storage strategies.

Shrum and O'Guinn (1993) present a psychological model of the cultivation process based on the notion of accessibility of information in a person's memory. They posit that human memory works much like a storage bin. When new information is acquired, a copy of that new information is placed on top of the appropriate bin. At some later time when information is being retrieved for decision making, the contents of the bin are searched from the top down. Thus information deposited most recently and most frequently stands a better chance of being recalled. A person who watches a lot of TV crime shows, for example, might file away many exaggerated portrayals of crime and violence in the appropriate bin. When asked to make a judgment about the frequency of real-life crime, the TV images are the most accessible and the person might base his or her judgment of social reality on them.

Shrum and O'Guinn reported the results of an empirical test of this notion. They reasoned that the faster a person is able to make a response, the more accessible is the information retrieved. Consequently, when confronted with a social reality judgment, heavy TV viewers should be able to make judgments faster than light viewers and their judgments should also demonstrate a cultivation effect. The results of their experiment supported this reasoning. Shrum (1996) reported a study that replicated these findings. In this experiment, subjects who were heavier viewers of soap operas were more likely to show a cultivation effect and also responded faster to the various cultivation questions that were asked of them. Mares's (1996) experiment suggests that confusion about the source of information is related to the cultivation effect. She found that the effect was stronger when people wrongly attributed fictional information to a newscast.

In sum, cultivation has proven to be an evocative and heuristic notion. It is likely that future research will concentrate on identifying key variables important to the process and on specifying the psychological processes that underlie the process.

## ■ Social Impact of the Internet

Recall from Chapter 1 that mass media research follows a typical pattern when a new medium develops. Phase 1 concerns an interest in the medium itself: the technology used, functions, access, cost. Phase 2 deals with the users of the medium: who they are, why they use it, what other media it displaces. Phase 3 pertains to the social, psychological, and physical effects of the medium, particularly any harmful effects. Finally, Phase 4 involves research about how the medium can be improved.

Research examining the Internet has generally followed this pattern. Much of the research done during the mid-1990s described the technology involved in the Internet and some of the possible functions that it might serve (see, for example, Porter, 1997). Most of the studies reviewed in this section fall into Phase 2.

The Internet is such a recent development that this section departs from the organizational structure we used earlier. It is too early to write the history of Internet research or to talk about theoretical developments. The methods used to study the net are those discussed earlier in this book: surveys, content analysis, and the occasional experiment. Moreover, new research methods that use the unique resources of the Internet will probably continue to emerge. Consequently, this section divides the research into relevant topic categories.

### Audience Characteristics

By far the greatest amount of research has concerned identifying the audience and their patterns of usage. As we will discuss in Chapter 18, getting accurate information on the Internet audience is a difficult task. When it comes to how many people actually use the Internet, for example, surveys provide only a rough estimate. The number is growing every day, and research companies have used different samples to project their results. A MediaMark 1998 study projected that about 44 million U.S. adults had used the Internet. A survey by Intelliquest put that number at 56 million. Another 1998 study, this one by A. C. Nielsen Company, estimated the number of U.S. and Canadian users at 58 million. Yet another survey projected 52 million net users in the entire world.

There is more agreement when it comes to the demographics of net users. More women are using the net than ever before. A 1997 survey of 1,000 respondents published in *Business Week* (Cortese, 1997) found that females accounted for 43% of all net users, up from 25% in 1995. Similar results were found in a survey by NetSmart (Internet drawing, 1998), which found that 40% of on-line users were female. A survey by Jupiter Communications (Dyrli, 1998) revealed that 40% of net users worldwide are females. An on-line survey by the Georgia Tech Graphic, Visualization and Usage Center (GVUs 9th, 1998) found approximately the same percentage of females. The Internet is no longer a male-dominated medium. (Check out *www.cc.gatech.edu/gvu/user surveys/survey-11-1997* for the most recent data on the on-line audience.)

The Internet audience has also gotten older. The *Business Week* survey mentioned earlier reported that 45% of net users are over 40. This trend was also found by a MediaMark study, which reported that 56% of its sample of Internet users was over 35 (Cyberstats, 1998), and by the Georgia Tech survey, which revealed that about 37% of worldwide users were over 40.

Education and income are both related to Internet use. The MediaMark survey found that 80% of users had attended college, while the *Business Week* survey reported a comparable 73%. The Georgia Tech and the *Business Week* polls found that about 44% of users had annual incomes greater than $50,000 compared to about 30% of the general population.

The overwhelming majority of Internet users are white, according to both the Georgia Tech and *Business Week* surveys. Whites make up about 85%–88% of users, with Asians accounting for about 4% and African-Americans and Hispanics the rest.

Longitudinal usage data suggest that the Internet deviates from the pattern followed by other new media. Lindstrom (1997) points out that initial use of a medium is abnormally high during the novelty phase and then declines over time as the medium becomes familiar. During the 1950s, for example, individuals who bought TV sets watched more TV during their first few months of ownership than they did during the rest of the year. Lindstrom cites data from a Nielsen survey, however, that show that Internet use actually increased in the 12-month period following initial use. He hypothesizes that it requires both learning and practice to get the most utility out of the Internet, thus increasing use over time.

Internet usage does not seem to displace other media except for television and to a lesser extent listening to CDs. One study noted that Internet users consume more traditional print media than do nonusers. They are also more inclined to listen to the radio and go to movies. Television viewing suffers because a great deal of Internet usage is in the evening hours, when people traditionally watch TV (Weaver, 1998). Another survey found that 35–44-year-old males had decreased their time spent listening to CDs to spend more time on the Internet (Jeffrey, 1998).

The audience still relies on and trusts traditional news sources for most of their information about the world. A Gallup survey of more than 1,000 Americans done in 1998 revealed that only a few people (about 11%) frequently used the Internet as a source of news. In addition, about 45% of the Gallup sample reported that they cannot trust the accuracy of what's on the net. Only infomercials and talk shows were viewed with more distrust than the Internet (Newport & Saad, 1998).

### Functions and Uses

It appears that research concerning the Internet has reached Phase 2 with the advent of studies examining how people are using the Internet. Although a definitive list of uses and gratifications has yet to be drawn up, some preliminary results show some general trends. At the risk of oversimplifying, the main functions seem to be (1) information, (2) communication, (3) entertainment, and (4) affiliation.

The primary use seems to be information gathering. One survey found that about 85% of respondents reported used the net for research and educational purposes (Hammonds, 1997). A Nielsen survey found that about 75% used the net for informational needs, with most looking for information about products or services. A survey sponsored by *Advertising Age* turned up the same results (Fawcett, 1996). In a qualitative study, Maignan and Lukas (1997) found that information gathering was a main attraction for their informants, who compared the Internet to a massive library or set of encyclopedias.

The communication function is best exemplified by the use of e-mail. Hammonds (1997) reported that about 90% of his sample used e-mail, and Hunter (1997) found that his sample of students and faculty at a major university ranked e-mail first in terms of use and satisfaction. More than 90% of the respondents to the Georgia Tech survey rated e-mail as indispensable.

Surfing the web and generally exploring web sites illustrate the entertainment function of the Internet. More than 60% of the *Business Week* sample reported that they frequently used the net for entertainment. The Georgia tech survey revealed that 80% of their respondents reported that they browsed the web just to be entertained. Game playing, a specific form of entertainment, was also a common reason for logging on the net (Hammonds, 1997). Maignan and Lukas report that one of their informants described this function as similar to "going on a ride or a trip." Another person said that using the Internet was more fun than going to the movies.

The last function, affiliation, may be the most interesting. The Georgia Tech study found that 45% of respondents reported that after going on the net they felt more "connected" to people like themselves. Maignan and Lukas noted that many of their respondents said that the Internet gave them a feeling of belonging to a distinct social group. Approximately 60% of the *Business Week* sample said that going on-line made them feel like part of a community.

Finally, the frequency of Internet uses seems to be related to age. Younger people use the net more for entertainment and socializing, whereas older people use it more for information (Cortese, 1997). In addition, there are functions that have yet to catch on. Few respondents to these surveys reported shopping on-line, and only a small minority were frequent visitors to chat rooms.

### Social Effects

Since the Internet is so new, Phase 3 research about the effects of the medium has yet to emerge. Nonetheless, there are some indications about what is to come. Stevens (1998) raises questions about the impact of pornographic web sites, particularly on young people. DeKeseredy, Schwartz, and Bergen (1998) suggest a connection among viewing pornography on the Internet, male peer support, and abuse of women in dating. This area will probably be examined closely in subsequent years.

Another potential harmful effect has been labeled "Internet addiction" (Young, K., 1998). This condition is typified by a psychological dependence on the Internet that causes persons to turn into "onlineaholics" who ignore family, work, and friends as they devote most of their time to surfing the net. Young estimated that perhaps 5 million people may be addicted. Surveys have shown that middle-aged women, the unemployed, and newcomers to the net are most at risk (Hurley, 1997). Students are also susceptible. One study reported that one in three students knew someone whose grades had suffered because of heavy net use. Another found a positive correlation between high Internet use and dropout rate (Young, J., 1998). In New York an Internet addiction support group has started regular meetings to help addicts kick the habit. (*http://netaddiction.com/resources/test* has a test you can take online to see whether you suffer from Internet addiction.)

A 1998 study done at Carnegie Mellon University raised some interesting questions about the relationship between Internet use and feelings of depression and loneliness (Harmon, 1998). Somewhat unexpectedly, a 2-year panel study of 169 individuals found that Internet use appeared to cause a decline in psychological well-being. Even though most panel members were frequent visitors to chat rooms and used e-mail heavily, their feelings of loneliness increased as they reported a decline in their amount of interaction with family members and friends. The researchers hypothesized that on-line communication does not provide the kind of support obtained from conventional face-to-face communication.

## ▪▪▪ Summary

Academic research and private sector research are both similar and different. They share common techniques and try to predict and explain behavior, but academic research is public, is more theoretical in nature, is generally determined more by the individual researcher than by management, and usually costs less than private sector research. Five main areas of mass media effects research conducted by the academic sector are (1) prosocial and antisocial effects of specific media content, (2) uses and gratifications, (3) agenda setting, (4) perceptions of social reality, and (5) the Internet. Each of these areas is typified by its own research history, method, and theoretical formulation.

### Questions and Problems for Further Investigation

1. List some topics in addition to those mentioned in this chapter that might interest both private sector researchers and academic researchers.
2. What problems arise when the experimental technique is used to study agenda setting? Describe how this might be done.
3. Assume that, as a consultant for a large metropolitan newspaper, you are designing a uses and gratifications study of newspaper reading. What variables would you include in the analysis? If you were instead an academic researcher interested in the same question, how might your investigation differ from the private sector study?
4. List some perceptions of social reality, in addition to those discussed in the chapter, that might be cultivated by heavy media exposure.
5. What other social effects might arise from increased use of the Internet?
6. The debate about the impact of media violence is too complicated to be covered fully in a short section. If you are using *InfoTrac College Edition*, do a search on "television violence" to see the many different viewpoints on this topic.

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Chapter 18

# Mass Media Research and the Internet

- *Brief History of the Internet*
- *Internet Resources*
- *Uses of the Internet for Media Researchers*
- *Practical and Ethical Considerations*

*Summary*

*Questions and Problems for Further Investigation*

*References and Suggested Readings*

The Internet has had a profound impact on the way people communicate, conduct business, and process information. It is not surprising that the Internet is also influencing mass media research (see Newhagen & Rafaeli, 1996). To oversimplify, the Internet has:

- Changed the way researchers search for and disseminate information
- Simplified collaboration and interaction among investigators
- Provided new material for analysis
- Created new methods for gathering media data

Accordingly, this chapter provides a brief history and description of the Internet and its various components, discusses the ways the Internet can be used to find data relevant to media research projects, and examines some of the ways the Internet can be used as a data-gathering tool.

## Brief History of the Internet

The idea behind the Internet can be traced back to a 1962 memo written by an MIT scientist who discussed a "galactic network" of interconnected computers through which everybody could connect to everybody else. This concept was particularly interesting to the RAND Corporation, a think tank then wrestling with the problem of how the U.S. military might communicate after an atomic attack. (Keep in mind that the early 1960s was the height of the Cold War with the Soviet Union. It was also the time of the Cuban missile crisis when nuclear war was a distinct possibility.) In 1964 RAND made a revolutionary proposal for a computer network that would have no central authority and would continue to function even if a large part of it was destroyed. The basic principle behind this system was simple. Each computer in the network would be equal to all the other computers, and each would decide on its own the best way to send, route, and receive messages. Thus, if a number of computers were destroyed, the remaining computers would figure out the best way to route messages through the system, bypassing the disabled computers.

In order for this system to work, computer-generated messages would be disassembled into "packets" of information, similar to breaking down a written letter into its component paragraphs and putting each paragraph in a separate envelope. These individual packets would be transferred from computer to computer until they were all reassembled at the destination. The route each individual packet would take did not matter as long as they all got to where they were sent.

In 1969 the Pentagon's Advanced Research Projects Agency (ARPA) put together the first packet-switching network that linked together four supercomputers. The network was named ARPANET after its sponsor. By 1972 more than 35 computers had been linked together via ARPANET. Although long-distance computer programming and calculating were supposed to be the main functions of ARPANET, it was quickly discovered that scientists were using the system primarily to send news and personal messages to one another via electronic mail, or e-mail.

By the mid-1970s, more advanced programs were developed for handling information packets. A standard format, called TCP/IP for Transmission Control Protocol/Internet Protocol, made it easier for many different kinds of computers to be linked to ARPANET. As a result, more than 580 host computers were linked to the net by 1983. On January 1, 1983, the U.S. military broke away from ARPANET to form its own network, MILNET; this date is considered the official start date of the Internet (see *www.discover.com* for more information).

In 1984 the National Science Foundation (NSF) entered the picture when it announced plans to link together several supercomputers at various U.S. universities. For technical reasons, ARPANET was not the best way to link these machines together, so the NSF started its own faster and upgraded computer network (NSFNET) that also used the Internet Protocol. Other computer networks were soon linked up to the new NSF network, and the name "Internet" began to stick for this new collection of computer links. In 1989 ARPANET itself was formally transferred to the Internet.

Soon many companies and social organizations owned powerful computers and linking them to the Internet was easy. Since the initial philosophy behind the Internet was decentralization, there was no central authority that would prevent anyone from linking up. In fact, the opposite was true. The Internet community welcomed organizations and corporations. Connecting to the Internet did not cost the taxpayer anything because each network handled its own financing and technical needs. The more networks that joined, the more valuable the system became as a communication channel. As a result, the Internet grew quickly.

Two other inventions also encouraged growth. In 1990 scientists in Europe created **hypertext**, a system that links together electronic documents, including text and graphics. The result was an interconnected web of pages that became known as the **World Wide Web** (WWW). Any person or company could create a web page as long as it used the standard protocol developed in Europe. Many commercial organizations took advantage of the web's graphical possibilities and established web sites. The WWW got another boost in 1993 with the invention of **web browsers**, or programs that searched the web for requested information, described it, and configured it for display.

In 1998 the U.S. government announced plans for a faster, more advanced Internet connection that would be available first to scientists and universities. The benefits from this new arrangement will eventually spread to the general public.

By the year 2001, it is estimated that more than 130 million host computers will be connected to the Internet. The number of U.S. homes with Internet access is expected to be more than 55 million by that same date. TV sets that are "Internet-ready" will be available by then, which will increase the net's popularity even more. The full impact of the Internet on communication has yet to be felt.

For several more detailed discussions on the development of the Internet, search "Internet history" on the Internet.

## ▪ Internet Resources

The Internet can be used in a variety of ways. The discussion in this section presents some of the more popular uses of the computer-based information/communication source that are relevant to mass communication researchers.

### E-mail

The electronic equivalent of postal mail, this is the most widely used feature on the Internet. Millions of e-mail messages are sent every day. An e-mail message is sent from one Internet computer to another until it reaches its addressee. The routing computers (*servers*) also act as mailboxes and store messages until it is convenient for a person to retrieve them.

E-mail allows the user to communicate with one person or with many. An e-mail mailing list can be developed that links together people who have a common interest. These mailing lists use special software (called *list servers*) to distribute a message via e-mail to everyone on the list. A person who subscribes to such a list can post messages for all to see and can read the messages posted by others. These are some of the lists that may be relevant to mass media research:

- *content@list.gatech.edu*—This list specializes in methods and technical issues relating to content analysis.
- *rtvj-l@listserv.umt.edu*—The list is sponsored by the radio-television journalism division of the Association for Education in Journalism and Mass Communication.
- *comserve@cios.org*—Maintained at the Communication Institute for Online Scholarship, the list has a mass communication division.

### Newsgroups

Somewhat similar to list servers, newsgroups perform as electronic conferences and disseminate information on thousands of topics. Unlike list servers that communicate with only a subscriber, newsgroups are open to everyone. There are more than 40,000 newsgroups whose messages (or *posts*) are arranged in a hierarchical fashion, with the messages becoming more specific as a reader travels down the hierarchy. If a reader wishes to post a reply, the message is added to the "thread" of the original post. However, be aware that newsgroups are self-maintained and unregulated. The information they contain is open to question. Accordingly, they can be less reliable than mailing lists.

One newsgroup relevant to mass media research is *comp.soft-sys.stat.spss,* which contains information relevant to the popular SPSS statistical software program.

### World Wide Web

The most used resource on the Internet after e-mail, the WWW is that part of the Internet that contains text, graphics, sounds, and video. The web is divided into millions of *web sites* that are composed of *web pages.* All web pages are written in hypertext markup language (HTML) and are linked to other web documents. To view a web page, a person needs a computer program called a browser that translates HTML, and the other information on the web page, into an appealing graphic format on the user's screen. The two most popular web browsers are Netscape Navigator and Microsoft Internet Explorer.

The wealth of information on the web is useless if a researcher has no way to find what is important or relevant. A number of computer programs, called "search engines," have been developed that explore the web (and also newsgroups and list servers) looking for specified information and display the results as a series of "hits." Some search engines simply search the titles of web pages, whereas others scan the body of the text. A few of the many popular search engines that web users can use are *AltaVista* (the search engine used most often for references in this book), *HotBot, Excite, Yahoo,* and *Lycos.* Each engine offers a basic and advanced search method. Additional information about web searching is presented in a later section.

There are literally thousands of web pages that can be useful for mass communication research. Some of these are discussed later. For more information, use one of the search engines to search for "mass media research" or "mass communication research."

### Telnet

Not used as much as it was before the advent of the web, Telnet is a program that allows one computer to connect to another computer in a different location and makes the user's computer a terminal for the remote computer. Telnet can let a user "log into" places such as library card catalogs at distant universities or even make use of a supercomputer on some other continent. Telnet programs often contain a program that allows a person to download files from the remote computer to the user's computer.

## ▪ Uses of the Internet for Media Researchers

There are numerous ways that a mass media researcher can use the Internet. Here are some of the more obvious uses:

- Searching relevant literature and gathering information concerning a research topic
- Sharing information with other researchers
- Using messages on the Internet as a source for content analysis
- Gathering data on-line through surveys, experiments, and focus groups

Each of these is discussed in turn.

### Information Retrieval

As mentioned in Chapter 2, one of the earliest steps in a research project is a review of existing literature that relates to the research topic. The Internet makes this task easier thanks to the many on-line databases and on-line research publications that can be searched electronically. Most university and public libraries offer on-line searching capabilities to their users. A researcher looking for relevant articles can typically search a large number of databases that are grouped by discipline or by source. Some of the databases relevant to mass media research are the general Periodical Abstracts listing or the more specialized PsychFIRST, Socioabs, Social Sciences Abstracts, and ERIC inventories. To use these services, the researcher must have a fairly clear idea of some essential terms that relate to the proposed research topic. Doing a key word search on the word "television" will likely generate so many general articles that the results are not useful. Searching for articles on "television and children" will narrow the focus a bit, but the most effective method is to use more specific search terms, such as "V-chip" and "children's television viewing." Be aware that a focused research question or hypothesis makes the search task easier.

The Communication Institute for Online Scholarship (CIOS) offers an on-line journals index that lists more than 29,000 bibliographic references from 65 communication journals. The CIOS also provides the ComAbstracts service that contains abstracts of articles published in 40 communication journals including the leading mass communication publications. The ComAbstracts database can be searched by key word or by author. Researchers who are not members of CIOS and use the service will see a list of article titles relevant to their search. To view the abstracts of these articles, a person must be a member of CIOS. Visit *http://www.cios.org* for more information.

The following mass communication journals can also be searched on-line:

- *Journal of Communication (http://www.oup.co.uk/jnlcom)*
- *Canadian Journal of Communication (http://hoshi.cic.sfu.ca/j/cjc/)*
- *Public Opinion Quarterly (http://www.journals.uchicago.edu/POQ)*

Finally, of course, one of the search engines mentioned earlier can be used to search the WWW for relevant web pages. A full-scale web search has both advantages and disadvantages. On the positive side, it may turn up unpublished (not in print) articles and other sources that mainstream searches do not include in their databases. On the negative side, the sheer number of results usually turned up in a web search may be unmanageable. In addition, the reliability of some of the sources may be difficult to assess. Finally, web sites are ephemeral; a web site used as a reference may evaporate and no longer exist. As a result, other researchers may be unable to find the information. Because of this, it is a good idea for researchers to make a paper copy of the various web sites they use as references. To illustrate, in the research for this edition of *Mass Media Research,* we looked for recent articles about the topic of "cultivation analysis." A *HotBot* advanced search using "cultivation analysis" and "television" as key words turned up 92 matches, most of which were simply references to articles cited in a report by the University of Michigan's Survey Research Center or in the resumes of various professors and were not particularly helpful. One source, however, was a paper on the topic given at a recent scholarly convention and not easily available in print, while another "hit" led to an article about cultivation in the *Journal of Criminal Justice and Popular Culture,* a source not likely to be included in the traditional communication abstracts databases. The search also turned up a long essay on the intercultural dimension in cultivation research that contained the author's name but no evidence that the essay had been reviewed for a conference or an academic journal or that anyone had ever judged it to be a competent piece of research.

### Communication with Other Researchers

The Internet has made communication among mass media researchers more efficient. In addition to e-mail, the relevant list servers, and newsgroups mentioned earlier, the Internet has opened other unique channels of communication among researchers.

Webrings are a way to group together sites that have a similar focus. Links on each page allow the visitor to move from one sight to the next and eventually end up where he or she started—hence the label "ring." Webrings are controlled by a ringmaster or ringmistress, who creates the ring, sets up the ring's home page, answers questions about the ring, and adds new sites to the ring. Webrings consists of two lists: the ring and the queue. The ring contains all the sites that are actually linked together. These sites all have "Next" or "Previous" buttons that move users from one site to the next. The queue lists sites that want to join the ring but have not been approved yet.

An example of a ring that might be useful for mass media researchers is the Qualitative Research Ring Site, which contains sites of interest to those using the qualitative method *(www.irn.pdx.edu/~kerlinb/qrl/).* The Journalism and Research Webring *(http://mav.net/guidelines/webring.html)* contains links most valuable to reporters, but media researchers may also find this ring useful.

Scholarly journals are also using the Internet to improve communication. Most of the major print journals in the field have established some kind of presence on the web. Some sites simply list basic information about subscriptions and submission guidelines, whereas others contain tables of contents from recent issues, abstracts, and a search program. Almost all journals try to speed up the editorial process by using e-mail to conduct peer review of submitted manuscripts, and some use their websites to make available articles that have been accepted but not yet published.

In addition to these traditional print journals, several journals that are relevant to mass media research exist in an on-line version. The *Electronic Journal of Communication,* for example, publishes articles on research, theory, and industry practices. Past issues have been devoted to magazine research and the impact of the Internet on traditional journalism. The *Journal of Computer Mediated Communication,* currently published at the University of Southern California, contains research related to on-line media, while the *Qualitative Report* is an electronic journal that publishes methodological research on the qualitative technique. Finally, the *Web Journal of Mass Communication Research* published its first issue in 1998.

On-line journals have features that improve scholarly communication. First, information can be published more rapidly in an electronic journal. Articles in printed journals must be typeset, printed, and bound into journals that are then distributed via traditional mail. An article in an electronic journal can bypass all of these steps. Second, there are no space limitations for an on-line journal. Lengthy appendixes, tables, and even the original database used by the authors can be included in an on-line publication. Finally, although print articles can display a list of related references and where they appear, on-line articles can be linked with other relevant articles so that a reader can easily jump from one to another.

Research forums, "white pages," research exchanges, and personal pages are other ways that the net has improved communication. The CIOS sponsors Comforum, an electronic conference on topics of general interest in communication, and also provides a "white pages" directory that helps a person find the name and e-mail address of researchers who may have similar interests. The London International Research Exchange (*http://easynet.co.uk/LIRE/about.html*) uses the web to promote research projects on media-related topics and to link together researchers from a number of disciplines who have an interest in mass communication research. One of their recent publications was an analysis of the media coverage of the 50th anniversary of D-Day in various countries around the world. Finally, many media researchers maintain their own personal home page where they may furnish copies of their research reports and provide news of their current projects.

### Source Material for Content Analysis

The Internet represents a new and challenging source of data for mass media content analysis. For example, researchers interested in international mass communication have access to a large number of on-line newspapers from countries all over the world. Links to more than 30 papers in a dozen countries can be found at *http://www.library.unr.edu/int_newspapers*. Other links are available at *http://www.cpxnet.com/intl-newspapers.html.* Many other sites provide links to the on-line versions of news magazines in different countries. This opens new possibilities in the cross-cultural analysis of the coverage of prominent news events.

Researchers interested in tracing the global flow of TV programs can access *http://shuttle.com/TV/schedule.html* and find program listings for selected networks in North America, Europe, Asia, and additional global TV schedules can be found at other sites. Those concerned with the content of U.S. TV newscasts can make use of the web site for the Television News Archive at Vanderbilt University *(http://tvnews.vanderbilt.*

*edu/tvnews.html).* This site contains on-line abstracts of network evening news programs along with other information about materials in the archive.

A web-based archive for qualitative data, QUALIDATA, was begun in 1995 at the University of Essex in the United Kingdom. The archive consists of mainly sociological and anthropological data compiled from research in the United Kingdom, but the archive could serve as a model for mass media qualitative researchers. QUALIDATA can be accessed via *http://www.essex.ac.uk/qualidata/current.*

In addition, the Internet has spawned unique forms of communication: e-mail, websites, newsgroups, electronic bulletin boards, and more. A few studies have investigated the content of these new channels, but much is left to discover. For example, December (1996) provided a conceptual discussion of the notion of "unit of analysis" as applied to Internet content research. Hill and Hughes (1997) content analyzed more than 5,600 newsgroup messages for political content. Similarly, Jones (1997) examined more than 6,000 newsgroup postings for mentions of news sources and found a trend toward the use of on-line publications. Meanwhile, Newhagen, Cordes, and Levy (1995) examined 650 Internet postings sent to "NBC Nightly News" in response to a series about new communication technologies, and McLaughlin (1996) content analyzed 37 art sites on the web.

The use of e-mail has also been studied. Pratt (1996) inspected about 500 e-mail messages sent by employees at an aerospace plant and found that most could be classified as a self-promotion. Rice (1997) did a stylistic analysis of e-mail and examined such content variables as sentence patterns, verbs, and paragraphing.

Use of the World Wide Web represents a major change in the mass communication process. In the past, it took a great deal of time, money, and energy to be a source of mass communication. Accordingly, mass communication was conceptualized as communication from one to many. The web, however, has made it possible for almost any organization or individual to have a web site at a relatively modest cost. Consequently, a new communication flow exists: from many to many. The ways people and organizations have been making use of this new mass communication scheme has been the subject of several content analyses. Walters (1996), for example, categorized the content of 100 personal home pages on the web and found it difficult to sort them into specific genres. A similar analysis was performed by Miller (1995), who found about eight categories that seemed to describe the content of most web pages, ranging from electronic curricula vitae to "cool" sites.

The content of the web sites maintained by organizations has been the focus of a few studies. Corporate web sites were examined by Salam, Rao, and Pegels (1998), who analyzed 125 web pages from *Fortune* 1000 companies. They found that price or value was the most frequently appearing item followed by performance and quality. Similarly, Palmer and Griffith (1998) performed a content analysis on 250 randomly selected corporate web sites of companies in the *Fortune* 500. Technical support was the most noted feature of the web sites, while only a few sites used marketing techniques.

This is only a sample of possible Internet content research. The list will doubtlessly expand as more media researchers become interested in the area.

## Data Collection

The Internet has great potential as a tool for data collection. This section discusses three possible methods that lend themselves to the net: focus groups, surveys, and experiments.

**Focus Groups.** Although they have yet to be widely used in academic research, on-line focus groups are used in a good deal of research in the private sector. A trained moderator conducts on-line groups in private chat rooms. An average group lasts about 60–90 minutes. The moderator poses general questions to the group, and each member types and sends his or her responses so that all other members can read them. The chat session can be monitored by the researcher or by the client, who can send instant private e-mail to the moderator suggesting other questions or topics while the group is in session.

There are definite advantages to the on-line group, or e-group as it is sometimes called. First, it is faster than the traditional face-to-face group. Some commercial research can recruit an e-group, conduct the session, and deliver the final report to a client within 5 days compared to several weeks in the traditional method. Second, on-line groups have a wide geographical reach. Participants in several different states (or even several different countries) can participate in the same panel discussion. Third, e-group researchers claim that their results are more honest than those from traditional focus groups. People in an on-line group use screen names rather than their real identities. This anonymity might let participants talk more freely about topics that might create inhibitions in the traditional setting. Finally, e-groups are cheaper than face-to-face groups, averaging about one-third to one-half the cost.

There are, of course, disadvantages as well. Most obvious is that the researcher cannot see the participants or record their nonverbal behavior and hear voice cues. Facial expressions and body language are important parts of an in-person group that are lost in the on-line setting. Indeed the researcher has no direct way of knowing whether the persons in the group are even who they say they are. In the traditional setting, if the target group is supposed to consist of 25–45-year-old women, the moderator can at least see the members and verify that they seem to fit in that category. In an e-group, researchers have to trust that the proper people have been recruited. Furthermore, on-line groups are limited to those people who have access to a computer and possess some basic computer skills (going on-line, finding the proper chat room site, sending a message, etc.). Finally, e-groups depend on written as opposed to verbal expression. It is not known whether people respond differently when they type their answers rather than express them orally. It might be that responses are briefer among on-line groups simply because it takes more effort to type a long response than to say it. In any case, on-line groups have opened new possibilities for qualitative data collection.

***Survey Research.*** The Internet offers new opportunities for survey researchers. But, like all new technologies, net surveys have both strengths and weaknesses. We look first at the advantages. Internet surveys are less expensive than mail, telephone, or face-to-face surveys. The reasons for these savings are easy to see: Mail surveys require envelopes, paper, and postage costs, whereas a net survey needs none of these things. Telephone surveys require a staff of interviewers, multiple telephone lines, and a facility large enough to conduct the research. One person can do a net survey with just one computer sitting on a desktop. Furthermore, telephone surveys run into the problems of answering machines, caller ID, and call blocking, which increase the cost and effort of gathering the data. Unlike personal interviews, which run up large labor and travel costs, a net survey researcher can gather data from people all over the world without leaving the office. In specific terms, as of late 1998, one firm that specializes in net surveys quoted a price of about $10 per completed e-mail survey versus about $20 per completed paper mail survey and about $30 for a completed telephone survey. Turnaround time is quicker for a net survey. A questionnaire can be distributed, responses received, and results tabulated in a matter of hours, compared to a few weeks for the other methods. In addition, a net survey is an effective way of reaching high-tech and high-income respondents. Other survey methods have a difficult time reaching this group. Finally, graphics, images, and audio can be incorporated into an on-line survey.

On the downside, the researcher is never sure who is answering the survey. Similar to a mail survey, it is hard to verify that the desired person actually provided the answers. Second, the Internet population is not a representative sample of the U.S. population. As of 1999, most people who used the net were young, male, high income, and technically knowledgeable. This disadvantage will become less relevant as the Internet becomes more popular and more accessible. Third, long questionnaires are less likely to get a response. Again, much like mail surveys, the shorter the net questionnaire, the higher the response rate. Finally, some people react badly to unsolicited surveys. In other survey situations, such a respondent might crumple up and throw away the mail survey, slam down the phone on a telephone interviewer, or slam the door. More serious negative responses are possible in the on-line situation. A respondent may send out an angry response ( a flame) to the surveyor and encourage others to do the same or, more disturbing, someone who is competent in the ways of e-mail and programming might send a "letter bomb" back to the surveyor's mail server that will crash the researcher's system.

Internet surveys can be distributed in different ways: by e-mail, on the web, or some combination of the two. The most common form is the e-mail survey. The questionnaire is written in ASCII text, the common element among e-mail systems. The respondent answers the questionnaire by typing in characters at given points in the message (e.g., a "Y" for yes, an "N" for no, or typing in words for an open-ended question), in effect editing the original message. When the respondent is done, he or she simply sends the edited message back as a reply.

E-mail surveys of this type are comparable in format to traditional mail surveys. Instructions must be written clearly, response options must be simple, and the whole instrument should be kept short. In fact, some e-mail programs might impose an overall length limit on the message. Attachments containing graphics and other visual aids can be added to an e-mail survey, but not every respondent may have the software necessary to display the attached material.

Web surveys are written in HTML and posted on a web site. Web surveys have some benefits over e-mail surveys. First, "radio buttons," which prevent respondents from selecting more than one response where only one is requested, and data entry fields, which prevent respondents from typing in the wrong spaces, are both possible. Second, instructions do not have to be written explicitly. The questions can be presented in the proper order according to what answers the respondent provides. Finally, graphics, animations, and even links to other pages can be integrated into the survey.

Using e-mail and the web survey together offers other possibilities. Respondents might be sent e-mail messages containing the address (the URL) of the web page that contains the survey. Some e-mail programs make it possible to simply click on the URL in the e-mail message and be taken to the web site with the survey.

Participants can be recruited in several ways. If the researcher has a web site, it is possible to do a "pop-up" survey. An interval is selected at random (say, 35), and then every 35th visitor to the web site sees a small window pop-up asking whether the user will complete a survey after he or she has finished exploring the site. If the visitor agrees, an icon appears on the screen and remains there until the visitor is ready to take the survey. A click on the icon takes the visitor to a web page that contains the survey.

Participants can also be recruited from e-mail lists. Many companies now ask customers to provide an e-mail address as part of the registration process when purchasing a product or service. The researcher can sample randomly from such a list and send e-mail questionnaires to those included in the sample. Other researchers post notices of their survey with relevant newsgroups or list servers. They provide a brief description of the research and a web address where the questionnaire is located. This technique, of course, results in a volunteer sample.

Longitudinal survey research is also possible on-line. Web panels consist of individuals who answer surveys on-line about specific topics. The same individuals can be contacted again at a later time. Proponents of web panels suggest that mortality among web panels is lower than with panels contacted via traditional research methods.

As of this writing, there are only a few examples of web surveys done by academic researchers. Eighmey (1997) sent an e-mail invitation to prospective respondents inviting them to visit a research web site to answer a web questionnaire. Individuals who met the researcher's screening criteria were then surveyed via conventional means. Parks and Floyd (1996) were interested in finding out whether personal relationships were formed on the Internet. They conducted an e-mail survey of 528 people who had posted messages on various newsgroups and received replies from 33% of them. Johnson and Kaye (1998) conducted a web-based survey about the credibility of traditional and Internet news sources. More than 300 people completed the survey during a 4-week period, and most rated on-line news media as "somewhat" credible. Coomber (1997) illustrated how the Internet might be used to reach a population not accessible by conventional means. He posted messages in several drug-related newsgroups and recruited a sample of drug dealers to answer a questionnaire. Coomber suggests that data gathering on the Internet is particularly useful when a person is less interested in studying a general population and more interested in examining the behavior of unusual or deviant groups, where the notion of a representative sample is much harder to define.

Private sector Internet surveys are more numerous. For example, MatchLogic, an advertising research company, launched a huge consumer survey in 1997 by posting 1 million banner ads on dozens of popular consumer web sites asking people to take their on-line survey. The company hoped to amass more than 3 million responses (Williams, 1997). Another media research company, Decision Analyst, replaced its national mail survey panel with an Internet panel of 5,000 households. Similarly, NFO Research used the Internet to survey its panel of 70,000 respondents (Wylie, 1997). Researchers who want to know more about web surveys (and/or volunteer to join a web panel) can visit *http://www.surveysite.com.*

***Experimental Research.*** Efforts to use the net for experimental research are still in their formative stages. Internet experiments offer some advantages. First, an international sample of subjects can be used; in traditional lab experiments, the samples are all local. Second, the Internet is more efficient because the experimenter does not have to be present during the experiment. He or she can simply place the experimental materials on-line and analyze the results when the experiment is finished. In that same vein, Internet experiments can go on around the clock and 7 days a week. Furthermore, Internet experiments are more convenient for subjects. Rather than the subjects having to go the experiment, the experiment comes to them. Finally, net experiments are cheaper. Overhead costs are low: no experimental rooms to rent, no papers or pencils or other expendable supplies, no reimbursed travel costs for subjects, and so on.

Of course, Internet experiments have obvious drawbacks. First, they are limited in scope to experimental materials that can be distributed on-line. For example, Bandura's experiments, where children watched a violent model and then aggressed against a plastic Bobo doll, would be difficult to do online. Second, the samples are probably not representative of the general population. (Those who favor Internet experiments also point out that the college sophomores who are the subjects of most traditional experiments are probably not representative either.) There are technical problems that might eliminate those people who do not have the appropriate browser or Internet connection. Additionally, the strict controls over the experimental environment in lab experiments do not exist with Internet experiments. It is possible, for an example, for one person to participate several times in the same web experiment, something not allowed in the lab. Subjects who do not understand directions while participating in an on-line experiment have no opportunities to ask questions. Finally, dropout is more likely on-line. Some subjects may start the experiment out of curiosity, get bored, and leave before it is over.

For all their disadvantages, however, net experiments might be acceptable in some areas of mass media research where a perfectly controlled lab situation is not necessary. In any case, the potential of experimentation on-line is only beginning to be explored.

Despite their relative rarity, there are some published examples of experiments using the Internet. Dreze and Zufryden (1997), for example, manipulated the design of a web site using four variables: type of background, image size, sound file display, and position of a celebrity endorsement. Visitors to the test set were sent at random to one of several different configurations. Their "clicking" behavior and the time they spent at the site were two of many dependent variables. The researchers collected data over a 2-month period and eventually wound up with a sample size of 788 (far more than most lab experiments could hope for). A listing of web experiments (including a "Web Experimental Psychology Lab" where the visitor can take part in experiments) and other links relevant to on-line experimentation can be found at *http://psych.hanover.edu/APS/exponnet.html* maintained by The American Psychological Association.

***Qualitative Research.*** In addition to the focus group method discussed earlier, qualitative researchers have used the Internet to gather data. Since much of qualitative research involves analyzing narrative statements, the web seems a particularly appropriate vehicle for soliciting these narratives. Study participants could be solicited via e-mail and asked to respond via the same channel to a list of questions. The e-mail responses would become the data source for the study. In addition, respondents could be assembled in a chat room and encouraged to provide their responses on-line, or a web site could be established where respondents see a list of questions or topics and provide their responses at the site. Fleitas's (1998) study of children with chronic illnesses provides an example of qualitative research using the web. She first constructed a web site and registered it with the major Internet search utilities as well as those search engines that specialized in health news and several relevant list servers. After a few initial contacts, she was able to use the snowball sampling technique (see Chapter 6) and eventually received thousands of replies. These responses were then analyzed using traditional qualitative techniques.

Herzog, Dinoff, and Page (1997) performed a qualitative analysis of an e-mail network devoted to a discussion of the animal rights movement. Their qualitative analysis of messages sent by network members revealed differences in the underlying philosophies of those who used the network. The authors also listed several arguments for conducting qualitative research over the Internet.

On-line qualitative research has obvious advantages and disadvantages. The Internet allows the qualitative researcher to collect data from individuals all over the world at a reasonable cost. In addition, since the respondents remain anonymous, they may be more likely to talk about sensitive topics and reveal inner feelings. The disadvantages are similar to those associated with other methods: There is no way to check whether participants are who they say they are. The technique is open only to those who have access to a computer and know how to use it, and written responses may not convey the depth of information that comes with a face-to-face situation.

## ▪ Practical and Ethical Considerations

Media researchers who contemplate gathering data over the Internet face some special difficulties. First, if a web site is going to be used, the researcher must have access to space on a web server and know enough about HTML to put the site together. Second, just because a web site exists does not mean that people will visit it. Publicizing the site and informing the relevant population are important steps in web data collection. Furthermore, a researcher who decides to post a questionnaire on the web should keep in mind that a potential audience of 50 million or so people might see it. Extra care should be taken to make sure the questionnaire is not offensive, that it contains nonsexist language, and that it reflects well on the researcher and his or her sponsoring organization.

In addition, certain ethical considerations are unique to the net. There must be a mechanism for subjects to provide informed consent before participating in a web experiment or filling out a web questionnaire. Moreover, in traditional experiments and surveys, a "debriefing" session is often needed to explain the goals of the research and give feedback to the participants. Special provisions to do this must be made for on-line research. Sending a standard e-mail explanation might be sufficient for most projects.

Researchers who analyze the content of bulletin boards, newsgroups, list servers, chat rooms, and e-mail need to consider the ethical implications of examining the communication of others without their consent or knowledge. The traditional ethical guidelines state that researchers who study people in public places usually do not require informed consent, whereas those who study people in places where some degree of privacy is expected need to obtain consent. The distinction between public and private may be blurry in cyberspace. Is a chat room public or private? Are messages posted to a newsgroup or a list server private? What if a person must subscribe or pay a fee to belong? Can deception ever be used to gather data? Misrepresenting oneself as a single parent in order to gain access to a chat room for single parents and win their confidence, for example, raises ethical questions about deception in data gathering. Is it ethical to gather data from a bulletin board or a list server operator about subscribers? Duncan (1996) provides some general ethical guidelines for on-line research. An interesting discussion of the ethics involved in data collection through the Internet can be found in Rimm (1995). In sum, the Internet brings new opportunities for mass communication research even as it raises new concerns.

## ▪▪▪ Summary

The Internet has had a significant impact on mass media research. It has speeded up communication among scholars, made information gathering easier, provided new material for analysis, and opened up new techniques of data gathering. Many researchers now use the Internet for on-line surveys and experiments as well as for qualitative data gathering. Using the Internet as a research tool raises new and unique ethical questions.

### Questions and Problems for Further Investigation

1. Search the research literature for examples of on-line surveys. Compare them with traditional surveys concerning their external validity, reliability, and efficiency.
2. What are some mass communications experiments that could be done on-line?
3. What steps could a researcher take to make sure that information obtained from a search of sources on the web is credible?
4. In addition to those mentioned in the text, what other web sites might be helpful for a mass media researcher?
5. On-line surveys are becoming more and more popular. If you are using *InfoTrac College Edition,* do a title search for "online surveys." How many different types of surveys can you identify?

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# Glossary

**acceptance rate:** the percentage of the target sample that agrees to participate in a research project.

**agenda setting:** the theory that the media provide topics of discussion and importance for consumers.

**aided recall:** a survey technique in which the interviewer shows the respondent a copy of a newspaper, magazine, television schedule, or other item that might help him or her to remember a certain article, program, advertisement, and so on.

**algorithm:** a statistical procedure or formula.

**American Standard Code for Information Interchange (ASCII):** the standard machine language used by microcomputers; each letter, number, or special character is represented by seven bits of information.

**analysis of variance (ANOVA):** a statistical procedure used to decompose sources of variation into two or more independent variables.

**analytical survey:** a survey that attempts to describe and explain why certain conditions exist (usually by testing certain hypotheses).

**anonymity:** researcher cannot connect the names of research participants with the information they provide.

**antecedent variable:** (1) in survey research, the variable used to predict another variable; (2) in experimental research, the independent variable.

**applied research:** research that attempts to solve a specific problem rather than to construct a theory.

**artifact:** a variable that creates an alternative explanation of results (a confounding variable).

**audience turnover:** in radio research, an estimate of the number of times the audience changes stations during a given daypart.

**auditorium music testing:** a testing procedure in which a group of respondents simultaneously rates music hooks.

**autonomy:** ethical principle that holds each individual is responsible for his or her decisions and should not be exploited.

**available sample:** a sample selected on the basis of accessibility.

**average quarter-hour (AQH):** the average number of persons or households tuned in to a specific channel or station for at least 5 minutes during a 15-minute time segment.

**bar chart:** see histogram.

**beneficence:** ethical principle that states that a researcher should share the positive benefits of a research project with all involved.

**beta weight:** a mathematically derived value that represents a variable's contribution to a prediction or weighted linear combination (also called weight coefficient).

**call-out research:** a procedure used in radio research to determine the popularity of recordings; see also *hook*.

**case study:** an empirical inquiry that uses multiple sources of data to investigate a problem.

**catch-up panel:** members of a previous cross-sectional sample who are relocated for subsequent observation.

**CATI:** computer-assisted telephone interviewing; video display terminals are used by interviewers to present questions and enter responses.

**census:** an analysis in which the sample comprises every element of a population.

**central limit theorem:** the sum of a large number of independent and identically distributed random variables that has an approximate normal distribution.

**central location testing (CLT):** research conducted with respondents who are invited to a field service facility or other research location.

**central tendency:** a single value that is chosen to represent a typical score in a distribution, such as the mean, the mode, or the median.

**checklist question:** a type of question in which the respondent is given a list of items and is asked to mark those that apply.

**chi-square statistic:** a measurement of observed versus expected frequencies; often referred to as *crosstabs*.

**circulation:** in the print media, the total number of copies of a newspaper or magazine that are delivered to subscribers plus all copies bought at newsstands or from other sellers.

**circulation research:** (1) a market-level study of newspaper and magazine penetration; (2) a study of the delivery and pricing systems used by newspapers and magazines.

**closed-ended question:** a question the respondent must answer by making a selection from a prepared set of options.

**Cloze procedure:** a method for measuring readability or recall in which every *n*th word is deleted from the message and readers are asked to fill in the blanks.

**cluster sample:** a sample placed into groups or categories.

**codebook:** a menu or list of responses used in coding open-ended questions.

**coding:** the placing of a unit of analysis into a particular category.

**coefficient of determination:** in correlational statistics, the amount of variation in the criterion variable that is accounted for by the antecedent variable.

**coefficient of nondetermination:** in correlational statistics, the amount of variation in the criterion variable that is left unexplained.

**cohort analysis:** a study of a specific population as it changes over time.

**communication audit:** in public relations, an examination of the internal and external means of communication used by an organization.

**computer-assisted telephone interviewing (CATI):** questionnaires are designed for the computer; interviewers enter respondents' answers directly into the computer for tabulation; question skips and response options are controlled by the computer.

**concealment:** withholding some information about a research project from a participant.

**concept:** an abstract idea formed by generalization.

**confidence interval:** an area within which there is a stated probability that the parameter will fall.

**confidence level:** the probability (for example, .05 or .01) of rejecting a null hypothesis that is in fact true; also called the alpha level.

**confidentiality:** researcher can connect the names of research participants with the information they provide but promises to keep connection secret.

**constitutive definition:** a type of definition in which other words or concepts are substituted for the word being defined.

**construct:** a combination of concepts that is created to describe a specific situation (for example, "authoritarianism").

**constructive replication:** an analysis of a hypothesis taken from a previous study that deliberately avoids duplicating the methods used in the previous study.

**continuous variable:** a variable that can take on any value over a range of values and can be meaningfully broken into subparts (for example, "height").

**control group:** subjects who do not receive experimental treatment and thus serve as a basis of comparison in an experiment.

**control variable:** a variable whose influence a researcher wishes to eliminate.

**convenience sample:** a nonprobability sample consisting of respondents or subjects who are available, such as college students in a classroom.

**co-op (incentive):** a payment given to respondents for participating in a research project.

**copy testing:** research used to determine the most effective way of structuring a message to achieve the desired results; also known as message research.

**cost per interview (CPI):** the dollar amount required to recruit or interview one respondent.

**cost per thousand (CPM):** the dollar cost of reaching 1,000 people or households by means of a particular medium or advertising vehicle.

**criterion variable:** (1) in survey research, the variable presumed to be the effects variable; (2) in experimental research, the dependent variable.

**cross-lagged correlation:** a type of longitudinal study in which information about two variables is gathered from the same sample at two different times; the correlations between variables at the same point in time are compared with the correlations at different points in time.

**cross-sectional research:** the collection of data from a representative sample at only one point in time.

**cross-tabulation analysis (crosstabs):** see *chi-square statistic*.

**cross-validation:** a procedure in which measurement instruments or subjects' responses are compared to verify their validity or truthfulness.

**cultivation analysis:** a research approach that suggests that heavy television viewing leads to perceptions of social reality that are consistent with the view of the world as presented on television.

**cume:** an estimate of the number of different persons who listened to or viewed a particular broadcast for at least 5 minutes during a given daypart; see also *reach*.

**data archives:** data storage facilities where researchers can deposit data for other researchers to use.

**database journalism:** a form of journalism that relies on computer-assisted analysis of existing information.

**database marketing:** research conducted with respondents whose names are included in databases, such as people who recently purchased a television set or members of a club or organization.

**daypart:** a given part of the broadcast day (for example, prime time = 8:00 P.M.–11:00 P.M. EST).

**deception:** deliberately misleading participants in a research project.

**demand characteristic:** the premise that subjects' awareness of the experimental condition may affect their performance in the experiment; also known as the Hawthorne effect.

**deontological:** ethical system based on rules.

**dependent variable:** the variable that is observed and whose value is presumed to depend on the independent variable(s).

**descriptive statistics:** statistical methods and techniques designed to reduce data sets to allow for easier interpretation.

**descriptive survey:** a survey that attempts to picture or document current conditions or attitudes.

**design-specific results:** research results that are based on, or specific to, the research design used.

**designated market area (DMA):** a term to define a TV market area; each county in the United States belongs to only one DMA.

**discrete variable:** a variable that can be conceptually subdivided into a finite number of indivisible parts (for example, the number of children in a family).

**disk-by-mail (DBM) survey:** a survey questionnaire on computer disk sent to respondents to answer at their leisure.

**dispersion:** the amount of variability in a set of scores.

**disproportionate stratified sampling:** overrepresentation of a specific stratum or characteristic.

**distribution:** a collection of scores or measurements.

**double-barreled question:** a single question that requires two separate responses (for example, "Do you like the price and style of this item?").

**double-blind experiment:** a research study in which experimenters and others do not know whether a given subject belongs to the experimental group or to the control group.

**dummy variable:** the variable created when a variable at the nominal level is transformed into a form more appropriate for higher order statistics.

**editor-reader comparison:** a readership study in which the perceptions of editors and readers are solicited.

**environmental monitoring program:** in public relations research, a study of trends in public opinion and events in the social environment that may have a significant impact on an organization.

**equivalency:** the internal consistency of a measure.

**error variance:** the error created by an unknown factor.

**evaluation apprehension:** a fear of being measured or tested, which may result in providing invalid data.

**evaluation research:** a small-scale environmental monitoring program designed to measure an organization's social performance.

**exhaustivity:** a state of a category system such that every unit of analysis can be placed into an existing slot.

**experimental design:** a blueprint or set of plans for conducting laboratory research.

**external validity:** the degree to which the results of a research study are generalizable to other situations.

**factor analysis:** a multivariate statistical procedure used primarily for data reduction, construct development, and the investigation of variable relationships.

**factor score:** a composite or summary score produced by factor analysis.

**factorial design:** a simultaneous analysis of two or more independent variables or factors.

**feeling thermometer:** a rating scale patterned after a weather thermometer on which respondents can rate their attitudes on a scale of 0 to 100.

**field observation:** a study of a phenomenon in a natural setting.

**field service:** a research company that conducts interviews, recruits respondents for research projects, or both.

**filter question:** a question designed to screen out certain individuals from participation in a study; also called a screener question.

**Flesch reading ease formula:** an early readability formula based on the number of words per sentence and the number of syllables per word.

**focus group:** an interview conducted with 6–12 subjects simultaneously and a moderator who leads a discussion about a specific topic.

**Fog Index:** a readability scale based on sentence length and the number of syllables per word.

**follow-back panel:** a research technique in which a current cross-sectional sample is selected and matched with archival data.

**forced-choice question:** a question that requires a subject to choose between two specified responses.

**forced exposure:** a test situation in which respondents are required to be exposed to a specific independent or dependent variable.

**framing:** how the media choose to portray what they cover.

**frequency:** in advertising, the total number of exposures to a message that a person or household receives.

**frequency curve:** a graphical display of frequency data in a smooth, unbroken curve.

**frequency distribution:** a collection of scores, ordered according to magnitude, and their respective frequencies.

**frequency polygon:** a series of lines connecting points that represent the frequencies of scores.

**gross incidence:** the percent of qualified respondents reached of all contacts made.

**gross rating points:** the total of audience ratings during two or more time periods, representing the size of the gross audience of a radio or television broadcast.

**group administration:** conducting measurements with several subjects simultaneously.

**histogram:** a bar chart that illustrates frequencies and scores.

**homogeneity:** equality of control and experimental groups prior to an experiment; also called point of prior equivalency.

**hook:** a short representative sample of a recording used in call-out research.

**hypertext:** system that links together electronic documents.

**hypothesis:** a tentative generalization about the relationship between two or more variables that predicts an experimental outcome.

**incidence:** the percentage of a population that possesses the desired characteristics for a particular research study.

**independent variable:** the variable that is systematically varied by the researcher.

**informed consent:** ethical guideline that states that participants in a research project should have the basic facts of the project revealed to them before they make a decision to participate in the research.

**instrument decay:** the deterioration of a measurement instrument during the course of a study, which reduces the instrument's effectiveness and accuracy.

**instrumental replication:** the duplication in a research study of the dependent variable of a previous study.

**intensive interview:** a hybrid of the one-on-one personal interview.

**interaction:** a treatment-related effect dependent on the concomitant influence of two independent variables on a dependent variable.

**intercoder reliability:** in content analysis, the degree of agreement between or among independent coders.

**internal consistency:** the level of consistency of performance among items within a scale.

**internal validity:** a property of a research study such that results are based on expected conditions rather than on extraneous variables.

**interval level:** a measurement system in which the intervals between adjacent points on a scale are equal (for example, a thermometer).

**isomorphism:** similarity of form or structure.

**item pretest:** a method of testing subjects' interest in reading magazine or newspaper articles.

**item-selection study:** a readership study used to determine who reads specific parts of a newspaper.

**justice:** ethical principle that holds that all people should be treated equally.

**leading question:** a question that suggests a certain response or makes an implicit assumption (for example, "How long have you been an alcoholic?").

**lifestyle segmentation research:** a research project that investigates and categorizes respondents' activities, interests, attitudes, and behaviors.

**Likert scale:** a measurement scale in which respondents strongly agree, agree, are neutral, disagree, or strongly disagree with the statements.

**literal replication:** a study that is an exact duplication of a previous study.

**longitudinal study:** the collection of data at different points in time.

**magazine readership survey:** a survey of readers to determine which sections of the magazine were viewed, read, or both.

**mail survey:** the mailing of self-administered questionnaires to a sample of people; the researcher must rely on the recipients to mail back their responses.

**mailing list:** a compilation of names and addresses, sometimes prepared by a commercial firm, that is used as a sampling frame for mail surveys.

**main effect:** the effect of the independent variable(s) on the dependent variable (no interaction is present).

**manipulation check:** a test to determine whether the manipulation of the independent variable actually had the intended effect.

**mark-sense reader:** see *optical character reader.*

**marker variable:** a variable that highlights or defines the construct under study.

**masked recall:** a survey technique in which the interviewer shows respondents the front cover of a newspaper or magazine with the name of the publication blacked out to test unaided recall of the publication.

**mean:** the arithmetic average of a set of scores.

**measurement:** a procedure in which a researcher assigns numerals to objects, events, or properties according to certain rules.

**measurement error:** an inconsistency produced by the instruments used in a research study.

**media efficiency:** reaching the maximum possible audience at the least possible cost.

**median:** the midpoint of a distribution of scores.

**medium variables:** in a content analysis, the aspects of content that are unique to the medium under consideration (for example, typography to a newspaper or magazine).

**memory:** the amount of information a computer can store and work with, excluding external storage devices.

**meta-analysis:** a quantitative aggregation of many research findings.

**method of authority:** a method of knowing in which something is believed because a source perceived as an authority says it is true.

**method of intuition:** a method of knowing in which something is believed because it is "self-evident" or "stands to reason"; also called a priori reasoning.

**method of tenacity:** a method of knowing in which something is believed because a person has always believed it to be true.

**method-specific results:** research results based on, or specific to, the research method used.

**metro survey area (MSA):** a region representing one of the Consolidated Metropolitan Statistical Areas (CMSA), as defined by the U.S. Office of Management and Budget.

**mode:** the score that occurs most often in a frequency distribution.

**mortality:** in panel studies and other forms of longitudinal research, the percent of original sample members who drop out of the research project for one reason or another.

**multiple regression:** an analysis of two or more independent variables and their relationship to a single dependent variable; used to predict the dependent variable.

**multistage sampling:** a form of cluster sampling in which individual households or persons, not groups, are selected.

**mutually exclusive:** a category system in which a unit of analysis can be placed in one and only one category.

**net incidence:** the number of respondents or subjects who actually participate in a research project.

**nominal level:** the level of measurement at which arbitrary numerals or other symbols are used to classify persons, objects, or characteristics.

**nonmaleficence:** ethical principle that states a researcher should do no harm.

**nonparametric statistics:** statistical procedures used with variables measured at the nominal or ordinal level.

**nonprobability sample:** a sample selected without regard to the laws of mathematical probability.

**normal curve:** a symmetrical, bell-shaped curve that possesses specific mathematical characteristics.

**normal distribution:** a mathematical model of how measurements are distributed; a graph of a normal distribution is a continuous, symmetrical, bell-shaped curve.

**null hypothesis:** the denial or negation of a research hypothesis.

**objective function:** a mathematical formula that provides various quantitative values for a given media schedule of advertisements; used in computer simulations of advertising media schedules.

**one-on-one interviews:** sessions in which respondents are interviewed one at a time.

**open-ended question:** a question to which respondents are asked to generate an answer or answers with no prompting from the item itself (for example, "What is your favorite type of television program?").

**operational definition:** a definition that specifies patterns of behavior and procedures in order to experience or measure a concept.

**operational replication:** a study that duplicates only the sampling methodology and the experimental procedures of a previous study.

**ordinal level:** the level of measurement at which items are ranked along a continuum.

**overnights:** ratings surveys of a night's television viewing computed in five major U.S. cities by the A. C. Nielsen Company.

**panel study:** a research technique in which the same sample of respondents is measured at different points in time.

**parameter:** a characteristic or property of a population.

**parametric statistics:** statistical procedures appropriate with variables measured at the interval or ratio level.

**parsimony principle:** the premise that the simplest method is the most preferable; also known as Occam's razor.

**partial correlation:** a method used to control a confounding or spurious variable that may affect the relationship between independent variables and dependent variables.

**people meter:** an electronic television audience data-gathering device capable of recording individual viewing behavior.

**periodicity:** any form of bias resulting from the use of a nonrandom list of subjects or items in selecting a sample.

**personal interview:** a survey technique in which a trained interviewer visits a respondent and administers a questionnaire in a face-to-face setting.

**pilot study:** a trial run of a study conducted on a small scale to determine whether the research design and methodology are relevant and effective.

**population:** a group or class of objects, subjects, or units.

**population distribution:** the frequency distribution of all the variables of interest as determined by a census of the population.

**power:** the probability of rejecting the null hypothesis when an alternative is true.

**precision journalism:** a technique of inquiry in which social science research methods are used to gather the news.

**precursor analysis:** a study that assumes that leaders establish trends and that these trends ultimately trickle down to the rest of society.

**predictor variable:** see *antecedent variable.*

**prerecruits:** respondents who are recruited ahead of time to participate in a research project.

**prestige bias:** the tendency of a respondent to give answers that will make him or her seem more educated, successful, financially stable, or otherwise prestigious.

**probability level:** a predetermined value at which researchers test their data for statistical significance.

**probability sample:** a sample selected according to the laws of mathematical probability.

**proportionate stratified sampling:** representing population proportions of a specific stratum or characteristic.

**proposition:** a statement of the form "if *A*, then *B*" that links two or more concepts.

**proprietary data:** research data gathered by a private organization that are available to the general public only if released by that organization.

**prosocial:** having positive results for society.

**protocol:** a document that contains the procedures to be used in a field study.

**psychographics:** an area of research that examines why people behave and think as they do.

**public relations audit:** a comprehensive study of the public relations position of an organization.

**purposive sample:** a sample deliberately chosen to be representative of a population.

**qualitative research method:** a description or analysis of a phenomenon that does not depend on the measurement of variables.

**quantitative research method:** a description or analysis of a phenomenon that involves specific measurements of variables.

**quasi-experiment:** a research design that does not involve random assignment of subjects to experimental groups.

**quota sample:** a sample selected to represent certain characteristics of interest.

**random digit dialing:** a method of selecting telephone numbers that ensures that all telephone households have an equal chance of being selected.

**random error:** error in a research study that cannot be controlled by the researcher.

**random sample:** a subgroup or subset of a population selected in such a way that each unit in a population has an equal chance of being selected.

**range:** a measure of dispersion based on the difference between the highest and lowest scores in a distribution.

**rating:** an estimate of the percentage of people or households in a population that are tuned to a specific station or network.

**ratio level:** a level of measurement that has all the properties of an interval level scale and also has a true zero point.

**reach in advertising:** the total number of people or households exposed to a message at least once during a specific period of time; see also *cume.*

**reactivity:** a subject's awareness of being measured or observed and its possible impact on that subject's behavior.

**readability:** the total of all elements in a piece of printed material that affect the degree to which people understand the piece and find it interesting.

**reader-nonreader study:** a study that contrasts nonreaders of newspapers or magazines with regular readers.

**reader profile:** a demographic summary of the readers of a particular publication.

**recall study:** a study in which respondents are asked to remember which advertisements they remember seeing in the medium being investigated.

**recognition:** a measurement of readership in which respondents are shown the logo of a magazine or newspaper.

**region of rejection:** the proportion of an area in a sampling distribution that equals the level of significance; the region of rejection represents all the values of a test statistic that are highly unlikely, provided the null hypothesis is true.

**relativistic:** ethical system that takes into account the situation in which a decision is made.

**reliability:** the property of a measure that consistently gives the same answer at different times.

**repeated-measures design:** a research design in which numerous measurements are made on the same subjects.

**replication:** an independent verification of a research study.

**research question:** a tentative generalization about the relationship between two or more variables.

**research supplier:** a company that provides various forms of research to clients, from data collection only to a final written analysis and summary of the data.

**retrospective panel:** a study in which each respondent is asked questions about events and attitudes in his or her lifetime.

**rough cut:** a model or simulation of a final product.

**sample:** a subgroup or subset of a population or universe.

**sample distribution:** the frequency distribution of all the variables of interest as determined from a sample.

**sample-specific results:** research results that are based on, or specific to, the research sample used.

**sampling distribution:** a probability distribution of all possible values of a statistic that would occur if all possible samples of a fixed size were taken from a given population.

**sampling error:** the degree to which measurements obtained from a sample differ from the measurements that would be obtained from the population.

**sampling frame:** a list of the members of a particular population.

**sampling interval:** a random interval used for selecting subjects or units in the systematic sampling method.

**sampling rate:** the ratio of the number of people chosen in the sample to the total number in the population (for example, if 100 fraternity members were systematically chosen from a sampling frame of 1,000 fraternity members, the sampling rate would be 10%, or 1/10).

**scale:** a form of measurement such as 10-point scales, Likert, Guttman, or semantic differential.

**scattergram:** a graphic technique for portraying the relationship between two variables.

**scientific method:** a systematic, controlled, empirical, and critical investigation of hypothetical propositions about the presumed relationships among natural phenomena.

**screener:** a short survey or a portion of a survey designed to select only appropriate respondents for a research project.

**secondary analysis:** the use of data collected by a previous researcher or another research organization; also called data reanalysis.

**semantic differential:** a rating scale consisting of seven spaces between two bipolar adjectives (for example, "good _______ bad").

**share:** an estimate of the percentage of persons or households tuned to a specific station, channel, or network.

**shopping center interview (intercept):** a nonprobability study in which respondents are recruited and interviewed in a shopping mall.

**sigma (Σ):** the Greek capital letter symbolizing summation.

**skewness:** the degree of departure of a curve from the normal distribution (curves can be positively or negatively skewed).

**SMOG Grading:** a measure of readability based on the number of syllables per word.

**social audit:** in public relations research, an analysis of the social performance of an organization.

**stability:** the degree of consistency of the results of a measure at different times.

**staged manipulation:** a situation in which researchers construct events and circumstances so they can manipulate the independent variable.

**standard deviation:** the square root of the variance (a mathematical index of dispersion).

**standard error:** an estimate of the amount of error present in a measurement.

**standard score:** a measure that has been standardized in relation to a distribution's mean and standard deviation.

**statistics:** a science that uses mathematical methods to collect, organize, summarize, and analyze data.

**straightforward manipulation:** a situation in which materials and instructions are simply presented to respondents or subjects.

**stratified sample:** a sample selected after the population has been divided into categories.

**structured interview:** an interview in which standardized questions are asked in a predetermined order.

**summary statistics:** statistics that summarize a great deal of numerical information about a distribution, such as the mean and the standard deviation.

**sweep:** a nationwide survey conducted by the A. C. Nielsen Company and Arbitron of every television market; conducted in February, May, July, and November.

**systematic random sampling:** a procedure to select every *n*th subject for a study, such as every 10th person in a telephone directory.

**systematic variance:** a regular increase or decrease in all scores or data in a research study by a known factor.

**teleological:** ethical system based on the balancing of the likely effects of a decision.

**telephone coincidental:** a broadcasting research procedure in which random subjects or households are called and asked what they are viewing or listening to at that moment.

**telephone survey:** a research method in which survey data are collected over the telephone by trained interviewers who ask questions and record responses.

**theory:** a set of related propositions that presents a systematic view of phenomena by specifying relationships among concepts.

**time spent listening (TSL):** a quantitative statement about the average time a listener spends listening to a radio station (or several stations); stated in hours and minutes.

**total observation:** in field observation, a situation in which the observer assumes no role in the phenomenon being observed other than that of observer.

**total participation:** field observation in which the observer becomes a full-fledged participant in the situation under observation.

**total survey area (TSA):** a region in which an audience survey is conducted.

**tracking study:** a special readership measurement technique in which respondents designate material they have read (using a different color of pencil for each reading episode).

**trend study:** a longitudinal study in which a topic is restudied using different groups of respondents (for example, the Roper studies of the credibility of the media).

**triangulation:** using a combined quantitative and qualitative approach to solve a problem.

**trigger event:** an event or activity that might focus public concern on a topic or issue.

***t*-test:** a statistic used to determine the significance between group means.

**Type I error:** rejection of the null hypothesis when it should be accepted.

**Type II error:** acceptance of the null hypothesis when it should be rejected.

**unaided recall:** question format in which respondents are asked to recall certain information without help from the researcher.

**unit of analysis:** the smallest element of a content analysis; the thing that is counted whenever it is encountered.

**unstructured interview:** an interview in which the interviewer asks broad and general questions but retains control over the discussion.

**uses and gratifications study:** a study of the motives for media usage and the rewards that are sought.

**utilitarianism:** ethical system that weighs the potential benefits of a decision against potential harm.

**validity:** the degree to which a test actually measures what it purports to measure.

**variable:** a phenomenon or event that can be measured or manipulated.

**variance:** a mathematical index of the degree to which scores deviate from the mean.

**voluntary participation:** ethical guideline that states subjects involved in a research project have a right to decline to participate or leave the project at any time.

**volunteer sample:** a group of people who go out of their way to participate in a survey or experiment (for example, by responding to a newspaper advertisement).

**web browser:** a program that searches the World Wide Web.

**weighting:** a mathematical procedure used to adjust a sample to meet the characteristics of a given population; also called sample balancing.

**World Wide Web:** system of interconnected computers and electronic information sites.

# Appendixes

**1** *Tables*

**2** *Brief Guide for Conducting Focus Groups*

**3** *Sample Data*

**4** *Sample Questionnaire*

**5** *Research Reports*

# Appendix 1

# Tables

- *Table 1 Random Numbers*
- *Table 2 Distribution of t*
- *Table 3 Areas Under the Normal Curve*
- *Table 4 Distribution of Chi-Square*
- *Table 5 Distribution of F: .05 Level*
- *Table 6 Distribution of F: .01 Level*

Table 1 *Random Numbers*

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 8 | 9 | 5 | 6 | 4 | 4 | 8 | 9 | 4 | 0 | 7 | 5 | 9 | 7 | 0 | 4 | 5 | 3 | 1 | 2 | 7 | 8 | 6 | 6 |
| 8 | 2 | 4 | 4 | 8 | 8 | 0 | 2 | 6 | 5 | 5 | 0 | 3 | 5 | 9 | 1 | 3 | 8 | 6 | 8 | 8 | 3 | 1 | 8 | 5 |
| 3 | 1 | 2 | 3 | 7 | 6 | 4 | 1 | 1 | 4 | 3 | 5 | 2 | 7 | 4 | 9 | 3 | 2 | 7 | 5 | 5 | 4 | 7 | 6 | 2 |
| 2 | 3 | 8 | 1 | 8 | 6 | 6 | 1 | 0 | 8 | 4 | 1 | 0 | 5 | 0 | 4 | 8 | 5 | 3 | 7 | 8 | 7 | 6 | 5 | 7 |
| 0 | 0 | 4 | 3 | 6 | 5 | 5 | 2 | 3 | 5 | 2 | 4 | 3 | 3 | 9 | 3 | 2 | 5 | 2 | 0 | 8 | 4 | 6 | 2 | 1 |
| 1 | 2 | 8 | 9 | 7 | 5 | 8 | 9 | 7 | 8 | 6 | 7 | 4 | 0 | 4 | 0 | 4 | 9 | 7 | 8 | 5 | 0 | 2 | 9 | 8 |
| 9 | 8 | 4 | 6 | 9 | 9 | 0 | 8 | 0 | 2 | 3 | 2 | 8 | 0 | 5 | 4 | 5 | 0 | 6 | 7 | 6 | 2 | 3 | 9 | 8 |
| 0 | 7 | 3 | 6 | 9 | 5 | 1 | 6 | 3 | 8 | 0 | 5 | 9 | 0 | 0 | 2 | 0 | 9 | 3 | 6 | 8 | 8 | 2 | 4 | 3 |
| 2 | 2 | 3 | 9 | 5 | 7 | 9 | 4 | 0 | 6 | 7 | 3 | 6 | 9 | 6 | 4 | 1 | 7 | 3 | 6 | 5 | 1 | 8 | 2 | 6 |
| 4 | 9 | 5 | 6 | 9 | 3 | 1 | 4 | 7 | 8 | 1 | 5 | 6 | 7 | 2 | 2 | 4 | 6 | 3 | 6 | 5 | 4 | 2 | 1 | 2 |
| 4 | 0 | 6 | 6 | 8 | 5 | 4 | 3 | 7 | 8 | 3 | 2 | 6 | 8 | 1 | 2 | 2 | 7 | 0 | 6 | 5 | 3 | 5 | 8 | 4 |
| 6 | 3 | 3 | 2 | 0 | 3 | 9 | 7 | 0 | 2 | 3 | 6 | 9 | 5 | 3 | 4 | 1 | 6 | 1 | 8 | 3 | 9 | 4 | 3 | 3 |
| 0 | 6 | 1 | 8 | 4 | 2 | 1 | 8 | 6 | 7 | 5 | 4 | 1 | 9 | 0 | 3 | 2 | 4 | 1 | 5 | 7 | 7 | 4 | 0 | 8 |
| 2 | 2 | 4 | 2 | 9 | 6 | 8 | 5 | 8 | 2 | 6 | 1 | 0 | 7 | 6 | 1 | 7 | 9 | 2 | 0 | 9 | 2 | 8 | 7 | 8 |
| 8 | 3 | 2 | 3 | 0 | 7 | 4 | 3 | 5 | 8 | 9 | 0 | 8 | 0 | 5 | 8 | 8 | 7 | 1 | 3 | 6 | 0 | 1 | 3 | 9 |
| 2 | 3 | 1 | 8 | 2 | 3 | 1 | 0 | 9 | 0 | 0 | 8 | 9 | 1 | 2 | 0 | 3 | 7 | 0 | 2 | 0 | 1 | 8 | 1 | 7 |
| 0 | 8 | 7 | 3 | 4 | 4 | 5 | 1 | 8 | 7 | 4 | 5 | 1 | 9 | 9 | 0 | 3 | 2 | 2 | 3 | 1 | 2 | 6 | 4 | 6 |
| 5 | 8 | 5 | 6 | 7 | 6 | 1 | 0 | 1 | 6 | 7 | 0 | 2 | 1 | 9 | 1 | 6 | 3 | 2 | 0 | 1 | 1 | 5 | 5 | 9 |
| 6 | 1 | 1 | 0 | 5 | 1 | 3 | 6 | 7 | 7 | 7 | 8 | 2 | 4 | 5 | 9 | 3 | 0 | 7 | 6 | 7 | 9 | 1 | 1 | 6 |
| 5 | 3 | 6 | 1 | 2 | 7 | 2 | 6 | 2 | 7 | 3 | 3 | 6 | 8 | 2 | 6 | 5 | 5 | 8 | 4 | 2 | 4 | 2 | 1 | 8 |
| 8 | 7 | 3 | 9 | 5 | 1 | 1 | 8 | 4 | 1 | 8 | 5 | 6 | 6 | 0 | 6 | 9 | 2 | 2 | 6 | 8 | 2 | 5 | 8 | 5 |
| 2 | 9 | 1 | 9 | 9 | 5 | 6 | 1 | 8 | 6 | 6 | 4 | 0 | 5 | 0 | 0 | 8 | 8 | 2 | 5 | 9 | 2 | 0 | 1 | 2 |
| 8 | 1 | 0 | 2 | 1 | 7 | 2 | 0 | 2 | 7 | 6 | 8 | 4 | 8 | 0 | 2 | 6 | 2 | 8 | 0 | 8 | 3 | 6 | 0 | 7 |
| 9 | 7 | 1 | 5 | 5 | 7 | 4 | 6 | 1 | 5 | 6 | 5 | 9 | 9 | 2 | 2 | 7 | 1 | 2 | 7 | 0 | 0 | 5 | 0 | 9 |
| 6 | 3 | 7 | 9 | 8 | 8 | 7 | 4 | 9 | 5 | 0 | 3 | 3 | 0 | 3 | 7 | 0 | 7 | 5 | 8 | 1 | 2 | 8 | 3 | 1 |
| 9 | 4 | 2 | 2 | 1 | 3 | 2 | 0 | 5 | 6 | 0 | 6 | 0 | 9 | 0 | 9 | 3 | 1 | 7 | 8 | 1 | 2 | 3 | 1 | 1 |
| 5 | 2 | 8 | 5 | 1 | 0 | 2 | 4 | 6 | 0 | 8 | 3 | 4 | 2 | 9 | 0 | 2 | 4 | 0 | 5 | 2 | 7 | 8 | 8 | 8 |
| 7 | 9 | 7 | 1 | 3 | 7 | 2 | 4 | 6 | 3 | 8 | 4 | 0 | 2 | 5 | 5 | 4 | 6 | 1 | 6 | 5 | 4 | 6 | 3 | 0 |
| 0 | 1 | 5 | 0 | 6 | 5 | 1 | 1 | 8 | 0 | 9 | 4 | 1 | 1 | 2 | 6 | 1 | 4 | 2 | 0 | 8 | 6 | 3 | 1 | 0 |
| 5 | 8 | 1 | 7 | 4 | 7 | 5 | 6 | 2 | 1 | 9 | 3 | 7 | 4 | 0 | 4 | 6 | 4 | 6 | 9 | 6 | 7 | 5 | 0 | 6 |
| 2 | 5 | 0 | 7 | 5 | 1 | 6 | 0 | 4 | 0 | 4 | 1 | 9 | 4 | 9 | 8 | 3 | 6 | 3 | 8 | 0 | 0 | 1 | 7 | 9 |
| 8 | 8 | 3 | 7 | 8 | 1 | 4 | 6 | 3 | 8 | 0 | 5 | 6 | 4 | 4 | 3 | 5 | 0 | 6 | 9 | 5 | 5 | 0 | 6 | 0 |
| 4 | 3 | 1 | 8 | 7 | 3 | 4 | 1 | 7 | 1 | 6 | 1 | 5 | 2 | 7 | 9 | 4 | 0 | 2 | 9 | 9 | 6 | 8 | 7 | 6 |
| 9 | 1 | 4 | 7 | 7 | 4 | 3 | 7 | 4 | 2 | 5 | 5 | 0 | 2 | 1 | 1 | 1 | 4 | 0 | 6 | 4 | 7 | 5 | 9 | 6 |
| 8 | 6 | 0 | 8 | 2 | 9 | 3 | 4 | 3 | 4 | 7 | 6 | 9 | 6 | 1 | 8 | 2 | 3 | 3 | 8 | 3 | 4 | 6 | 8 | 3 |
| 3 | 3 | 0 | 6 | 2 | 3 | 8 | 7 | 4 | 3 | 8 | 3 | 1 | 1 | 5 | 9 | 7 | 4 | 4 | 4 | 9 | 7 | 6 | 0 | 9 |
| 1 | 8 | 2 | 0 | 2 | 9 | 8 | 8 | 0 | 1 | 6 | 8 | 0 | 7 | 5 | 6 | 0 | 8 | 3 | 9 | 2 | 1 | 1 | 2 | 0 |
| 4 | 7 | 4 | 1 | 1 | 8 | 5 | 9 | 6 | 9 | 7 | 7 | 8 | 0 | 8 | 0 | 8 | 5 | 7 | 2 | 6 | 9 | 4 | 6 | 7 |
| 7 | 2 | 8 | 1 | 1 | 0 | 4 | 0 | 5 | 0 | 0 | 8 | 2 | 5 | 7 | 4 | 9 | 4 | 0 | 6 | 9 | 7 | 1 | 8 | 0 |
| 8 | 4 | 0 | 0 | 8 | 1 | 8 | 7 | 1 | 5 | 0 | 1 | 3 | 7 | 3 | 1 | 1 | 4 | 1 | 9 | 7 | 1 | 7 | 8 | 5 |
| 1 | 5 | 0 | 5 | 3 | 1 | 9 | 7 | 5 | 0 | 3 | 7 | 6 | 3 | 4 | 7 | 2 | 2 | 0 | 5 | 0 | 0 | 7 | 5 | 1 |
| 6 | 8 | 5 | 1 | 2 | 4 | 1 | 0 | 4 | 6 | 2 | 5 | 9 | 9 | 3 | 2 | 5 | 6 | 0 | 1 | 2 | 0 | 6 | 7 | 7 |
| 7 | 6 | 5 | 5 | 4 | 6 | 1 | 9 | 1 | 1 | 7 | 9 | 9 | 9 | 6 | 6 | 7 | 1 | 3 | 7 | 7 | 4 | 8 | 8 | 2 |
| 7 | 8 | 2 | 4 | 2 | 1 | 6 | 4 | 3 | 9 | 7 | 2 | 6 | 6 | 5 | 7 | 0 | 1 | 2 | 8 | 9 | 7 | 1 | 4 | 5 |
| 9 | 0 | 3 | 3 | 8 | 1 | 3 | 5 | 1 | 4 | 2 | 8 | 7 | 7 | 0 | 3 | 5 | 8 | 0 | 8 | 4 | 2 | 6 | 6 | 4 |
| 5 | 5 | 4 | 8 | 6 | 5 | 6 | 8 | 0 | 3 | 2 | 0 | 4 | 8 | 4 | 5 | 6 | 6 | 5 | 4 | 7 | 1 | 3 | 1 | 2 |
| 0 | 6 | 4 | 9 | 7 | 7 | 9 | 8 | 0 | 6 | 4 | 0 | 9 | 2 | 4 | 7 | 8 | 2 | 5 | 1 | 7 | 2 | 3 | 5 | 2 |
| 6 | 0 | 6 | 7 | 8 | 0 | 8 | 7 | 6 | 8 | 5 | 0 | 1 | 3 | 4 | 3 | 0 | 4 | 7 | 0 | 5 | 2 | 4 | 1 | 3 |
| 1 | 6 | 3 | 6 | 4 | 9 | 6 | 5 | 3 | 5 | 5 | 3 | 0 | 3 | 3 | 8 | 3 | 7 | 9 | 1 | 1 | 5 | 8 | 2 | 2 |
| 2 | 1 | 5 | 9 | 7 | 1 | 2 | 6 | 4 | 4 | 5 | 0 | 2 | 1 | 4 | 5 | 1 | 1 | 7 | 0 | 4 | 0 | 1 | 3 | 0 |

Table 1 *Random Numbers (continued)*

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 0 | 3 | 9 | 1 | 8 | 3 | 8 | 9 | 5 | 5 | 6 | 7 | 3 | 0 | 6 | 7 | 9 | 7 | 1 | 4 | 9 | 2 | 3 | 3 |
| 3 | 5 | 8 | 1 | 8 | 1 | 6 | 3 | 4 | 7 | 0 | 6 | 7 | 7 | 8 | 9 | 6 | 2 | 0 | 8 | 5 | 0 | 4 | 3 | 7 |
| 7 | 0 | 6 | 4 | 0 | 6 | 9 | 0 | 5 | 9 | 3 | 3 | 7 | 7 | 1 | 1 | 4 | 4 | 3 | 8 | 0 | 6 | 2 | 1 | 8 |
| 1 | 0 | 4 | 9 | 2 | 7 | 8 | 1 | 6 | 4 | 4 | 9 | 3 | 2 | 9 | 6 | 7 | 3 | 2 | 4 | 2 | 6 | 4 | 9 | 6 |
| 7 | 7 | 7 | 0 | 3 | 2 | 5 | 7 | 9 | 3 | 0 | 5 | 6 | 6 | 5 | 8 | 7 | 6 | 2 | 8 | 5 | 2 | 5 | 3 | 8 |
| 3 | 1 | 4 | 2 | 0 | 1 | 2 | 3 | 5 | 8 | 0 | 4 | 9 | 9 | 9 | 5 | 6 | 4 | 8 | 6 | 4 | 3 | 5 | 0 | 8 |
| 8 | 7 | 9 | 8 | 4 | 6 | 4 | 1 | 7 | 0 | 8 | 6 | 0 | 0 | 6 | 1 | 7 | 0 | 9 | 0 | 2 | 9 | 8 | 4 | 2 |
| 5 | 0 | 6 | 9 | 7 | 6 | 4 | 6 | 4 | 9 | 6 | 6 | 0 | 5 | 3 | 2 | 7 | 9 | 2 | 4 | 4 | 4 | 0 | 6 | 5 |
| 0 | 9 | 7 | 6 | 2 | 3 | 7 | 3 | 6 | 5 | 7 | 7 | 4 | 8 | 5 | 9 | 4 | 9 | 6 | 6 | 0 | 9 | 5 | 6 | 3 |
| 1 | 1 | 2 | 9 | 9 | 4 | 6 | 0 | 0 | 6 | 3 | 7 | 1 | 3 | 1 | 9 | 1 | 2 | 6 | 6 | 0 | 8 | 7 | 5 | 2 |
| 9 | 5 | 5 | 5 | 1 | 9 | 7 | 5 | 9 | 0 | 3 | 2 | 1 | 5 | 6 | 1 | 1 | 1 | 2 | 8 | 3 | 5 | 9 | 5 | 5 |
| 5 | 6 | 2 | 2 | 6 | 5 | 2 | 0 | 4 | 0 | 5 | 8 | 1 | 8 | 6 | 1 | 2 | 3 | 9 | 0 | 3 | 4 | 3 | 0 | 3 |
| 3 | 0 | 8 | 5 | 5 | 8 | 7 | 5 | 1 | 7 | 1 | 0 | 7 | 0 | 2 | 7 | 4 | 9 | 9 | 5 | 4 | 9 | 3 | 4 | 6 |
| 1 | 9 | 4 | 1 | 2 | 5 | 8 | 1 | 2 | 4 | 4 | 9 | 7 | 5 | 9 | 7 | 5 | 8 | 8 | 6 | 2 | 2 | 2 | 4 | 0 |
| 1 | 6 | 0 | 1 | 7 | 5 | 6 | 9 | 4 | 1 | 7 | 3 | 2 | 2 | 6 | 5 | 1 | 4 | 5 | 9 | 8 | 9 | 9 | 2 | 4 |
| 9 | 4 | 3 | 4 | 6 | 5 | 3 | 2 | 3 | 0 | 8 | 5 | 6 | 6 | 1 | 1 | 0 | 6 | 6 | 6 | 9 | 6 | 0 | 1 | 1 |
| 3 | 8 | 5 | 2 | 2 | 5 | 3 | 1 | 3 | 4 | 8 | 8 | 2 | 8 | 7 | 5 | 4 | 6 | 4 | 6 | 4 | 0 | 3 | 3 | 4 |
| 6 | 5 | 9 | 8 | 7 | 5 | 1 | 5 | 0 | 1 | 3 | 1 | 3 | 5 | 7 | 1 | 1 | 7 | 6 | 6 | 6 | 6 | 8 | 4 | 5 |
| 9 | 9 | 7 | 6 | 9 | 8 | 8 | 7 | 0 | 6 | 1 | 5 | 7 | 9 | 7 | 1 | 5 | 9 | 7 | 9 | 2 | 6 | 7 | 1 | 1 |
| 3 | 2 | 8 | 0 | 3 | 7 | 7 | 6 | 8 | 3 | 1 | 2 | 6 | 3 | 0 | 8 | 1 | 4 | 8 | 6 | 1 | 2 | 6 | 6 | 8 |
| 8 | 9 | 9 | 2 | 9 | 7 | 7 | 4 | 2 | 3 | 3 | 5 | 9 | 2 | 3 | 5 | 8 | 6 | 7 | 3 | 0 | 6 | 4 | 9 | 9 |
| 5 | 2 | 2 | 0 | 3 | 2 | 8 | 7 | 3 | 4 | 1 | 2 | 6 | 8 | 9 | 6 | 8 | 9 | 4 | 1 | 7 | 6 | 8 | 2 | 9 |
| 9 | 3 | 7 | 1 | 9 | 8 | 3 | 6 | 0 | 2 | 8 | 6 | 3 | 5 | 3 | 0 | 1 | 6 | 1 | 3 | 3 | 8 | 3 | 4 | 8 |
| 0 | 6 | 7 | 9 | 9 | 0 | 3 | 7 | 7 | 2 | 6 | 0 | 7 | 7 | 1 | 1 | 8 | 1 | 2 | 9 | 9 | 7 | 8 | 0 | 6 |
| 6 | 5 | 3 | 1 | 0 | 4 | 2 | 4 | 5 | 1 | 4 | 9 | 5 | 3 | 9 | 0 | 2 | 2 | 4 | 5 | 9 | 9 | 9 | 0 | 0 |
| 4 | 1 | 8 | 9 | 1 | 7 | 4 | 3 | 6 | 4 | 4 | 6 | 6 | 6 | 0 | 7 | 6 | 3 | 2 | 5 | 8 | 2 | 0 | 6 | 8 |
| 4 | 5 | 4 | 7 | 1 | 1 | 4 | 5 | 0 | 4 | 7 | 9 | 4 | 0 | 6 | 1 | 2 | 1 | 9 | 4 | 9 | 9 | 0 | 2 | 3 |
| 2 | 5 | 4 | 3 | 3 | 6 | 3 | 1 | 4 | 0 | 9 | 3 | 7 | 9 | 1 | 1 | 8 | 8 | 1 | 8 | 0 | 3 | 1 | 9 | 5 |
| 4 | 3 | 6 | 4 | 0 | 1 | 7 | 8 | 2 | 0 | 4 | 9 | 5 | 9 | 7 | 9 | 0 | 3 | 3 | 7 | 2 | 9 | 9 | 4 | 0 |
| 2 | 3 | 8 | 5 | 4 | 4 | 3 | 3 | 0 | 6 | 1 | 0 | 7 | 3 | 5 | 3 | 1 | 3 | 2 | 0 | 6 | 0 | 9 | 1 | 7 |
| 1 | 6 | 4 | 8 | 7 | 9 | 9 | 9 | 1 | 3 | 1 | 0 | 8 | 6 | 7 | 5 | 6 | 9 | 0 | 3 | 1 | 6 | 8 | 2 | 0 |
| 4 | 8 | 1 | 6 | 3 | 4 | 5 | 0 | 2 | 7 | 5 | 7 | 0 | 8 | 3 | 2 | 4 | 8 | 5 | 3 | 2 | 9 | 6 | 8 | 1 |
| 4 | 2 | 1 | 9 | 4 | 6 | 2 | 3 | 0 | 1 | 1 | 6 | 1 | 0 | 7 | 2 | 2 | 3 | 4 | 8 | 7 | 9 | 1 | 4 | 6 |
| 4 | 0 | 7 | 6 | 5 | 4 | 2 | 9 | 5 | 3 | 3 | 9 | 0 | 6 | 3 | 0 | 2 | 5 | 4 | 9 | 5 | 3 | 6 | 0 | 8 |
| 8 | 4 | 9 | 3 | 0 | 8 | 2 | 8 | 4 | 0 | 4 | 5 | 6 | 9 | 0 | 6 | 8 | 1 | 1 | 4 | 6 | 7 | 4 | 8 | 1 |
| 1 | 7 | 6 | 3 | 8 | 1 | 4 | 6 | 2 | 2 | 9 | 4 | 5 | 0 | 3 | 5 | 7 | 0 | 0 | 2 | 4 | 1 | 7 | 1 | 2 |
| 5 | 6 | 4 | 6 | 9 | 0 | 1 | 5 | 1 | 5 | 5 | 0 | 3 | 1 | 4 | 5 | 1 | 2 | 7 | 0 | 2 | 4 | 9 | 9 | 6 |
| 0 | 3 | 6 | 0 | 7 | 1 | 4 | 8 | 0 | 3 | 5 | 4 | 8 | 8 | 0 | 4 | 0 | 6 | 7 | 3 | 3 | 1 | 1 | 7 | 4 |
| 6 | 7 | 2 | 9 | 0 | 4 | 2 | 9 | 2 | 6 | 4 | 6 | 4 | 6 | 4 | 6 | 9 | 4 | 6 | 2 | 3 | 9 | 4 | 8 | 8 |
| 0 | 3 | 1 | 4 | 5 | 9 | 5 | 0 | 8 | 2 | 6 | 5 | 0 | 8 | 5 | 8 | 0 | 7 | 5 | 0 | 9 | 5 | 3 | 1 | 5 |
| 7 | 3 | 0 | 9 | 3 | 6 | 1 | 9 | 3 | 1 | 3 | 9 | 8 | 3 | 9 | 7 | 7 | 6 | 6 | 5 | 3 | 0 | 2 | 6 | 8 |
| 8 | 6 | 7 | 9 | 6 | 6 | 8 | 3 | 4 | 0 | 5 | 9 | 5 | 1 | 7 | 8 | 0 | 1 | 0 | 8 | 9 | 7 | 1 | 4 | 6 |
| 4 | 9 | 5 | 8 | 6 | 8 | 0 | 4 | 4 | 4 | 5 | 6 | 7 | 4 | 8 | 1 | 7 | 1 | 4 | 9 | 2 | 9 | 5 | 1 | 9 |
| 6 | 0 | 3 | 9 | 9 | 5 | 8 | 4 | 4 | 1 | 5 | 4 | 0 | 6 | 8 | 6 | 0 | 2 | 0 | 0 | 1 | 8 | 8 | 8 | 0 |
| 4 | 1 | 0 | 5 | 3 | 6 | 3 | 5 | 0 | 6 | 4 | 0 | 0 | 1 | 2 | 1 | 8 | 2 | 9 | 5 | 4 | 8 | 7 | 2 | 5 |
| 5 | 2 | 7 | 9 | 6 | 5 | 7 | 4 | 5 | 1 | 3 | 3 | 8 | 8 | 4 | 4 | 0 | 4 | 1 | 8 | 9 | 1 | 1 | 6 | 5 |
| 3 | 4 | 6 | 1 | 2 | 1 | 8 | 7 | 4 | 7 | 6 | 3 | 3 | 5 | 0 | 0 | 7 | 9 | 1 | 6 | 4 | 0 | 7 | 4 | 6 |
| 8 | 2 | 2 | 0 | 8 | 8 | 8 | 7 | 3 | 8 | 3 | 1 | 5 | 8 | 4 | 9 | 5 | 1 | 9 | 1 | 7 | 9 | 7 | 9 | 9 |
| 4 | 8 | 7 | 0 | 7 | 8 | 9 | 4 | 3 | 0 | 9 | 2 | 3 | 5 | 4 | 7 | 2 | 1 | 4 | 6 | 6 | 8 | 6 | 3 | 2 |
| 9 | 0 | 4 | 3 | 8 | 0 | 1 | 5 | 7 | 6 | 7 | 1 | 6 | 3 | 0 | 5 | 7 | 3 | 7 | 1 | 0 | 9 | 5 | 6 | 6 |

Table 1 *Random Numbers (continued)*

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 2 | 8 | 9 | 7 | 9 | 6 | 9 | 7 | 9 | 0 | 8 | 2 | 9 | 8 | 1 | 5 | 6 | 9 | 3 | 2 | 9 | 2 | 3 | 3 |
| 9 | 4 | 6 | 9 | 2 | 6 | 8 | 4 | 4 | 7 | 8 | 3 | 5 | 1 | 0 | 1 | 3 | 9 | 9 | 2 | 9 | 0 | 4 | 0 | 8 |
| 5 | 6 | 7 | 4 | 2 | 7 | 4 | 1 | 2 | 7 | 3 | 1 | 5 | 8 | 3 | 1 | 0 | 7 | 3 | 8 | 7 | 5 | 2 | 5 | 1 |
| 8 | 0 | 9 | 9 | 8 | 3 | 2 | 9 | 7 | 5 | 5 | 8 | 0 | 5 | 2 | 1 | 3 | 4 | 2 | 3 | 8 | 6 | 8 | 3 | 6 |
| 6 | 7 | 0 | 3 | 7 | 9 | 8 | 8 | 2 | 0 | 9 | 1 | 0 | 6 | 0 | 7 | 2 | 4 | 5 | 1 | 3 | 3 | 5 | 1 | 0 |
| 8 | 1 | 3 | 0 | 0 | 8 | 3 | 4 | 8 | 8 | 3 | 4 | 8 | 9 | 9 | 2 | 0 | 4 | 3 | 9 | 6 | 7 | 6 | 5 | 7 |
| 1 | 7 | 6 | 2 | 5 | 8 | 6 | 2 | 6 | 6 | 8 | 0 | 8 | 3 | 9 | 8 | 8 | 7 | 4 | 2 | 1 | 3 | 3 | 3 | 2 |
| 9 | 9 | 7 | 1 | 7 | 5 | 9 | 1 | 3 | 2 | 4 | 6 | 0 | 5 | 9 | 0 | 7 | 3 | 8 | 2 | 3 | 5 | 4 | 7 | 1 |
| 0 | 4 | 6 | 4 | 0 | 1 | 7 | 9 | 9 | 3 | 6 | 8 | 1 | 5 | 3 | 7 | 1 | 1 | 9 | 5 | 1 | 0 | 1 | 4 | 8 |
| 9 | 7 | 8 | 2 | 1 | 2 | 9 | 7 | 2 | 0 | 6 | 4 | 2 | 5 | 2 | 7 | 0 | 8 | 1 | 1 | 9 | 7 | 7 | 7 | 0 |
| 2 | 4 | 6 | 4 | 6 | 3 | 6 | 7 | 5 | 2 | 0 | 0 | 5 | 4 | 7 | 3 | 3 | 4 | 1 | 0 | 7 | 4 | 4 | 0 | 9 |
| 8 | 5 | 4 | 5 | 4 | 7 | 7 | 4 | 0 | 0 | 5 | 0 | 6 | 4 | 2 | 8 | 8 | 0 | 8 | 0 | 9 | 9 | 0 | 5 | 8 |
| 5 | 8 | 6 | 7 | 6 | 6 | 4 | 7 | 0 | 1 | 4 | 9 | 9 | 5 | 7 | 2 | 1 | 4 | 1 | 1 | 9 | 7 | 7 | 3 | 5 |
| 1 | 3 | 8 | 1 | 4 | 7 | 0 | 7 | 4 | 8 | 8 | 4 | 4 | 0 | 1 | 2 | 5 | 1 | 4 | 8 | 1 | 7 | 7 | 3 | 2 |
| 4 | 1 | 5 | 9 | 7 | 9 | 5 | 6 | 6 | 7 | 4 | 5 | 6 | 1 | 8 | 8 | 8 | 2 | 8 | 9 | 0 | 0 | 9 | 2 | 5 |
| 9 | 5 | 4 | 7 | 0 | 6 | 8 | 1 | 2 | 1 | 4 | 0 | 4 | 5 | 8 | 3 | 1 | 6 | 0 | 1 | 9 | 7 | 5 | 6 | 0 |
| 3 | 7 | 2 | 7 | 4 | 1 | 4 | 8 | 3 | 6 | 4 | 1 | 6 | 1 | 9 | 0 | 4 | 1 | 3 | 2 | 6 | 8 | 9 | 2 | 5 |
| 9 | 7 | 1 | 8 | 1 | 0 | 8 | 3 | 6 | 0 | 1 | 7 | 5 | 0 | 6 | 3 | 2 | 7 | 9 | 2 | 5 | 6 | 2 | 9 | 9 |
| 9 | 9 | 9 | 9 | 1 | 9 | 4 | 2 | 6 | 9 | 5 | 8 | 5 | 6 | 8 | 3 | 9 | 8 | 6 | 9 | 9 | 6 | 8 | 2 | 5 |
| 9 | 3 | 0 | 1 | 8 | 1 | 5 | 8 | 8 | 1 | 1 | 4 | 4 | 6 | 6 | 4 | 1 | 0 | 9 | 6 | 6 | 7 | 5 | 5 | 8 |
| 7 | 9 | 4 | 6 | 8 | 9 | 0 | 6 | 6 | 9 | 5 | 4 | 3 | 1 | 9 | 5 | 1 | 9 | 5 | 6 | 2 | 8 | 2 | 7 | 4 |
| 3 | 5 | 5 | 4 | 5 | 2 | 5 | 2 | 2 | 1 | 4 | 8 | 2 | 0 | 9 | 1 | 8 | 4 | 3 | 5 | 0 | 3 | 2 | 6 | 5 |
| 6 | 7 | 2 | 1 | 9 | 0 | 5 | 4 | 3 | 3 | 9 | 8 | 9 | 0 | 1 | 2 | 6 | 6 | 1 | 3 | 0 | 4 | 5 | 4 | 1 |
| 4 | 0 | 5 | 3 | 9 | 2 | 6 | 3 | 2 | 2 | 0 | 4 | 2 | 0 | 9 | 1 | 0 | 0 | 8 | 8 | 8 | 0 | 2 | 8 | 1 |
| 2 | 1 | 5 | 7 | 3 | 7 | 3 | 6 | 2 | 8 | 9 | 3 | 2 | 8 | 7 | 9 | 6 | 7 | 9 | 5 | 1 | 9 | 5 | 5 | 4 |
| 8 | 2 | 9 | 1 | 7 | 6 | 5 | 0 | 5 | 7 | 4 | 2 | 4 | 7 | 5 | 1 | 4 | 2 | 8 | 4 | 0 | 2 | 0 | 4 | 5 |
| 0 | 4 | 9 | 2 | 5 | 9 | 9 | 8 | 7 | 4 | 7 | 3 | 2 | 2 | 1 | 7 | 7 | 1 | 9 | 5 | 1 | 4 | 4 | 9 | 4 |
| 3 | 8 | 6 | 7 | 5 | 6 | 1 | 5 | 3 | 0 | 9 | 0 | 8 | 4 | 0 | 4 | 6 | 7 | 2 | 2 | 6 | 8 | 4 | 3 | 5 |
| 7 | 1 | 8 | 8 | 3 | 6 | 3 | 7 | 4 | 3 | 6 | 3 | 3 | 0 | 1 | 3 | 4 | 9 | 7 | 3 | 8 | 9 | 2 | 3 | 6 |
| 2 | 3 | 0 | 4 | 7 | 4 | 6 | 9 | 9 | 9 | 8 | 7 | 4 | 4 | 2 | 8 | 1 | 4 | 4 | 4 | 0 | 0 | 6 | 0 | 8 |
| 8 | 6 | 4 | 4 | 0 | 7 | 1 | 2 | 9 | 6 | 3 | 1 | 3 | 4 | 9 | 1 | 6 | 2 | 9 | 3 | 7 | 6 | 1 | 1 | 0 |
| 0 | 5 | 5 | 4 | 6 | 7 | 7 | 9 | 6 | 9 | 0 | 2 | 5 | 5 | 3 | 5 | 8 | 5 | 1 | 2 | 9 | 6 | 9 | 3 | 9 |
| 5 | 7 | 4 | 3 | 2 | 8 | 8 | 4 | 4 | 2 | 0 | 8 | 9 | 6 | 3 | 0 | 5 | 1 | 1 | 2 | 7 | 3 | 7 | 8 | 0 |
| 8 | 3 | 2 | 7 | 1 | 2 | 7 | 0 | 2 | 9 | 1 | 1 | 7 | 1 | 5 | 4 | 8 | 1 | 9 | 1 | 2 | 5 | 0 | 5 | 3 |
| 3 | 1 | 2 | 1 | 0 | 7 | 7 | 3 | 0 | 4 | 7 | 1 | 3 | 8 | 9 | 3 | 8 | 7 | 2 | 7 | 5 | 1 | 4 | 8 | 9 |
| 0 | 7 | 9 | 7 | 0 | 6 | 4 | 5 | 3 | 0 | 5 | 8 | 2 | 7 | 3 | 7 | 3 | 0 | 6 | 2 | 4 | 3 | 3 | 9 | 1 |
| 9 | 0 | 3 | 4 | 4 | 3 | 1 | 8 | 2 | 1 | 0 | 4 | 5 | 9 | 7 | 2 | 9 | 0 | 5 | 5 | 4 | 7 | 1 | 5 | 9 |
| 1 | 5 | 7 | 9 | 2 | 9 | 5 | 2 | 8 | 9 | 1 | 8 | 6 | 4 | 2 | 3 | 4 | 0 | 6 | 1 | 4 | 1 | 7 | 9 | 9 |
| 7 | 3 | 8 | 2 | 7 | 8 | 4 | 7 | 5 | 9 | 3 | 4 | 2 | 9 | 9 | 4 | 8 | 3 | 1 | 1 | 6 | 5 | 1 | 5 | 6 |
| 2 | 4 | 0 | 4 | 4 | 0 | 4 | 5 | 0 | 7 | 6 | 4 | 9 | 2 | 0 | 5 | 3 | 9 | 2 | 8 | 1 | 1 | 8 | 0 | 2 |
| 2 | 9 | 9 | 9 | 6 | 6 | 8 | 0 | 6 | 9 | 4 | 0 | 8 | 4 | 2 | 4 | 0 | 4 | 6 | 0 | 2 | 1 | 2 | 2 | 4 |
| 5 | 8 | 2 | 2 | 2 | 1 | 7 | 7 | 2 | 5 | 9 | 4 | 2 | 1 | 7 | 2 | 1 | 7 | 7 | 9 | 3 | 3 | 5 | 9 | 8 |
| 7 | 3 | 7 | 4 | 3 | 6 | 3 | 0 | 9 | 9 | 1 | 6 | 3 | 9 | 2 | 3 | 0 | 2 | 6 | 8 | 9 | 8 | 9 | 0 | 7 |
| 8 | 8 | 9 | 7 | 6 | 2 | 9 | 9 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 2 | 4 | 7 | 8 | 9 | 6 | 6 | 9 | 7 | 8 |
| 1 | 4 | 0 | 9 | 6 | 1 | 0 | 9 | 8 | 7 | 0 | 5 | 8 | 0 | 6 | 5 | 8 | 0 | 5 | 0 | 1 | 9 | 3 | 0 | 1 |
| 1 | 6 | 4 | 2 | 4 | 7 | 6 | 7 | 7 | 3 | 5 | 9 | 3 | 2 | 2 | 9 | 2 | 7 | 8 | 6 | 3 | 7 | 7 | 8 | 1 |
| 1 | 2 | 9 | 8 | 1 | 2 | 5 | 7 | 7 | 9 | 6 | 8 | 4 | 4 | 0 | 6 | 3 | 3 | 1 | 1 | 6 | 7 | 2 | 5 | 8 |
| 5 | 7 | 7 | 5 | 3 | 5 | 5 | 5 | 6 | 7 | 9 | 4 | 3 | 1 | 5 | 7 | 2 | 7 | 6 | 9 | 7 | 6 | 1 | 0 | 3 |
| 2 | 4 | 7 | 9 | 1 | 7 | 2 | 8 | 3 | 4 | 4 | 1 | 1 | 1 | 3 | 0 | 6 | 9 | 1 | 4 | 8 | 8 | 7 | 5 | 6 |
| 0 | 2 | 5 | 9 | 4 | 0 | 8 | 2 | 5 | 6 | 0 | 4 | 7 | 1 | 6 | 3 | 6 | 5 | 5 | 6 | 1 | 1 | 6 | 7 | 6 |

Table 1 *Random Numbers (continued)*

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 9 | 0 | 8 | 8 | 8 | 7 | 4 | 1 | 9 | 9 | 9 | 5 | 5 | 1 | 8 | 2 | 1 | 3 | 7 | 5 | 7 | 8 | 7 | 1 |
| 1 | 1 | 0 | 4 | 2 | 7 | 2 | 3 | 9 | 9 | 5 | 7 | 5 | 0 | 9 | 5 | 3 | 9 | 6 | 8 | 6 | 7 | 4 | 9 | 0 |
| 0 | 0 | 6 | 6 | 6 | 3 | 1 | 5 | 6 | 3 | 8 | 9 | 7 | 2 | 9 | 0 | 9 | 8 | 4 | 9 | 4 | 2 | 5 | 0 | 0 |
| 2 | 8 | 5 | 9 | 9 | 3 | 5 | 2 | 5 | 2 | 1 | 1 | 7 | 4 | 0 | 7 | 9 | 0 | 1 | 4 | 9 | 1 | 9 | 8 | 9 |
| 7 | 5 | 8 | 0 | 7 | 9 | 4 | 5 | 7 | 9 | 3 | 2 | 0 | 7 | 6 | 3 | 2 | 6 | 3 | 6 | 0 | 9 | 7 | 8 | 5 |
| 2 | 8 | 1 | 2 | 4 | 9 | 9 | 2 | 0 | 1 | 9 | 7 | 9 | 7 | 2 | 0 | 8 | 1 | 4 | 9 | 2 | 8 | 6 | 5 | 9 |
| 1 | 6 | 5 | 9 | 5 | 2 | 6 | 8 | 5 | 8 | 1 | 8 | 0 | 6 | 1 | 2 | 2 | 7 | 1 | 0 | 8 | 6 | 1 | 9 | 9 |
| 3 | 8 | 0 | 2 | 2 | 2 | 0 | 4 | 5 | 5 | 5 | 4 | 5 | 6 | 9 | 9 | 1 | 4 | 2 | 6 | 7 | 3 | 9 | 3 | 5 |
| 7 | 0 | 7 | 8 | 2 | 1 | 9 | 6 | 3 | 1 | 1 | 8 | 1 | 1 | 7 | 8 | 1 | 6 | 0 | 3 | 9 | 6 | 7 | 1 | 0 |
| 9 | 5 | 9 | 2 | 6 | 6 | 6 | 7 | 4 | 1 | 9 | 5 | 1 | 9 | 8 | 4 | 2 | 7 | 9 | 3 | 8 | 5 | 5 | 0 | 8 |
| 9 | 9 | 3 | 7 | 7 | 0 | 5 | 3 | 1 | 2 | 2 | 4 | 7 | 0 | 2 | 2 | 4 | 0 | 2 | 1 | 4 | 5 | 2 | 6 | 9 |
| 2 | 8 | 6 | 7 | 5 | 0 | 2 | 8 | 7 | 0 | 4 | 2 | 5 | 4 | 1 | 5 | 3 | 3 | 7 | 0 | 7 | 8 | 8 | 0 | 8 |
| 5 | 8 | 4 | 6 | 5 | 0 | 3 | 6 | 4 | 5 | 2 | 4 | 7 | 9 | 6 | 7 | 7 | 3 | 1 | 5 | 9 | 7 | 7 | 4 | 2 |
| 2 | 7 | 9 | 4 | 0 | 0 | 1 | 7 | 0 | 7 | 2 | 0 | 0 | 5 | 1 | 8 | 6 | 4 | 9 | 7 | 9 | 7 | 0 | 4 | 8 |
| 3 | 2 | 0 | 4 | 1 | 5 | 9 | 2 | 4 | 0 | 8 | 3 | 9 | 0 | 6 | 9 | 8 | 3 | 7 | 7 | 2 | 6 | 0 | 6 | 8 |
| 9 | 4 | 4 | 2 | 4 | 3 | 1 | 3 | 1 | 3 | 0 | 2 | 2 | 8 | 2 | 7 | 5 | 6 | 8 | 5 | 3 | 2 | 9 | 9 | 9 |
| 1 | 4 | 7 | 7 | 0 | 3 | 1 | 3 | 3 | 5 | 9 | 6 | 5 | 1 | 6 | 4 | 0 | 6 | 9 | 7 | 3 | 9 | 2 | 1 | 6 |
| 2 | 7 | 4 | 6 | 7 | 2 | 6 | 2 | 7 | 2 | 5 | 1 | 3 | 8 | 7 | 7 | 8 | 2 | 1 | 9 | 2 | 5 | 0 | 9 | 0 |
| 5 | 3 | 2 | 1 | 6 | 4 | 9 | 4 | 4 | 6 | 2 | 5 | 3 | 3 | 3 | 5 | 2 | 5 | 4 | 9 | 5 | 7 | 4 | 4 | 6 |
| 6 | 0 | 9 | 6 | 4 | 0 | 0 | 9 | 3 | 2 | 7 | 7 | 6 | 6 | 7 | 9 | 7 | 8 | 1 | 8 | 0 | 4 | 1 | 8 | 1 |
| 6 | 8 | 6 | 5 | 0 | 5 | 3 | 4 | 2 | 3 | 3 | 7 | 5 | 7 | 7 | 9 | 7 | 4 | 7 | 0 | 5 | 6 | 5 | 1 | 3 |
| 7 | 2 | 1 | 3 | 4 | 1 | 7 | 8 | 1 | 8 | 4 | 4 | 1 | 6 | 6 | 6 | 2 | 5 | 6 | 6 | 2 | 0 | 4 | 1 | 9 |
| 7 | 5 | 9 | 1 | 3 | 2 | 7 | 1 | 2 | 6 | 3 | 1 | 3 | 3 | 1 | 2 | 9 | 0 | 9 | 8 | 9 | 8 | 6 | 9 | 8 |
| 8 | 7 | 7 | 6 | 8 | 8 | 8 | 1 | 6 | 8 | 6 | 1 | 8 | 8 | 6 | 1 | 7 | 5 | 6 | 8 | 6 | 4 | 3 | 6 | 9 |
| 0 | 4 | 6 | 4 | 6 | 1 | 9 | 6 | 1 | 4 | 5 | 9 | 1 | 1 | 3 | 6 | 1 | 4 | 5 | 7 | 0 | 8 | 2 | 5 | 4 |
| 9 | 6 | 8 | 6 | 1 | 6 | 3 | 0 | 3 | 7 | 0 | 4 | 9 | 8 | 8 | 7 | 7 | 6 | 8 | 1 | 7 | 1 | 5 | 0 | 8 |
| 7 | 6 | 9 | 7 | 0 | 9 | 8 | 7 | 1 | 2 | 0 | 9 | 0 | 3 | 8 | 5 | 3 | 9 | 3 | 7 | 4 | 1 | 1 | 5 | 7 |
| 3 | 2 | 7 | 0 | 9 | 2 | 7 | 5 | 8 | 0 | 4 | 7 | 8 | 1 | 4 | 2 | 4 | 0 | 0 | 9 | 6 | 5 | 9 | 2 | 5 |
| 4 | 2 | 6 | 8 | 9 | 1 | 9 | 0 | 4 | 2 | 1 | 3 | 4 | 3 | 2 | 0 | 6 | 7 | 4 | 7 | 1 | 3 | 9 | 7 | 9 |
| 6 | 8 | 6 | 5 | 1 | 4 | 1 | 3 | 0 | 6 | 7 | 0 | 9 | 5 | 2 | 8 | 7 | 0 | 9 | 3 | 8 | 5 | 1 | 3 | 5 |
| 6 | 3 | 5 | 7 | 2 | 0 | 2 | 8 | 6 | 3 | 3 | 8 | 5 | 3 | 1 | 0 | 4 | 6 | 6 | 3 | 1 | 7 | 9 | 9 | 7 |
| 7 | 3 | 7 | 7 | 3 | 4 | 5 | 2 | 3 | 6 | 2 | 3 | 6 | 5 | 5 | 3 | 9 | 2 | 1 | 7 | 0 | 6 | 4 | 2 | 0 |
| 6 | 0 | 1 | 2 | 5 | 0 | 2 | 9 | 4 | 9 | 8 | 3 | 5 | 9 | 5 | 7 | 4 | 5 | 2 | 8 | 4 | 7 | 6 | 6 | 4 |
| 2 | 6 | 6 | 8 | 6 | 5 | 0 | 7 | 7 | 5 | 5 | 4 | 9 | 1 | 2 | 0 | 3 | 4 | 8 | 9 | 6 | 4 | 9 | 8 | 9 |
| 3 | 6 | 8 | 7 | 2 | 9 | 9 | 2 | 7 | 5 | 6 | 0 | 9 | 0 | 6 | 5 | 8 | 8 | 2 | 8 | 3 | 4 | 7 | 4 | 0 |
| 4 | 2 | 5 | 5 | 7 | 2 | 6 | 5 | 9 | 4 | 3 | 8 | 7 | 5 | 6 | 5 | 3 | 6 | 3 | 4 | 3 | 8 | 5 | 4 | 7 |
| 3 | 2 | 3 | 1 | 1 | 5 | 6 | 5 | 8 | 3 | 9 | 6 | 2 | 2 | 0 | 2 | 9 | 0 | 9 | 3 | 1 | 1 | 3 | 1 | 4 |
| 0 | 2 | 3 | 6 | 6 | 9 | 4 | 4 | 6 | 6 | 0 | 9 | 9 | 7 | 4 | 0 | 1 | 3 | 2 | 5 | 6 | 9 | 4 | 5 | 1 |
| 6 | 5 | 6 | 9 | 4 | 1 | 6 | 8 | 8 | 6 | 7 | 0 | 0 | 6 | 0 | 8 | 8 | 3 | 9 | 7 | 8 | 4 | 1 | 7 | 6 |
| 7 | 3 | 1 | 3 | 9 | 1 | 2 | 0 | 7 | 1 | 5 | 2 | 1 | 2 | 0 | 7 | 0 | 1 | 7 | 8 | 6 | 4 | 6 | 6 | 3 |
| 3 | 5 | 2 | 5 | 5 | 9 | 9 | 0 | 1 | 5 | 3 | 2 | 1 | 7 | 0 | 1 | 9 | 3 | 6 | 3 | 3 | 4 | 5 | 0 | 9 |
| 2 | 7 | 6 | 2 | 3 | 9 | 6 | 7 | 5 | 3 | 6 | 1 | 5 | 0 | 2 | 0 | 3 | 2 | 9 | 1 | 6 | 2 | 1 | 4 | 6 |
| 7 | 8 | 9 | 1 | 3 | 0 | 3 | 0 | 0 | 2 | 8 | 5 | 5 | 4 | 3 | 8 | 9 | 6 | 8 | 2 | 2 | 1 | 8 | 8 | 1 |
| 1 | 1 | 0 | 8 | 2 | 7 | 9 | 9 | 8 | 5 | 5 | 1 | 9 | 0 | 7 | 1 | 2 | 5 | 7 | 6 | 8 | 5 | 8 | 2 | 8 |
| 9 | 6 | 3 | 9 | 6 | 2 | 1 | 1 | 1 | 0 | 3 | 2 | 1 | 7 | 5 | 0 | 6 | 9 | 0 | 6 | 2 | 0 | 9 | 5 | 1 |
| 1 | 0 | 3 | 2 | 4 | 6 | 1 | 9 | 9 | 8 | 8 | 6 | 5 | 7 | 6 | 9 | 8 | 9 | 1 | 2 | 4 | 9 | 1 | 3 | 5 |
| 2 | 3 | 7 | 1 | 5 | 7 | 2 | 5 | 8 | 1 | 1 | 7 | 6 | 6 | 4 | 9 | 1 | 3 | 0 | 3 | 5 | 2 | 6 | 3 | 3 |
| 2 | 3 | 6 | 4 | 7 | 5 | 3 | 4 | 7 | 7 | 7 | 6 | 4 | 3 | 5 | 9 | 6 | 3 | 8 | 7 | 8 | 0 | 1 | 3 | 2 |
| 9 | 3 | 6 | 1 | 5 | 4 | 4 | 5 | 3 | 3 | 5 | 4 | 1 | 5 | 2 | 3 | 4 | 6 | 4 | 5 | 3 | 7 | 6 | 9 | 2 |
| 0 | 4 | 0 | 4 | 6 | 7 | 0 | 2 | 9 | 4 | 3 | 5 | 9 | 9 | 7 | 4 | 9 | 0 | 6 | 8 | 7 | 5 | 9 | 3 | 6 |

Table 1 *Random Numbers (concluded)*

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 3 | 6 | 4 | 8 | 6 | 5 | 9 | 2 | 6 | 4 | 5 | 1 | 6 | 9 | 9 | 0 | 8 | 6 | 7 | 4 | 5 | 7 | 2 | 8 |
| 1 | 1 | 5 | 8 | 8 | 6 | 9 | 0 | 3 | 3 | 6 | 8 | 4 | 1 | 8 | 1 | 3 | 9 | 0 | 8 | 3 | 4 | 5 | 6 | 5 |
| 7 | 2 | 8 | 1 | 8 | 8 | 3 | 7 | 4 | 4 | 3 | 5 | 0 | 2 | 1 | 3 | 1 | 9 | 9 | 1 | 1 | 1 | 7 | 0 | 0 |
| 1 | 8 | 4 | 9 | 4 | 8 | 6 | 2 | 6 | 5 | 1 | 7 | 6 | 9 | 5 | 8 | 8 | 2 | 8 | 4 | 0 | 6 | 2 | 7 | 8 |
| 2 | 7 | 3 | 0 | 6 | 1 | 3 | 6 | 4 | 1 | 9 | 2 | 4 | 5 | 4 | 4 | 9 | 5 | 4 | 7 | 1 | 4 | 2 | 0 | 0 |
| 2 | 1 | 0 | 3 | 9 | 9 | 3 | 2 | 8 | 0 | 0 | 3 | 4 | 6 | 2 | 9 | 2 | 5 | 5 | 9 | 6 | 5 | 0 | 7 | 8 |
| 5 | 1 | 2 | 1 | 7 | 3 | 1 | 5 | 7 | 1 | 5 | 8 | 7 | 7 | 5 | 7 | 9 | 8 | 0 | 8 | 5 | 3 | 2 | 5 | 8 |
| 2 | 5 | 3 | 5 | 4 | 8 | 4 | 5 | 2 | 5 | 7 | 7 | 2 | 8 | 7 | 1 | 8 | 2 | 3 | 9 | 3 | 1 | 5 | 9 | 9 |
| 0 | 6 | 1 | 5 | 3 | 1 | 9 | 8 | 0 | 4 | 3 | 2 | 0 | 1 | 4 | 5 | 4 | 2 | 9 | 8 | 2 | 9 | 1 | 5 | 5 |
| 4 | 7 | 0 | 9 | 2 | 7 | 5 | 8 | 6 | 1 | 5 | 4 | 0 | 9 | 9 | 7 | 3 | 9 | 6 | 5 | 5 | 4 | 0 | 1 | 4 |
| 4 | 6 | 1 | 4 | 8 | 5 | 7 | 1 | 9 | 7 | 0 | 9 | 4 | 2 | 8 | 0 | 1 | 3 | 6 | 4 | 0 | 4 | 9 | 7 | 2 |
| 8 | 5 | 2 | 7 | 5 | 0 | 5 | 6 | 6 | 3 | 3 | 3 | 1 | 8 | 1 | 6 | 7 | 3 | 2 | 4 | 9 | 6 | 6 | 8 | 9 |
| 1 | 9 | 5 | 1 | 2 | 4 | 1 | 4 | 7 | 2 | 9 | 8 | 7 | 7 | 4 | 9 | 5 | 1 | 2 | 8 | 6 | 7 | 0 | 0 | 7 |
| 1 | 1 | 7 | 5 | 2 | 6 | 4 | 7 | 5 | 9 | 2 | 9 | 2 | 7 | 0 | 9 | 3 | 3 | 1 | 6 | 2 | 1 | 0 | 8 | 2 |
| 6 | 0 | 4 | 0 | 7 | 7 | 9 | 9 | 5 | 0 | 3 | 8 | 6 | 9 | 8 | 9 | 1 | 2 | 5 | 2 | 6 | 3 | 3 | 6 | 5 |
| 4 | 2 | 8 | 8 | 4 | 2 | 2 | 6 | 5 | 9 | 7 | 6 | 4 | 5 | 2 | 4 | 4 | 4 | 7 | 2 | 3 | 3 | 8 | 0 | 1 |
| 6 | 3 | 1 | 3 | 5 | 0 | 4 | 8 | 3 | 4 | 1 | 7 | 2 | 9 | 0 | 6 | 3 | 3 | 5 | 0 | 4 | 0 | 4 | 5 | 1 |
| 4 | 9 | 9 | 6 | 2 | 8 | 3 | 1 | 8 | 4 | 8 | 1 | 1 | 0 | 9 | 4 | 6 | 4 | 2 | 1 | 5 | 9 | 4 | 8 | 6 |
| 5 | 5 | 8 | 5 | 7 | 3 | 5 | 3 | 1 | 0 | 8 | 9 | 8 | 0 | 1 | 0 | 6 | 2 | 1 | 6 | 9 | 7 | 3 | 5 | 1 |
| 0 | 8 | 3 | 6 | 4 | 9 | 7 | 5 | 6 | 2 | 8 | 7 | 3 | 8 | 9 | 0 | 2 | 2 | 0 | 0 | 4 | 9 | 9 | 0 | 9 |
| 5 | 6 | 2 | 1 | 3 | 3 | 7 | 4 | 0 | 7 | 1 | 9 | 3 | 8 | 7 | 6 | 5 | 8 | 9 | 0 | 8 | 3 | 7 | 1 | 4 |
| 6 | 7 | 6 | 6 | 5 | 2 | 7 | 1 | 5 | 0 | 1 | 5 | 8 | 3 | 1 | 5 | 3 | 5 | 5 | 2 | 2 | 4 | 2 | 5 | 4 |
| 1 | 0 | 2 | 9 | 2 | 0 | 9 | 5 | 4 | 1 | 6 | 9 | 6 | 8 | 4 | 0 | 2 | 6 | 5 | 3 | 2 | 2 | 1 | 3 | 9 |
| 9 | 7 | 3 | 0 | 4 | 1 | 8 | 8 | 6 | 5 | 9 | 3 | 9 | 1 | 2 | 2 | 0 | 7 | 2 | 3 | 8 | 9 | 9 | 7 | 8 |
| 3 | 6 | 6 | 7 | 1 | 6 | 5 | 6 | 6 | 9 | 6 | 7 | 8 | 6 | 2 | 1 | 4 | 1 | 1 | 0 | 8 | 8 | 5 | 4 | 0 |
| 2 | 4 | 3 | 9 | 7 | 6 | 0 | 0 | 6 | 2 | 8 | 4 | 3 | 4 | 4 | 1 | 1 | 5 | 9 | 3 | 7 | 9 | 4 | 8 | 3 |
| 0 | 4 | 7 | 0 | 4 | 1 | 0 | 7 | 2 | 9 | 6 | 4 | 5 | 2 | 7 | 2 | 9 | 8 | 3 | 4 | 5 | 6 | 8 | 8 | 2 |
| 6 | 0 | 5 | 9 | 1 | 1 | 1 | 4 | 4 | 6 | 9 | 7 | 8 | 8 | 6 | 3 | 6 | 7 | 6 | 0 | 5 | 1 | 0 | 5 | 5 |
| 1 | 1 | 5 | 1 | 6 | 6 | 0 | 5 | 1 | 5 | 6 | 0 | 7 | 5 | 2 | 7 | 3 | 7 | 2 | 4 | 8 | 6 | 2 | 5 | 4 |
| 3 | 4 | 2 | 3 | 2 | 5 | 9 | 4 | 7 | 1 | 7 | 8 | 4 | 1 | 3 | 8 | 8 | 5 | 3 | 7 | 6 | 8 | 8 | 6 | 4 |
| 8 | 3 | 3 | 6 | 5 | 8 | 0 | 5 | 9 | 6 | 6 | 1 | 3 | 4 | 5 | 4 | 2 | 8 | 3 | 9 | 5 | 0 | 8 | 9 | 1 |
| 9 | 2 | 1 | 2 | 4 | 7 | 6 | 5 | 9 | 3 | 6 | 0 | 5 | 0 | 7 | 5 | 3 | 7 | 9 | 3 | 8 | 5 | 1 | 7 | 6 |
| 2 | 6 | 6 | 8 | 4 | 7 | 5 | 4 | 7 | 0 | 8 | 4 | 2 | 6 | 8 | 3 | 1 | 4 | 5 | 9 | 8 | 7 | 5 | 0 | 6 |
| 6 | 6 | 4 | 6 | 5 | 8 | 8 | 5 | 9 | 8 | 5 | 9 | 4 | 6 | 5 | 2 | 4 | 0 | 7 | 1 | 4 | 1 | 8 | 7 | 0 |
| 1 | 1 | 6 | 5 | 4 | 5 | 4 | 0 | 4 | 1 | 7 | 2 | 1 | 5 | 7 | 5 | 8 | 5 | 7 | 4 | 4 | 8 | 2 | 6 | 2 |
| 3 | 0 | 8 | 3 | 7 | 1 | 3 | 1 | 9 | 0 | 7 | 7 | 5 | 2 | 2 | 7 | 6 | 3 | 9 | 9 | 9 | 0 | 3 | 8 | 6 |
| 8 | 0 | 2 | 6 | 1 | 8 | 5 | 9 | 3 | 1 | 7 | 9 | 4 | 7 | 5 | 5 | 4 | 9 | 6 | 4 | 6 | 1 | 6 | 0 | 1 |
| 4 | 5 | 2 | 7 | 5 | 1 | 0 | 6 | 4 | 2 | 1 | 6 | 2 | 4 | 9 | 1 | 8 | 3 | 1 | 8 | 8 | 2 | 7 | 4 | 1 |
| 0 | 5 | 6 | 1 | 3 | 8 | 3 | 9 | 8 | 3 | 6 | 9 | 4 | 9 | 1 | 5 | 2 | 5 | 6 | 5 | 8 | 4 | 5 | 1 | 9 |
| 7 | 4 | 1 | 5 | 0 | 4 | 4 | 3 | 4 | 8 | 7 | 4 | 8 | 7 | 4 | 5 | 1 | 3 | 9 | 2 | 4 | 1 | 2 | 2 | 5 |
| 7 | 4 | 5 | 7 | 0 | 9 | 8 | 3 | 4 | 9 | 7 | 8 | 1 | 3 | 2 | 2 | 8 | 3 | 7 | 3 | 8 | 5 | 2 | 6 | 1 |
| 5 | 8 | 8 | 2 | 4 | 5 | 4 | 9 | 5 | 6 | 5 | 5 | 0 | 1 | 7 | 6 | 3 | 6 | 1 | 6 | 6 | 5 | 6 | 8 | 9 |
| 1 | 4 | 9 | 9 | 2 | 0 | 5 | 4 | 1 | 2 | 6 | 4 | 3 | 8 | 4 | 3 | 4 | 3 | 2 | 4 | 4 | 2 | 9 | 5 | 6 |
| 2 | 3 | 5 | 4 | 3 | 3 | 6 | 9 | 2 | 8 | 2 | 1 | 1 | 5 | 5 | 0 | 7 | 1 | 4 | 5 | 0 | 5 | 6 | 3 | 0 |
| 9 | 6 | 1 | 5 | 9 | 9 | 1 | 2 | 9 | 2 | 5 | 3 | 9 | 9 | 4 | 1 | 6 | 2 | 3 | 4 | 0 | 8 | 8 | 6 | 9 |
| 0 | 7 | 2 | 9 | 3 | 7 | 5 | 5 | 5 | 0 | 5 | 7 | 3 | 3 | 6 | 8 | 6 | 2 | 7 | 2 | 1 | 5 | 0 | 0 | 3 |
| 6 | 2 | 8 | 1 | 5 | 1 | 1 | 4 | 8 | 2 | 9 | 5 | 5 | 6 | 5 | 2 | 0 | 6 | 7 | 3 | 3 | 9 | 2 | 2 | 2 |
| 2 | 7 | 8 | 8 | 9 | 0 | 4 | 1 | 4 | 6 | 9 | 7 | 5 | 4 | 9 | 2 | 4 | 4 | 0 | 6 | 9 | 5 | 4 | 4 | 4 |
| 4 | 3 | 3 | 9 | 1 | 2 | 1 | 3 | 6 | 3 | 4 | 3 | 4 | 8 | 8 | 6 | 9 | 3 | 2 | 3 | 3 | 4 | 7 | 1 | 2 |
| 8 | 8 | 0 | 5 | 2 | 2 | 8 | 0 | 8 | 5 | 3 | 0 | 3 | 7 | 4 | 9 | 6 | 0 | 1 | 8 | 5 | 3 | 8 | 6 | 4 |

Table 2 *Distribution of t*

| *df* | *Level of significance for one-tailed test* | | | | | |
|---|---|---|---|---|---|---|
| | .10 | .05 | .025 | .01 | .005 | .0005 |
| | *Level of significance for two-tailed test* | | | | | |
| | .20 | .10 | .05 | .02 | .01 | .001 |
| 1 | 3.078 | 6.314 | 12.706 | 31.821 | 63.657 | 636.619 |
| 2 | 1.886 | 2.920 | 4.303 | 6.965 | 9.925 | 31.598 |
| 3 | 1.638 | 2.353 | 3.182 | 4.541 | 5.841 | 12.941 |
| 4 | 1.533 | 2.132 | 2.776 | 3.747 | 4.604 | 8.610 |
| 5 | 1.476 | 2.015 | 2.571 | 3.365 | 4.032 | 6.859 |
| 6 | 1.440 | 1.943 | 2.447 | 3.143 | 3.707 | 5.959 |
| 7 | 1.415 | 1.895 | 2.365 | 2.998 | 3.499 | 5.405 |
| 8 | 1.397 | 1.860 | 2.306 | 2.896 | 3.355 | 5.041 |
| 9 | 1.383 | 1.833 | 2.262 | 2.821 | 3.250 | 4.781 |
| 10 | 1.372 | 1.812 | 2.228 | 2.764 | 3.169 | 4.587 |
| 11 | 1.363 | 1.796 | 2.201 | 2.718 | 3.106 | 4.437 |
| 12 | 1.356 | 1.782 | 2.179 | 2.681 | 3.055 | 4.318 |
| 13 | 1.350 | 1.771 | 2.160 | 2.650 | 3.012 | 4.221 |
| 14 | 1.345 | 1.761 | 2.145 | 2.624 | 2.977 | 4.140 |
| 15 | 1.341 | 1.753 | 2.131 | 2.602 | 2.947 | 4.073 |
| 16 | 1.337 | 1.746 | 2.120 | 2.583 | 2.921 | 4.015 |
| 17 | 1.333 | 1.740 | 2.110 | 2.567 | 2.898 | 3.965 |
| 18 | 1.330 | 1.734 | 2.101 | 2.552 | 2.878 | 3.992 |
| 19 | 1.328 | 1.729 | 2.093 | 2.539 | 2.861 | 3.883 |
| 20 | 1.325 | 1.725 | 2.086 | 2.528 | 2.845 | 3.850 |
| 21 | 1.323 | 1.721 | 2.080 | 2.518 | 2.831 | 3.819 |
| 22 | 1.321 | 1.717 | 2.074 | 2.508 | 2.819 | 3.792 |
| 23 | 1.319 | 1.714 | 2.069 | 2.500 | 2.807 | 3.767 |
| 24 | 1.318 | 1.711 | 2.064 | 2.492 | 2.797 | 3.745 |
| 25 | 1.316 | 1.708 | 2.060 | 2.485 | 2.787 | 3.725 |
| 26 | 1.315 | 1.706 | 2.056 | 2.479 | 2.779 | 3.707 |
| 27 | 1.314 | 1.703 | 2.052 | 2.473 | 2.771 | 3.690 |
| 28 | 1.313 | 1.701 | 2.048 | 2.467 | 2.763 | 3.674 |
| 29 | 1.311 | 1.699 | 2.045 | 2.462 | 2.756 | 3.659 |
| 30 | 1.310 | 1.697 | 2.042 | 2.457 | 2.750 | 3.646 |
| 40 | 1.303 | 1.684 | 2.021 | 2.423 | 2.704 | 3.551 |
| 60 | 1.296 | 1.671 | 2.000 | 2.390 | 2.660 | 3.460 |
| 120 | 1.289 | 1.658 | 1.980 | 2.358 | 2.617 | 3.373 |
| ∞ | 1.282 | 1.645 | 1.960 | 2.326 | 2.576 | 3.291 |



Table abridged from Table III of Fisher and Yates, *Statistical Tables for Biological, Agricultural, and Medical Research*, published by Longman Group Ltd., London (previously published by Oliver and Boyd Ltd., Edinburgh), by permission of the authors and publishers.

Table 3 *Areas Under the Normal Curve. Proportion of Area Under the Normal Curve Between the Mean and a z Distance from the Mean*

| $\frac{x}{\sigma}$ or $z$ | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
|---|---|---|---|---|---|---|---|---|---|---|
| .0 | .0000 | .0040 | .0080 | .0120 | .0160 | .0199 | .0239 | .0279 | .0319 | .0359 |
| .1 | .0398 | .0438 | .0478 | .0517 | .0557 | .0596 | .0636 | .0675 | .0714 | .0753 |
| .2 | .0793 | .0832 | .0871 | .0910 | .0948 | .0987 | .1026 | .1064 | .1103 | .1141 |
| .3 | .1179 | .1217 | .1255 | .1293 | .1331 | .1368 | .1406 | .1443 | .1480 | .1517 |
| .4 | .1554 | .1591 | .1628 | .1664 | .1700 | .1736 | .1772 | .1808 | .1844 | .1879 |
| .5 | .1915 | .1950 | .1985 | .2019 | .2054 | .2088 | .2123 | .2157 | .2190 | .2224 |
| .6 | .2257 | .2291 | .2324 | .2357 | .2389 | .2422 | .2454 | .2486 | .2517 | .2549 |
| .7 | .2580 | .2611 | .2642 | .2673 | .2704 | .2734 | .2764 | .2794 | .2823 | .2852 |
| .8 | .2881 | .2910 | .2939 | .2967 | .2995 | .3023 | .3051 | .3078 | .3106 | .3133 |
| .9 | .3159 | .3186 | .3212 | .3238 | .3264 | .3289 | .3315 | .3340 | .3365 | .3389 |
| 1.0 | .3413 | .3438 | .3461 | .3485 | .3508 | .3531 | .3554 | .3577 | .3599 | .3621 |
| 1.1 | .3643 | .3665 | .3686 | .3708 | .3729 | .3749 | .3770 | .3790 | .3810 | .3830 |
| 1.2 | .3849 | .3869 | .3888 | .3907 | .3925 | .3944 | .3962 | .3980 | .3997 | .4015 |
| 1.3 | .4032 | .4049 | .4066 | .4082 | .4099 | .4115 | .4131 | .4147 | .4162 | .4177 |
| 1.4 | .4192 | .4207 | .4222 | .4236 | .4251 | .4265 | .4279 | .4292 | .4306 | .4319 |
| 1.5 | .4332 | .4345 | .4357 | .4370 | .4382 | .4394 | .4406 | .4418 | .4429 | .4441 |
| 1.6 | .4452 | .4463 | .4474 | .4484 | .4495 | .4505 | .4515 | .4525 | .4535 | .4545 |
| 1.7 | .4454 | .4564 | .4573 | .4582 | .4591 | .4599 | .4608 | .4616 | .4625 | .4633 |
| 1.8 | .4641 | .4649 | .4656 | .4664 | .4671 | .4678 | .4686 | .4693 | .4699 | .4706 |
| 1.9 | .4713 | .4719 | .4726 | .4732 | .4738 | .4744 | .4750 | .4756 | .4761 | .4767 |
| 2.0 | .4772 | .4778 | .4783 | .4788 | .4793 | .4798 | .4803 | .4808 | .4812 | .4817 |
| 2.1 | .4821 | .4826 | .4830 | .4834 | .4838 | .4842 | .4846 | .4850 | .4854 | .4857 |
| 2.2 | .4861 | .4864 | .4868 | .4871 | .4875 | .4878 | .4881 | .4884 | .4887 | .4890 |
| 2.3 | .4893 | .4896 | .4898 | .4901 | .4904 | .4906 | .4909 | .4911 | .4913 | .4916 |
| 2.4 | .4918 | .4920 | .4922 | .4925 | .4927 | .4929 | .4931 | .4932 | .4934 | .4936 |
| 2.5 | .4938 | .4940 | .4941 | .4943 | .4945 | .4946 | .4948 | .4949 | .4951 | .4952 |
| 2.6 | .4953 | .4955 | .4956 | .4957 | .4959 | .4960 | .4961 | .4962 | .4963 | .4964 |
| 2.7 | .4965 | .4966 | .4967 | .4968 | .4969 | .4970 | .4971 | .4972 | .4973 | .4974 |
| 2.8 | .4974 | .4975 | .4976 | .4977 | .4977 | .4978 | .4979 | .4979 | .4980 | .4981 |
| 2.9 | .4981 | .4982 | .4982 | .4983 | .4984 | .4984 | .4985 | .4985 | .4986 | .4986 |
| 3.0 | .4987 | .4987 | .4987 | .4988 | .4988 | .4989 | .4989 | .4989 | .4990 | .4990 |
| 3.1 | .4990 | .4991 | .4991 | .4991 | .4992 | .4992 | .4992 | .4992 | .4993 | .4993 |
| 3.2 | .4993 | .4993 | .4994 | .4994 | .4994 | .4994 | .4994 | .4995 | .4995 | .4995 |
| 3.3 | .4995 | .4995 | .4995 | .4996 | .4996 | .4996 | .4996 | .4996 | .4996 | .4997 |
| 3.4 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4998 |
| 3.5 | .4998 | | | | | | | | | |
| 4.0 | .49997 | | | | | | | | | |
| 4.5 | .499997 | | | | | | | | | |
| 5.0 | .4999997 | | | | | | | | | |

Table 4 *Distribution of Chi-Square*

| | Probability | | | | | |
|---|---|---|---|---|---|---|
| *df* | .20 | .10 | .05 | .02 | .01 | .001 |
| 1 | 1.642 | 2.706 | 3.841 | 5.412 | 6.635 | 10.827 |
| 2 | 3.219 | 4.605 | 5.991 | 7.824 | 9.210 | 13.815 |
| 3 | 4.642 | 6.251 | 7.815 | 9.837 | 11.345 | 16.266 |
| 4 | 5.989 | 7.779 | 9.488 | 11.668 | 13.277 | 18.467 |
| 5 | 7.289 | 9.236 | 11.070 | 13.388 | 15.086 | 20.515 |
| 6 | 8.558 | 10.645 | 12.592 | 15.033 | 16.812 | 22.457 |
| 7 | 9.803 | 12.017 | 14.067 | 16.622 | 18.475 | 24.322 |
| 8 | 11.030 | 13.362 | 15.507 | 18.168 | 20.090 | 26.125 |
| 9 | 12.242 | 14.684 | 16.919 | 19.679 | 21.666 | 27.877 |
| 10 | 13.442 | 15.987 | 18.307 | 21.161 | 23.209 | 29.588 |
| 11 | 14.631 | 17.275 | 19.675 | 22.618 | 24.725 | 31.264 |
| 12 | 15.812 | 18.549 | 21.026 | 24.054 | 26.217 | 32.909 |
| 13 | 16.985 | 19.812 | 22.362 | 25.472 | 27.688 | 34.528 |
| 14 | 18.151 | 21.064 | 23.685 | 26.873 | 29.141 | 36.123 |
| 15 | 19.311 | 22.307 | 24.996 | 28.259 | 30.578 | 37.697 |
| 16 | 20.465 | 23.542 | 26.296 | 29.633 | 32.000 | 39.252 |
| 17 | 21.615 | 24.769 | 27.587 | 30.995 | 33.409 | 40.790 |
| 18 | 22.760 | 25.989 | 28.869 | 32.346 | 34.805 | 42.312 |
| 19 | 23.900 | 27.204 | 30.144 | 33.687 | 36.191 | 43.820 |
| 20 | 25.038 | 28.412 | 31.410 | 35.020 | 37.566 | 45.315 |
| 21 | 26.171 | 29.615 | 32.671 | 36.343 | 38.932 | 46.797 |
| 22 | 27.301 | 30.813 | 33.924 | 37.659 | 40.289 | 48.268 |
| 23 | 28.429 | 32.007 | 35.172 | 38.968 | 41.638 | 49.728 |
| 24 | 29.553 | 33.196 | 36.415 | 40.270 | 42.980 | 51.179 |
| 25 | 30.675 | 34.382 | 37.652 | 41.566 | 44.314 | 52.620 |

Table 4 *Distribution of Chi-Square (continued)*

| | Probability | | | | | |
|---|---|---|---|---|---|---|
| *df* | .20 | .10 | .05 | .02 | .01 | .001 |
| 26 | 31.795 | 35.563 | 38.885 | 42.856 | 45.642 | 54.052 |
| 27 | 32.912 | 36.741 | 40.113 | 44.140 | 46.963 | 55.476 |
| 28 | 34.027 | 37.916 | 41.337 | 45.419 | 48.278 | 56.893 |
| 29 | 35.139 | 39.087 | 42.557 | 46.693 | 49.588 | 58.302 |
| 30 | 36.250 | 40.256 | 43.773 | 47.962 | 50.892 | 59.703 |
| 32 | 38.466 | 42.585 | 46.194 | 50.487 | 53.486 | 62.487 |
| 34 | 40.676 | 44.903 | 48.602 | 52.995 | 56.061 | 65.247 |
| 36 | 42.879 | 47.212 | 50.999 | 55.489 | 58.619 | 67.985 |
| 38 | 45.076 | 49.513 | 53.384 | 57.969 | 61.162 | 70.703 |
| 40 | 47.269 | 51.805 | 55.759 | 60.436 | 63.691 | 73.402 |
| 42 | 49.456 | 54.090 | 58.124 | 62.892 | 66.206 | 76.084 |
| 44 | 51.639 | 56.369 | 60.481 | 65.337 | 68.710 | 78.750 |
| 46 | 53.818 | 58.641 | 62.830 | 67.771 | 71.201 | 81.400 |
| 48 | 55.993 | 60.907 | 65.171 | 70.197 | 73.683 | 84.037 |
| 50 | 58.164 | 63.167 | 67.505 | 72.613 | 76.154 | 86.661 |
| 52 | 60.332 | 65.422 | 69.832 | 75.021 | 78.616 | 89.272 |
| 54 | 62.496 | 67.673 | 72.153 | 77.422 | 81.069 | 91.872 |
| 56 | 64.658 | 69.919 | 74.468 | 79.815 | 83.513 | 94.461 |
| 58 | 66.816 | 72.160 | 76.778 | 82.201 | 85.950 | 97.039 |
| 60 | 68.972 | 74.397 | 79.082 | 84.580 | 88.379 | 99.607 |
| 62 | 71.125 | 76.630 | 81.381 | 86.953 | 90.802 | 102.166 |
| 64 | 73.276 | 78.860 | 83.675 | 89.320 | 93.217 | 104.716 |
| 66 | 75.424 | 81.085 | 85.965 | 91.681 | 95.626 | 107.258 |
| 68 | 77.571 | 83.308 | 88.250 | 94.037 | 98.028 | 109.791 |
| 70 | 79.715 | 85.527 | 90.531 | 96.388 | 100.425 | 112.317 |

Table 4 is taken from Table IV of Fisher and Yates, *Statistical Tables for Biological, Agricultural, and Medical Research*, published by Longman Group UK Ltd., 1974.

Table 5 *Distribution of F: .05 Level*

| $df_2$ / $df_1$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 24 | 30 | 40 | 60 | 120 | ∞ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 161.4 | 199.5 | 215.7 | 224.6 | 230.2 | 234.0 | 236.8 | 238.9 | 240.5 | 241.9 | 243.9 | 245.9 | 248.0 | 249.1 | 250.1 | 251.1 | 252.2 | 253.3 | 254.3 |
| 2 | 18.51 | 19.00 | 19.16 | 19.25 | 19.30 | 19.33 | 19.35 | 19.37 | 19.38 | 19.40 | 19.41 | 19.43 | 19.45 | 19.45 | 19.46 | 19.47 | 19.48 | 19.49 | 19.50 |
| 3 | 10.13 | 9.55 | 9.28 | 9.12 | 9.01 | 8.94 | 8.89 | 8.85 | 8.81 | 8.79 | 8.74 | 8.70 | 8.66 | 8.64 | 8.62 | 8.59 | 8.57 | 8.55 | 8.53 |
| 4 | 7.71 | 6.94 | 6.59 | 6.39 | 6.26 | 6.16 | 6.09 | 6.04 | 6.00 | 5.96 | 5.91 | 5.86 | 5.80 | 5.77 | 5.75 | 5.72 | 5.69 | 5.66 | 5.63 |
| 5 | 6.61 | 5.79 | 5.41 | 5.19 | 5.05 | 4.95 | 4.88 | 4.82 | 4.77 | 4.74 | 4.68 | 4.62 | 4.56 | 4.53 | 4.50 | 4.46 | 4.43 | 4.40 | 4.36 |
| 6 | 5.99 | 5.14 | 4.76 | 4.53 | 4.39 | 4.28 | 4.21 | 4.15 | 4.10 | 4.06 | 4.00 | 3.94 | 3.87 | 3.84 | 3.81 | 3.77 | 3.74 | 3.70 | 3.67 |
| 7 | 5.59 | 4.74 | 4.35 | 4.12 | 3.97 | 3.87 | 3.79 | 3.73 | 3.68 | 3.64 | 3.57 | 3.51 | 3.44 | 3.41 | 3.38 | 3.34 | 3.30 | 3.27 | 3.23 |
| 8 | 5.32 | 4.46 | 4.07 | 3.84 | 3.69 | 3.58 | 3.50 | 3.44 | 3.39 | 3.35 | 3.28 | 3.22 | 3.15 | 3.12 | 3.08 | 3.04 | 3.01 | 2.97 | 2.93 |
| 9 | 5.12 | 4.26 | 3.86 | 3.63 | 3.48 | 3.37 | 3.29 | 3.23 | 3.18 | 3.14 | 3.07 | 3.01 | 2.94 | 2.90 | 2.86 | 2.83 | 2.79 | 2.75 | 2.71 |
| 10 | 4.96 | 4.10 | 3.71 | 3.48 | 3.33 | 3.22 | 3.14 | 3.07 | 3.02 | 2.98 | 2.91 | 2.85 | 2.77 | 2.74 | 2.70 | 2.66 | 2.62 | 2.58 | 2.54 |
| 11 | 4.84 | 3.98 | 3.59 | 3.36 | 3.20 | 3.09 | 3.01 | 2.95 | 2.90 | 2.85 | 2.79 | 2.72 | 2.65 | 2.61 | 2.57 | 2.53 | 2.49 | 2.45 | 2.40 |
| 12 | 4.75 | 3.89 | 3.49 | 3.26 | 3.11 | 3.00 | 2.91 | 2.85 | 2.80 | 2.75 | 2.69 | 2.62 | 2.54 | 2.51 | 2.47 | 2.43 | 2.38 | 2.34 | 2.30 |
| 13 | 4.67 | 3.81 | 3.41 | 3.18 | 3.03 | 2.92 | 2.83 | 2.77 | 2.71 | 2.67 | 2.60 | 2.53 | 2.46 | 2.42 | 2.38 | 2.34 | 2.30 | 2.25 | 2.21 |
| 14 | 4.60 | 3.74 | 3.34 | 3.11 | 2.96 | 2.85 | 2.76 | 2.70 | 2.65 | 2.60 | 2.53 | 2.46 | 2.39 | 2.35 | 2.31 | 2.27 | 2.22 | 2.18 | 2.13 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 4.54 | 3.68 | 3.29 | 3.06 | 2.90 | 2.79 | 2.71 | 2.64 | 2.59 | 2.54 | 2.48 | 2.40 | 2.33 | 2.29 | 2.25 | 2.20 | 2.16 | 2.11 | 2.07 |
| 16 | 4.49 | 3.63 | 3.24 | 3.01 | 2.85 | 2.74 | 2.66 | 2.59 | 2.54 | 2.49 | 2.42 | 2.35 | 2.28 | 2.24 | 2.19 | 2.15 | 2.11 | 2.06 | 2.01 |
| 17 | 4.45 | 3.59 | 3.20 | 2.96 | 2.81 | 2.70 | 2.61 | 2.55 | 2.49 | 2.45 | 2.38 | 2.31 | 2.23 | 2.19 | 2.15 | 2.10 | 2.06 | 2.01 | 1.96 |
| 18 | 4.41 | 3.55 | 3.16 | 2.93 | 2.77 | 2.66 | 2.58 | 2.51 | 2.46 | 2.41 | 2.34 | 2.27 | 2.19 | 2.15 | 2.11 | 2.06 | 2.02 | 1.97 | 1.92 |
| 19 | 4.38 | 3.52 | 3.13 | 2.90 | 2.74 | 2.63 | 2.54 | 2.48 | 2.42 | 2.38 | 2.31 | 2.23 | 2.16 | 2.11 | 2.07 | 2.03 | 1.98 | 1.93 | 1.88 |
| 20 | 4.35 | 3.49 | 3.10 | 2.87 | 2.71 | 2.60 | 2.51 | 2.45 | 2.39 | 2.35 | 2.28 | 2.20 | 2.12 | 2.08 | 2.04 | 1.99 | 1.95 | 1.90 | 1.84 |
| 21 | 4.32 | 3.47 | 3.07 | 2.84 | 2.68 | 2.57 | 2.49 | 2.42 | 2.37 | 2.32 | 2.25 | 2.18 | 2.10 | 2.05 | 2.01 | 1.96 | 1.92 | 1.87 | 1.81 |
| 22 | 4.30 | 3.44 | 3.05 | 2.82 | 2.66 | 2.55 | 2.46 | 2.40 | 2.34 | 2.30 | 2.23 | 2.15 | 2.07 | 2.03 | 1.98 | 1.94 | 1.89 | 1.84 | 1.78 |
| 23 | 4.28 | 3.42 | 3.03 | 2.80 | 2.64 | 2.53 | 2.44 | 2.37 | 2.32 | 2.27 | 2.20 | 2.13 | 2.05 | 2.01 | 1.96 | 1.91 | 1.86 | 1.81 | 1.76 |
| 24 | 4.26 | 3.40 | 3.01 | 2.78 | 2.62 | 2.51 | 2.42 | 2.36 | 2.30 | 2.25 | 2.18 | 2.11 | 2.03 | 1.98 | 1.94 | 1.89 | 1.84 | 1.79 | 1.73 |
| 25 | 4.24 | 3.39 | 2.99 | 2.76 | 2.60 | 2.49 | 2.40 | 2.34 | 2.28 | 2.24 | 2.16 | 2.09 | 2.01 | 1.96 | 1.92 | 1.87 | 1.82 | 1.77 | 1.71 |
| 26 | 4.23 | 3.37 | 2.98 | 2.74 | 2.59 | 2.47 | 2.39 | 2.32 | 2.27 | 2.22 | 2.15 | 2.07 | 1.99 | 1.95 | 1.90 | 1.85 | 1.80 | 1.75 | 1.69 |
| 27 | 4.21 | 3.35 | 2.96 | 2.73 | 2.57 | 2.46 | 2.37 | 2.31 | 2.25 | 2.20 | 2.13 | 2.06 | 1.97 | 1.93 | 1.88 | 1.84 | 1.79 | 1.73 | 1.67 |
| 28 | 4.20 | 3.34 | 2.95 | 2.71 | 2.56 | 2.45 | 2.36 | 2.29 | 2.24 | 2.19 | 2.12 | 2.04 | 1.96 | 1.91 | 1.87 | 1.82 | 1.77 | 1.71 | 1.65 |
| 29 | 4.18 | 3.33 | 2.93 | 2.70 | 2.55 | 2.43 | 2.35 | 2.28 | 2.22 | 2.18 | 2.10 | 2.03 | 1.94 | 1.90 | 1.85 | 1.81 | 1.75 | 1.70 | 1.64 |
| 30 | 4.17 | 3.32 | 2.92 | 2.69 | 2.53 | 2.42 | 2.33 | 2.27 | 2.21 | 2.16 | 2.09 | 2.01 | 1.93 | 1.89 | 1.84 | 1.79 | 1.74 | 1.68 | 1.62 |
| 40 | 4.08 | 3.23 | 2.84 | 2.61 | 2.45 | 2.34 | 2.25 | 2.18 | 2.12 | 2.08 | 2.00 | 1.92 | 1.84 | 1.79 | 1.74 | 1.69 | 1.64 | 1.58 | 1.51 |
| 60 | 4.00 | 3.15 | 2.76 | 2.53 | 2.37 | 2.25 | 2.17 | 2.10 | 2.04 | 1.99 | 1.92 | 1.84 | 1.75 | 1.70 | 1.65 | 1.59 | 1.53 | 1.47 | 1.39 |
| 120 | 3.92 | 3.07 | 2.68 | 2.45 | 2.29 | 2.17 | 2.09 | 2.02 | 1.96 | 1.91 | 1.83 | 1.75 | 1.66 | 1.61 | 1.55 | 1.50 | 1.43 | 1.35 | 1.25 |
| ∞ | 3.84 | 3.00 | 2.60 | 2.37 | 2.21 | 2.10 | 2.01 | 1.94 | 1.88 | 1.83 | 1.75 | 1.67 | 1.57 | 1.52 | 1.46 | 1.39 | 1.32 | 1.22 | 1.00 |

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Table 6 *Distribution of F: .01 Level*

| $df_2$ / $df_1$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 24 | 30 | 40 | 60 | 120 | ∞ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4052 | 4999.5 | 5403 | 5625 | 5764 | 5859 | 5928 | 5982 | 6022 | 6056 | 6106 | 6157 | 6209 | 6235 | 6261 | 6287 | 6313 | 6339 | 6366 |
| 2 | 98.5 | 99.00 | 99.17 | 99.25 | 99.30 | 99.33 | 99.36 | 99.37 | 99.39 | 99.40 | 99.42 | 99.43 | 99.45 | 99.46 | 99.47 | 99.47 | 99.48 | 99.49 | 99.50 |
| 3 | 34.12 | 30.82 | 29.46 | 28.71 | 28.24 | 27.91 | 27.67 | 27.49 | 27.35 | 27.23 | 27.05 | 26.87 | 26.69 | 26.60 | 26.50 | 26.41 | 26.32 | 26.22 | 26.13 |
| 4 | 21.20 | 18.00 | 16.69 | 15.98 | 15.52 | 15.21 | 14.98 | 14.80 | 14.66 | 14.55 | 14.37 | 14.20 | 14.02 | 13.93 | 13.84 | 13.75 | 13.65 | 13.56 | 13.46 |
| 5 | 16.26 | 13.27 | 12.06 | 11.39 | 10.97 | 10.67 | 10.46 | 10.29 | 10.16 | 10.05 | 9.89 | 9.72 | 9.55 | 9.47 | 9.38 | 9.29 | 9.20 | 9.11 | 9.02 |
| 6 | 13.75 | 10.92 | 9.78 | 9.15 | 8.75 | 8.47 | 8.26 | 8.10 | 7.98 | 7.87 | 7.72 | 7.56 | 7.40 | 7.31 | 7.23 | 7.14 | 7.06 | 6.97 | 6.88 |
| 7 | 12.25 | 9.55 | 8.45 | 7.85 | 7.46 | 7.19 | 6.99 | 6.81 | 6.72 | 6.62 | 6.47 | 6.31 | 6.16 | 6.07 | 5.99 | 5.91 | 5.82 | 5.74 | 5.65 |
| 8 | 11.26 | 8.65 | 7.59 | 7.01 | 6.63 | 6.37 | 6.18 | 6.03 | 5.91 | 5.81 | 5.67 | 5.52 | 5.36 | 5.28 | 5.20 | 5.12 | 5.03 | 4.95 | 4.86 |
| 9 | 10.56 | 8.02 | 6.99 | 6.42 | 6.06 | 5.80 | 5.61 | 5.47 | 5.35 | 5.26 | 5.11 | 4.96 | 4.81 | 4.73 | 4.65 | 4.57 | 4.48 | 4.40 | 4.31 |
| 10 | 10.04 | 7.56 | 6.55 | 5.99 | 5.64 | 5.39 | 5.20 | 5.06 | 4.94 | 4.85 | 4.71 | 4.56 | 4.41 | 4.33 | 4.25 | 4.17 | 4.08 | 4.00 | 3.91 |
| 11 | 9.65 | 7.21 | 6.22 | 5.67 | 5.32 | 5.07 | 4.89 | 4.74 | 4.63 | 4.54 | 4.40 | 4.25 | 4.10 | 4.02 | 3.94 | 3.86 | 3.78 | 3.69 | 3.60 |
| 12 | 9.33 | 6.93 | 5.95 | 5.41 | 5.06 | 4.82 | 4.64 | 4.50 | 4.39 | 4.30 | 4.16 | 4.01 | 3.86 | 3.78 | 3.70 | 3.62 | 3.54 | 3.45 | 3.36 |
| 13 | 9.07 | 6.70 | 5.74 | 5.21 | 4.86 | 4.62 | 4.44 | 4.30 | 4.19 | 4.10 | 3.96 | 3.82 | 3.66 | 3.59 | 3.51 | 3.43 | 3.34 | 3.25 | 3.17 |
| 14 | 8.86 | 6.51 | 5.56 | 5.04 | 4.69 | 4.46 | 4.28 | 4.14 | 4.03 | 3.94 | 3.80 | 3.66 | 3.51 | 3.43 | 3.35 | 3.27 | 3.18 | 3.09 | 3.00 |
| 15 | 8.68 | 6.36 | 5.42 | 4.89 | 4.56 | 4.32 | 4.14 | 4.00 | 3.89 | 3.80 | 3.67 | 3.52 | 3.37 | 3.29 | 3.21 | 3.13 | 3.05 | 2.96 | 2.87 |
| 16 | 8.53 | 6.23 | 5.29 | 4.77 | 4.44 | 4.20 | 4.03 | 3.89 | 3.78 | 3.69 | 3.55 | 3.41 | 3.26 | 3.18 | 3.10 | 3.02 | 2.93 | 2.84 | 2.75 |
| 17 | 8.40 | 6.11 | 5.18 | 4.67 | 4.34 | 4.10 | 3.93 | 3.79 | 3.68 | 3.59 | 3.46 | 3.31 | 3.16 | 3.08 | 3.00 | 2.92 | 2.83 | 2.75 | 2.65 |
| 18 | 8.29 | 6.01 | 5.09 | 4.58 | 4.25 | 4.01 | 3.84 | 3.71 | 3.60 | 3.51 | 3.37 | 3.23 | 3.08 | 3.00 | 2.92 | 2.84 | 2.75 | 2.66 | 2.57 |
| 19 | 8.18 | 5.93 | 5.01 | 4.50 | 4.17 | 3.94 | 3.77 | 3.63 | 3.52 | 3.43 | 3.30 | 3.15 | 3.00 | 2.92 | 2.84 | 2.76 | 2.67 | 2.58 | 2.49 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 8.10 | 5.85 | 4.94 | 4.43 | 4.10 | 3.87 | 3.70 | 3.56 | 3.46 | 3.37 | 3.23 | 3.09 | 2.94 | 2.86 | 2.78 | 2.69 | 2.61 | 2.52 | 2.42 |
| 21 | 8.02 | 5.78 | 4.87 | 4.37 | 4.04 | 3.81 | 3.64 | 3.51 | 3.40 | 3.31 | 3.17 | 3.03 | 2.88 | 2.80 | 2.72 | 2.64 | 2.55 | 2.46 | 2.36 |
| 22 | 7.95 | 5.72 | 4.82 | 4.31 | 3.99 | 3.76 | 3.59 | 3.45 | 3.35 | 3.26 | 3.12 | 2.98 | 2.83 | 2.75 | 2.67 | 2.58 | 2.50 | 2.40 | 2.31 |
| 23 | 7.88 | 5.66 | 4.76 | 4.26 | 3.94 | 3.71 | 3.54 | 3.41 | 3.30 | 3.21 | 3.07 | 2.93 | 2.78 | 2.70 | 2.62 | 2.54 | 2.45 | 2.35 | 2.26 |
| 24 | 7.82 | 5.61 | 4.72 | 4.22 | 3.90 | 3.67 | 3.50 | 3.36 | 3.26 | 3.17 | 3.03 | 2.89 | 2.74 | 2.66 | 2.58 | 2.49 | 2.40 | 2.31 | 2.21 |
| 25 | 7.77 | 5.57 | 4.68 | 4.18 | 3.85 | 3.63 | 3.46 | 3.32 | 3.22 | 3.13 | 2.99 | 2.85 | 2.70 | 2.62 | 2.54 | 2.45 | 2.36 | 2.27 | 2.17 |
| 26 | 7.72 | 5.53 | 4.64 | 4.14 | 3.82 | 3.59 | 3.42 | 3.29 | 3.18 | 3.09 | 2.96 | 2.81 | 2.66 | 2.58 | 2.50 | 2.42 | 2.33 | 2.23 | 2.13 |
| 27 | 7.68 | 5.49 | 4.60 | 4.11 | 3.78 | 3.56 | 3.39 | 3.26 | 3.15 | 3.06 | 2.93 | 2.78 | 2.63 | 2.55 | 2.47 | 2.38 | 2.29 | 2.20 | 2.10 |
| 28 | 7.64 | 5.45 | 4.57 | 4.07 | 3.75 | 3.53 | 3.36 | 3.23 | 3.12 | 3.03 | 2.90 | 2.75 | 2.60 | 2.52 | 2.44 | 2.35 | 2.26 | 2.17 | 2.06 |
| 29 | 7.60 | 5.42 | 4.54 | 4.04 | 3.73 | 3.50 | 3.33 | 3.20 | 3.09 | 3.00 | 2.87 | 2.73 | 2.57 | 2.49 | 2.41 | 2.33 | 2.23 | 2.14 | 2.03 |
| 30 | 7.56 | 5.39 | 4.51 | 4.02 | 3.70 | 3.47 | 3.30 | 3.17 | 3.07 | 2.98 | 2.84 | 2.70 | 2.55 | 2.47 | 2.39 | 2.30 | 2.21 | 2.11 | 2.01 |
| 40 | 7.31 | 5.18 | 4.31 | 3.83 | 3.51 | 3.29 | 3.12 | 2.99 | 2.89 | 2.80 | 2.66 | 2.52 | 2.37 | 2.29 | 2.20 | 2.11 | 2.02 | 1.92 | 1.80 |
| 60 | 7.08 | 4.98 | 4.13 | 3.65 | 3.34 | 3.12 | 2.95 | 2.82 | 2.72 | 2.63 | 2.50 | 2.35 | 2.20 | 2.12 | 2.03 | 1.94 | 1.84 | 1.73 | 1.60 |
| 120 | 6.85 | 4.79 | 3.95 | 3.48 | 3.17 | 2.96 | 2.79 | 2.66 | 2.56 | 2.47 | 2.34 | 2.19 | 2.03 | 1.95 | 1.86 | 1.76 | 1.66 | 1.53 | 1.38 |
| ∞ | 6.63 | 4.61 | 3.78 | 3.32 | 3.02 | 2.80 | 2.64 | 2.51 | 2.41 | 2.32 | 2.18 | 2.04 | 1.88 | 1.79 | 1.70 | 1.59 | 1.47 | 1.32 | 1.00 |

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*Note:* $df_1$ = rows of table (for degrees of freedom in denominator)—within
$df_2$ = columns of table (for degrees of freedom in numerator)—between

Appendix 2

# Brief Guide for Conducting Focus Groups


- *Are Focus Groups the Correct Method?*
- *Assembling the Groups*
- *Choosing a Field Service and a Facility Location*
- *Recruiting*
- *Before the Groups Begin*
- *Conducting the Groups*
- *Handling Respondents*
- *Procedural Steps in Conducting a Focus Group*
- *Focus Group Criticisms*
- *Caveat*

*Summary*

Though a popular research method for many decades and a very valuable research tool, focus groups are double-edged swords. The method looks deceptively simple: Invite 6–12 people to a research location, hold a controlled discussion for 2 hours, and write a report. Despite their simplicity, however, focus groups have gremlins hiding around dozens of corners. Researchers who are unaware of the potential problems in conducting a focus group may reap disastrous results. Even the simplest focus group topic can become impossible to handle under certain circumstances. In this appendix we discuss some of the problem areas that should be considered both before a focus group meets and while the group is in progress. The comments are based on our experiences while conducting more than 2,500 focus groups during the past 25+ years.

## ▪ *Are Focus Groups the Correct Method?*

First the researcher must be sure that the focus group is the correct approach for the research problem at hand. Focus groups are intended to collect qualitative information—nothing more. All too often, however, people (including some researchers) attempt to interpret focus group data as quantitative information. Indeed the most egregious error associated with conducting focus groups is using the method for the wrong purpose. Focus groups should be used to collect indications of what may exist; they should not be used to answer quantitative questions.

## ▪ *Assembling the Groups*

A research project requires a great deal of careful planning to anticipate any condition or situation that might complicate its completion. Two important considerations in assembling focus groups are date and time.

### *Date*

Focus groups are similar to surveys and experiments in that they must be scheduled carefully. Any conflict with major holidays or other officially recognized days away from work may cause extreme difficulty in recruiting participants. In addition to religious holidays, the Fourth of July, Labor Day, and other long-established holidays, researchers need to anticipate problems that may be created by less well- known events. Depending on the city and the time of year, some or all of the following may create havoc with recruiting: Monday Night Football, the World Series, the Stanley Cup, or even local high school or college sports events. There are also blockbuster television shows or other widely publicized TV programs that create a great deal of viewer interest, along with county or state fairs, major musical events or concerts, and political elections.

Conducting focus groups on Friday is generally not recommended. It might be a good idea in an "emergency" research situation, but usually most respondents do not want to give up one of their weekend nights to participate in a research project. Although some recruiting companies may be willing to accept a Friday night focus group, most frown on the practice and will try to convince the researcher to consider another day of the week. If Friday night groups are scheduled, researchers should plan to pay participants more incentive money and should expect the field service to charge more for recruiting because more telephone calls will be required to recruit participants.

### *Time*

The time selected to conduct focus groups depends completely on the type of participants desired. If housewives are needed, late morning or early afternoon is satisfactory. People who work outside the home are best scheduled for evenings. In most cases, back-to-back night focus groups begin at 6:00 P.M. and 8:00 P.M. Since most groups last about 2 hours, some researchers schedule the second group for 8:15 or 8:30 to allow some time for tidying the facility and resetting equipment. Also, the additional time gives the moderator a few minutes to relax before the second group starts.

Just as the date of focus groups can affect the turnout, so can the time. If business travelers are the target group, it might be wise to schedule their group to begin at 8:30 P.M. Researchers need to put themselves in the position of the person who is being recruited and try to anticipate the time that is most convenient.

### The Unexpected

Sometimes researchers consider every possible scheduling conflict and still encounter unforeseen problems. Problems created by nature obviously cannot be controlled, but consideration should be given to the weather conditions at the time the groups are scheduled. For example, focus groups planned in the northern part of the United States from January to March may need to be cancelled because of snowstorms. If the research cannot wait until spring, it is wise to plan for an alternative day and possibly an alternative site. Experienced research companies that recruit for focus groups often ask the people recruited about their availability at a later time if the weather forces cancellation of the originally scheduled group.

Then there are the completely unanticipated events that force a cancellation. For example, in the past 25+ years of conducting focus groups around the United States, we have had to cancel because of an earthquake, riots after the Rodney King decision in Los Angeles, a hurricane, loss of electrical power at the research facility, and a field service hostess who mistakenly turned respondents away because she "rescreened" the respondents with the wrong screener. Researchers should always assume that something unexpected will happen and prepare for unforeseen events.

## ▪ Choosing a Field Service and a Facility Location

A researcher who frequently conducts focus groups in the same city usually uses the same field service for respondent recruiting and facility use. In addition to establishing a rapport with the company, the researcher is accustomed to the facilities and is generally not surprised by anything when the groups begin. It is extremely important to completely investigate any company used for the first time. A researcher who does not follow through on this simple task may be headed for a major "surprise" in the end. Veteran researchers have learned that just because a company calls itself a research firm does not mean that the people who own and operate the firm know what they are doing. There are incompetents and charlatans in the research field, just as in any other business. Many researchers who plan to use a company new to them usually contact other researchers for a recommendation. In addition, some researchers consult the lists of recruiting facilities prepared by marketing research organizations such as the American Marketing Association (AMA). Do not assume, however, that a research facility listed by an association conducts its business in a professional manner. The only requirement for listing in an association directory is payment of annual membership dues. A caveat in the research field: Beware of any marketing, research, or consulting association whose members can join by simply paying a fee.

After satisfactory references about a field service have been received, the focus group facility should be investigated. Is the facility easily accessible, or will participants have difficulty finding the building? Is parking nearby and safe? If the focus group sessions are to be held in a motel room, it is important to find out about the motel itself. Obviously, a rundown and poorly located motel will hinder recruitment and make it difficult for the researcher to moderate a serious discussion with respondents. Respondents will base their perceptions of the research project on the quality of the facilities, so every effort should be made to select a facility that communicates "professionalism."

The focus room should provide enough seating space for up to 14 adults, and the table should allow for easy discussion among all members of the group. The viewing room should have comfortable seating for the observers.

Finally, the researcher must find out about the recording equipment the research company plans to use. The microphones must be sensitive enough to pick up all levels of sound in the room, and a backup system should be provided in the event that the main recording system fails during the group sessions.

## ▪ Recruiting

The recruiting questionnaire, or screener, used to select people to participate in the groups is one of the most important aspects of the focus group methodology. The screener defines who will be allowed to participate in the discussion. If the screener questions do not adequately identify the type of person who should attend, the results of the research will probably be worthless.

Researchers usually work very closely with the recruiting firm in developing the screener. Every characteristic desired for the participants needs to be covered (age, gender, race, location of residence, type of employment, knowledge of the topic under discussion, and so on). All relevant characteristics must be addressed by the questions in the screener, and the interviewers who will make the recruiting phone calls must understand the requirements precisely. Good research companies will carefully review the screener with their recruiting staff, but it never hurts to ask whether the procedure (known as "briefing") is planned.

We present four guidelines for recruiting:

1. Always overrecruit. The number of extra people generally depends on the type of respondent desired. There is no rule of thumb, but if a researcher needs 10 participants in a group, 14 or 15 should be recruited.

2. Determine the amount of co-op money to be paid during the initial discussions of recruiting with the research company. As mentioned earlier, co-op fees can range from $10 to $500. Most research companies ask that the co-op money be provided in advance; this is standard procedure. The respondents, however, are always paid after the group meeting, not before or during the session.

3. Make sure the guidelines for recruiting participants are clearly understood by the field service. These companies usually use a database to recruit for focus groups, so it is best to specify that only one person from each such club, organization, or other group will be allowed to participate. (Otherwise a field service might simply call the local PTA and ask for volunteers.) In addition, it must be emphasized that relatives of participants will not be allowed in the groups. Finally, it is good practice to insist that no person be recruited for a group if he or she has participated in related focus groups during the past year (or other time period the researcher feels is appropriate). This restriction serves to eliminate the "professional" focus group member—the person who is constantly called by the field service to participate.

4. Just before the groups start, or shortly after, always ask the field service for the screeners used in recruiting the groups. Professional field services will not hesitate to

provide researchers with the screeners. Companies that claim screeners are private property, have been destroyed, or are proprietary information are generally trying to hide something (such as recruiting members from the same club or organization).

## ▪ Before the Groups Begin

The major items researchers must attend to before the focus groups begin are listed in this section. Although the items are numbered, they need not be performed in this particular order. Moreover, some jobs involve a great deal of time, whereas others can be completed in a few minutes.

1. Prepare the moderator's guide. The moderator uses the guide to ensure that all relevant questions are asked, not to force a group into a set pattern of questioning and answering. Researchers must be prepared to skip around among the prepared questions, depending on how the group reacts. In many cases, respondents mention interesting points that should be pursued.

2. Make arrangements with the field service for any audiotaping or videotaping that will be required. Although audiotaping is generally considered standard for all groups, videotaping is an option. Most research companies do not charge for audiotaping, but there is usually a substantial fee for videotaping.

3. Check all electronic equipment and other mechanical devices that will be used during the groups. Assume that nothing will work and check everything. Items (for example, tape machines) that are not checked are the ones that will not work when they are supposed to (Murphy's law).

4. In most focus group situations, respondents are offered a light dinner or snack. Catering arrangements need to be discussed with the recruiting company and depend on how much money the client wishes to spend.

5. Although respondents are reminded several times of the group's starting time, one or two people are sure to arrive late. It is the researcher's responsibility to instruct the recruiting company on how to handle late arrivals. Some focus groups may suffer no harm if one or two respondents arrive a few minutes late. If the session begins with showing or playing some type of information (audiotapes, videotapes, placards), however, a late respondent cannot participate meaningfully in the group. In such cases, it is best to pay the late respondent the co-op money and allow the person to go home. Many "professional" focus group respondents have learned that if they arrive about 15 minutes late they will still receive the co-op money. It is up to the researcher to decide the time limit. Our practice is that if respondents are more than 15 minutes late for the session, they are not paid the co-op.

6. Researchers need to establish with the recruiting company what will happen if not enough respondents "show" for a group. The course of action (such as not paying for the recruiting of the group) depends on the reason for the low turnout. If bad weather or another unpredictable natural event makes it difficult for people to get to the facility, the recruiting company should not be penalized. However, if the weather is fine and there are no unexpected disrupting influences, the researcher may request that recruiting charges be waived. Fortunately for researchers, good field services that face shortfalls generally offer to reschedule the groups for no additional charge.

7. There is one rule for the people who view the groups behind the one-way mirror: no loud noises. The only thing that separates the viewing room from the focus room is a thin sheet of glass, and loud talking, laughing, or other noises from behind the mirror are annoying to the moderator as well as to the respondents. Viewers should also refrain from lighting cigarettes, cigars, or pipes if the

flame may be detected by those on the other side of the mirror. This sounds like a minor detail, but the quick flash of light can distract a respondent who may be unaware that viewers are behind the mirror. Other rules for the viewers are established by the moderator on an ad hoc basis. For example, we do not allow viewers to send in more than one or two notes during the session (the notes contain other questions to ask).

## ▪ Conducting the Groups

The type of introduction to a focus group and the amount of information provided to the respondents depend on the purpose of the group and the sponsor of the research. In some cases it is important for the respondents to receive no preliminary information during the introduction; in other cases concepts or procedures must be explained before actual questioning can begin. The moderator usually starts a focus group by explaining the purpose of the group (the amount of detail depends on the reason for the group).

Some of the information the authors tell respondents in a focus group introduction is summarized next:

• There are no right or wrong answers to the questions that will be asked. Everyone should feel free to make relevant comments, whether positive or negative.

• The group is being audiotaped (or videotaped) for future reference. None of the comments made in the group will be used outside the group without prior written permission.

• There is at least one person behind the mirror watching the group. In our case, this person is usually a coworker, so the respondents are told, "A person who works with me is behind the mirror watching the group. If you hear any noises back there, that's him falling off his chair or something." Some researchers do not like to tell respondents that viewers are behind the mirror for fear of making the respondents nervous. However, in moderating many thousands of focus groups, we have never found this to be a problem.

• The group is informal and there is no need to raise a hand to say something. No one should hesitate to ask questions, and the respondents should feel free to speak up without being invited to do so.

After the brief introduction, the respondents are asked to introduce themselves and give a bit of information about their background, such as occupation, length of time living in the area, and so forth.

A focus group will not fail if the moderator has a thorough understanding of the goals of the group, a detailed moderator's guide, and an acute interest in listening to the respondents' answers. A moderator should not feel restricted to the order of questioning in the moderator's guide. If respondents raise a relevant point, it is important to ask follow-up questions.

## ▪ Handling Respondents

As a rule, people who participate in focus groups tend to fall into one of five types:

1. The *active* participant who is interested in providing relevant answers to the moderator's questions. A group of 10 of this type would make a moderator's job easy.

2. The *shy* person who is embarrassed to speak out or feels inhibited for some reason. This person can be included simply by calling on him or her for a response, such as "Bob, what do you think about that?"

3. The *know-it-all* who has an answer to every question and tries to dominate the group. This person can be handled by saying something like "Bob, before you answer, let me find out what Jim thinks."

4. The *over-talker* who cannot answer a question in only one or two sentences. This

person can be controlled by saying something like "Bob, very briefly, what do you think about that?" If Bob continues, cut him off.

5. The *obnoxious* person who does not really wish to participate and tries to make life difficult for the moderator by making sarcastic remarks or irrelevant comments. The moderator can easily control this person simply by cutting him off, or by saying "My purpose in conducting this group is to get a variety of opinions about [the focus group topic]. I'm not interested in listening to sarcastic remarks or degrading comments. If that is what you wish to do, I'll allow you to leave now." (If the person continues to be obnoxious, it is easy to have the person removed from the group.)

Eliminating people from a group that is already in session calls for a prior arrangement with the field service. For example, it may be agreed that when the moderator believes it is necessary to eliminate a respondent, the moderator will leave the focus room and give the name of the offending person to the field service representative. A few minutes after the moderator has returned to the group, the unwanted group member is summoned by the field service representative for a "phone call." Outside the focus room, the company representative very politely dismisses the person. ("You seem to be an expert in the area, and your input may affect the other respondents' answers" is one approach.) The goal is to eliminate the problem respondent quickly. The moderator cannot allow one person to destroy the group. Speed is most important in getting rid of an unwanted respondent.

## ▪ Procedural Steps in Conducting a Focus Group

We tend to follow the same procedure consistently when arriving at a focus group facility to conduct a group. This series of steps ensures that all potential problems are addressed ahead of time. Upon arriving at the facility (usually an hour before the start of the first group), each of us follows these steps:

1. Introduce himself to the receptionist, show an appropriate picture I. D. card, and ask for the host or hostess in charge of the group.
2. Ask which focus room will be used.
3. Determine entrances and exits for respondents and viewers.
4. Examine the focus room for the appropriate equipment, space, number of chairs around the focus table, writing instruments, pads of paper, and other materials needed for the group.
5. Explain to the host or hostess that it will be all right for respondents to bring food into the room.
6. Review the procedures for eliminating an unwanted respondent.
7. Review the procedures for handling respondents who show up late for the group (either allow them to enter the room or pay them and send them home).
8. Check for air conditioning and heating controls.
9. Ask for the screeners for the respondents recruited for the group.
10. Review the procedures for starting the audiotape, videotape, or both.
11. Review the procedures for allowing notes to be sent in from viewers behind the mirror.
12. Check to see that meals or snacks have been prepared for respondents and viewers.
13. Explain any unique aspects, such as whether a break will be taken after 1 hour, to the host or hostess.
14. Determine how long after the scheduled starting time the group will actually start. This depends on how many respondents arrive at the scheduled starting time.

## Focus Group Criticisms

Some researchers claim that focus groups are not a good research methodology because of the potential influence of one or two respondents on the other members of the group. These critics say that a "dominant" respondent can negatively affect the outcome of the group and that group "pressures" may influence the comments made by individuals.

It is our experience that those who criticize focus groups because of the potential influence of certain respondents do not have enough experience moderating focus groups to deal with the range of respondents who participate in the groups. A professional moderator never has ongoing problems with difficult respondents. A professional moderator can identify almost immediately a "problem" respondent and can solve the problem in a matter of minutes. If a moderator has problems with respondents, the moderator should consider another occupation.

## Caveat

This section is not intended to scare novice researchers. Rather, the intention is to explain a situation that must be considered by any researcher who plans to conduct focus groups. The problem relates to the cheating that some companies do to recruit respondents for focus groups. In some cases it is difficult for field services to find enough qualified respondents for a project because the screener requirements are too stringent. Instead of calling the client and explaining the recruiting difficulty, some recruiters simply use "standbys" for the group. These people are usually friends of the company owner or company personnel who are called at the last minute to meet the goal of a focus group's "show rate."

Does this mean that inferior research is conducted in some cases? The sad truth is, yes. During our research careers, we have caught several field services and recruiting companies in the act of cheating. Most field services and recruiting companies, however, are owned and operated by hard-working professionals who sincerely care about the quality of their work. As always, it is a minority of operators who spoil the process for all companies. It is the researcher's responsibility to check everything about a focus group to ensure that all is in order. A researcher should never assume that what he or she sees is real.

## Summary

Properly conducted focus groups are a valuable research tool. They are exciting to conduct, and they can provide a great deal of useful information. Yet it is important for a novice researcher to view several groups before jumping into the moderator's seat. Although focus groups can be easy to conduct, they can also turn into nightmares if the moderator does not have enough experience dealing with the multitude of respondent types who will be involved. At one time or another, all moderators will face respondents who are drunk, high on drugs, physically sick, angry, happy, sad, tired, or have any one of many psychological problems.

# Appendix 3

# Sample Data

Since computers analyze most research data, questionnaire responses must be quantified. A project codebook is a column-by-column explanation of the responses and their corresponding code numbers.

The following codebook was prepared for the data in this appendix. It can be used to conduct a study with actual data.

| Column(s) | Variable |
|---|---|
| 1–3 | Respondent number |
| 4 | Age and gender |
| | 1 = Male 18–24 |
| | 2 = Male 25–34 |
| | 3 = Female 18–24 |
| | 4 = Female 25–34 |
| 5 | WAAA Listen |
| | 1 = Yes |
| | 2 = No |
| 6 | WAAA Morning Show Listener |
| | 1 = Frequently |
| | 2 = Sometimes |
| | 3 = Never |
| 7 | WBBB Listen |
| | 1 = Yes |
| | 2 = No |
| 8 | WBBB Morning Show Listener |
| | 1 = Frequently |
| | 2 = Sometimes |
| | 3 = Never |
| 9 | WCCC Listen |
| | 1 = Yes |
| | 2 = No |
| 10 | WCCC Morning Show Listener |
| | 1 = Frequently |
| | 2 = Sometimes |
| | 3 = Never |

| Column(s) | Variable |
|---|---|
| 11 | WDDD Listen |
| | 1 = Yes |
| | 2 = No |
| 12 | WDDD Morning Show Listener |
| | 1 = Frequently |
| | 2 = Sometimes |
| | 3 = Never |
| 13 | WEEE Listen |
| | 1 = Yes |
| | 2 = No |
| 14 | WEEE Morning Show Listener |
| | 1 = Frequently |
| | 2 = Sometimes |
| | 3 = Never |
| 15 | WFFF Listen |
| | 1 = Yes |
| | 2 = No |
| 16 | WFFF Morning Show Listener |
| | 1 = Frequently |
| | 2 = Sometimes |
| | 3 = Never |
| 17 | Favorite Station |
| | 1 = Don't know/No answer |
| | 2 = Other |
| | 3 = WAAA |
| | 4 = WBBB |
| | 5 = WCCC |
| | 6 = WDDD |
| | 7 = WEEE |
| | 8 = WFFF |
| | 9 = WGGG |

The following columns relate to why respondents listen to station WCCC. The possible answers are: 1 = Agree; 2 = Disagree; 3 = Don't know/No answer.

| | |
|---|---|
| 18 | Amount of new or current music |
| 19 | Quality of new or current music |
| 20 | Amount of older music |
| 21 | Quality of older music |
| 22 | Morning show |
| 23 | Upbeat/energetic feeling |
| 24 | Contests and prizes |
| 25 | Because friends listen |
| 26 | Afternoon announcers |
| 27 | Involvement in local activities |
| 28 | Hear favorite songs frequently |
| 29 | Attitude toward its listeners |
| 30 | Morning show announcers |
| 31 | Pace or tempo of station |
| 32 | News and information |
| 33 | Traffic reports |
| 34 | To hear new music and artists |
| 35 | Variety of music played |
| 36 | Source of local information |
| 37 | Amount of music |

Coding questionnaires consist of reading each question, referring to the codebook, and assigning the appropriate code for the respondent's answer(s). These data are then input into the computer for analysis.

SAMPLE DATA

Note: The codebook for the following data is included in Chapter 7.

| Column.....> | 1 2 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Respondent | 0 0 1 | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| | 0 0 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 1 | 2 | 2 | 3 | 1 | 2 | 1 |
| | 0 0 3 | 3 | 2 | 0 | 2 | 0 | 1 | 3 | 1 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| | 0 0 4 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 0 0 5 | 4 | 1 | 3 | 1 | 3 | 2 | 0 | 1 | 3 | 2 | 0 | 2 | 0 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 0 0 6 | 4 | 2 | 0 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 0 0 7 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 1 | 3 | 2 | 0 | 9 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 |
| | 0 0 8 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 3 | 2 | 2 | 1 | 1 | 2 | 1 |
| | 0 0 9 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 0 1 0 | 1 | 1 | 2 | 1 | 3 | 1 | 2 | 1 | 2 | 2 | 0 | 2 | 0 | 9 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| | 0 1 1 | 1 | 1 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 5 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 1 |
| | 0 1 2 | 2 | 2 | 0 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 3 | 2 | 0 | 5 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1 |
| | 0 1 3 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 0 | 2 | 0 | 9 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 2 | 1 |
| | 0 1 4 | 2 | 1 | 3 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 |
| | 0 1 5 | 2 | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| | 0 1 6 | 3 | 2 | 0 | 1 | 3 | 2 | 0 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 0 1 7 | 3 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 0 | 8 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| | 0 1 8 | 3 | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 1 |
| | 0 1 9 | 3 | 1 | 2 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| | 0 2 0 | 3 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| | 0 2 1 | 3 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 1 | 2 | 0 | 1 | 3 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 0 2 2 | 3 | 2 | 0 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 |
| | 0 2 3 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| | 0 2 4 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 1 | 2 | 2 | 0 | 2 | 0 | 3 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 3 | 1 | 1 | 2 | 1 | 3 | 3 | 1 | 1 | 2 | 1 |
| | 0 2 5 | 4 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 9 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 026 | 4 | 2 | 0 | 1 | 2 | 2 | 0 | 1 | 2 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 |
| 027 | 4 | 1 | 2 | 1 | 1 | 2 | 0 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| 028 | 4 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 029 | 4 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 2 | 0 | 2 | 0 | 3 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 |
| 030 | 4 | 1 | 2 | 1 | 1 | 2 | 0 | 1 | 3 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| 031 | 4 | 2 | 0 | 1 | 1 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 0 | 3 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 |
| 032 | 4 | 1 | 3 | 1 | 2 | 2 | 0 | 1 | 3 | 2 | 0 | 1 | 1 | 6 | 1 | 2 | 2 | 1 | 2 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 |
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| 056 | 1 | 1 | 2 | 1 | 3 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
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| 058 | 1 | 2 | 0 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| 059 | 2 | 1 | 3 | 1 | 2 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 0 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 2 | 1 |
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| 062 | 2 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| 063 | 2 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 0 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 1 |
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| 065 | 2 | 1 | 2 | 1 | 3 | 1 | 2 | 1 | 3 | 1 | 2 | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 066 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 0 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 067 | 3 | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 |
| 068 | 3 | 1 | 1 | 2 | 0 | 1 | 1 | 1 | 3 | 1 | 3 | 2 | 0 | 9 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 |
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| 070 | 3 | 1 | 3 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
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| 072 | 3 | 2 | 0 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
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| 076 | 4 | 2 | 0 | 1 | 1 | 2 | 0 | 1 | 2 | 2 | 0 | 2 | 0 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 |
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| 082 | 2 | 1 | 3 | 1 | 3 | 2 | 0 | 1 | 2 | 1 | 3 | 2 | 0 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 |
| 083 | 2 | 2 | 0 | 1 | 1 | 2 | 0 | 1 | 1 | 1 | 2 | 1 | 2 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 084 | 2 | 1 | 2 | 1 | 1 | 2 | 0 | 1 | 3 | 1 | 3 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
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| 086 | 3 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 0 | 5 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
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| 107 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
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| 116 | 4 | 1 | 3 | 1 | 1 | 2 | 0 | 1 | 2 | 2 | 0 | 2 | 0 | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 |
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| 122 | 1 | 1 | 3 | 2 | 0 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 0 | 9 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| 123 | 1 | 2 | 0 | 1 | 2 | 2 | 0 | 1 | 1 | 1 | 3 | 1 | 3 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
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| 125 | 2 | 2 | 0 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
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| 127 | 3 | 1 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 |
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| 131 | 3 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 9 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 |
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| 133 | 4 | 1 | 3 | 2 | 0 | 2 | 0 | 1 | 1 | 2 | 0 | 1 | 3 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
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| 137 | 4 | 1 | 1 | 2 | 0 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 0 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| 138 | 4 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 8 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| 139 | 4 | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 2 | 1 | 3 | 5 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| 140 | 4 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 141 | 4 | 2 | 0 | 1 | 1 | 2 | 0 | 1 | 2 | 2 | 0 | 2 | 0 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| 142 | 1 | 1 | 1 | 2 | 0 | 1 | 1 | 1 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 |
| 143 | 1 | 1 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 0 | 2 | 0 | 9 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 |
| 144 | 2 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 3 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 3 | 1 | 2 | 2 | 1 |
| 145 | 3 | 2 | 0 | 1 | 2 | 2 | 0 | 1 | 3 | 1 | 2 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |

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| 146 | 3 | 1 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 1 | 3 | 1 | 3 | 5 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| 147 | 3 | 2 | 0 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| 148 | 3 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 9 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| 149 | 3 | 1 | 3 | 1 | 3 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| 150 | 3 | 2 | 0 | 2 | 0 | 1 | 3 | 1 | 1 | 1 | 3 | 1 | 3 | 5 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| 151 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 |
| 152 | 4 | 2 | 0 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 |
| 153 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 0 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 154 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 155 | 2 | 1 | 2 | 2 | 0 | 1 | 3 | 1 | 2 | 2 | 0 | 2 | 0 | 9 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 156 | 2 | 1 | 3 | 1 | 2 | 2 | 0 | 1 | 3 | 1 | 3 | 2 | 0 | 8 | 2 | 2 | 1 | 1 | 2 | 1 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 |
| 157 | 2 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 158 | 2 | 2 | 0 | 1 | 2 | 2 | 0 | 1 | 2 | 2 | 0 | 2 | 0 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 |
| 159 | 2 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 0 | 2 | 0 | 9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 |
| 160 | 3 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 1 | 2 | 3 | 1 | 1 | 1 | 2 | 3 | 1 |
| 161 | 3 | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 1 |
| 162 | 3 | 1 | 3 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 0 | 5 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 |
| 163 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 1 | 2 | 0 | 1 | 3 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 |
| 164 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 2 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 165 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| 166 | 4 | 2 | 0 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 167 | 4 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 168 | 4 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 169 | 4 | 1 | 2 | 1 | 1 | 2 | 0 | 1 | 1 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| 170 | 4 | 1 | 3 | 1 | 3 | 2 | 0 | 1 | 3 | 1 | 2 | 1 | 2 | 5 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 |
| 171 | 4 | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 2 |
| 172 | 4 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 2 |
| 173 | 4 | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 174 | 4 | 2 | 0 | 1 | 3 | 1 | 3 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 |
| 175 | 4 | 1 | 3 | 1 | 2 | 1 | 3 | 1 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

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| 176 | 4 | 1 | 1 | 2 | 0 | 2 | 0 | 1 | 3 | 2 | 0 | 1 | 3 | 5 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 |
| 177 | 4 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 |
| 178 | 1 | 1 | 3 | 2 | 0 | 2 | 0 | 1 | 3 | 1 | 2 | 1 | 1 | 6 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 |
| 179 | 1 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 5 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 |
| 180 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 181 | 1 | 1 | 3 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| 182 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 183 | 2 | 2 | 0 | 1 | 3 | 2 | 0 | 1 | 3 | 1 | 3 | 2 | 0 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 184 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 3 | 9 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 185 | 2 | 2 | 0 | 1 | 2 | 2 | 0 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| 186 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 6 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 187 | 4 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 |
| 188 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 189 | 3 | 2 | 0 | 1 | 3 | 1 | 2 | 1 | 2 | 2 | 0 | 2 | 0 | 9 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 |
| 190 | 3 | 2 | 0 | 1 | 2 | 1 | 3 | 1 | 2 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| 191 | 3 | 1 | 2 | 1 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 2 | 0 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| 192 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 193 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 0 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 |
| 194 | 4 | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 2 | 1 | 2 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 195 | 4 | 2 | 0 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 0 | 3 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 |
| 196 | 4 | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 1 | 1 | 2 | 1 | 3 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 197 | 4 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| 198 | 4 | 1 | 2 | 1 | 1 | 2 | 0 | 1 | 1 | 2 | 0 | 2 | 0 | 3 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 |
| 199 | 4 | 2 | 0 | 1 | 3 | 1 | 3 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 |
| 200 | 4 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 5 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 1 | 1 |

# Appendix 4

# Sample Questionnaire

The sample questionnaire in this appendix contains several types of questions that can be asked in a telephone interview for a radio station. Wimmer-Hudson Research & Development in Denver, Colorado, designed the questionnaire. Because the original questionnaire was proprietary, however, it has been edited and "masked" so that the exact location and nature of the questions cannot be identified. The actual questionnaire also included more questions. Note that the format of the response options does not exactly match those shown in Chapter 9. This is because of the conventions and styles of the CATI-based interviewing system used by Wimmer-Hudson Research & Development.

Review the questionnaire and then answer the following questions:

1. What is the advantage of numbering the pages "Page 2 of 5," "Page 3 of 5," and so on?
2. What is important about the way the introduction is worded?
3. What type of person is interviewed? (Check the screener questions.)
4. Why are questions 5 and 6 screening questions? Why are they located near the beginning of the questionnaire?
5. Which questions have quotas that the interviewers (or CATI system) must consider?
6. Why do questions 7 and 8 use "do you choose" and "when you have the choice" in the wording?
7. Analyze the skip patterns. Who answers each of the questions?
8. What other questions would you add to this questionnaire? (The goal of the questionnaire is to find out how the station is perceived by listeners and nonlisteners.)

*BIG CITY FM RADIO (N = 400)* © 1998 Wimmer-Hudson R&D

Hi. This is ____ from ____. We're not selling anything and this is not a promotion or a contest. We're conducting an opinion survey about radio in the Big City area and I'd like to ask you a few questions. For quality improvement purposes, this call may be monitored.

1. First, in which of the following age groups do you belong . . . under 21, 21 to 24, 25 to 34, 35 to 44, 45 to 50, or over 50?

   Under 21 .............[QUOTA FILLED]
   1 = 21 to 24 .............[QUOTA=51]
   2 = 25 to 34 .............[QUOTA=145]
   3 = 35 to 44 .............[QUOTA=145]
   4 = 45 to 50 .............[QUOTA=59] ........................................1
   Over 50 .............[QUOTA FILLED]

2. [GENDER. RECORD WITHOUT ASKING. QUOTA]

   1 = Male [60%]    2 = Female [40%] ........................................2

3. Which county do you live in? [DON'T READ]

   1 = Dorne ...............[QUOTA=55]    3 = Villa ...................[QUOTA=80]
   2 = Walter ...............[QUOTA=220]    4 = Summer .............[QUOTA=45]
   5 = DK/NA/Other [TERM] ........................................3

4. I'd like to describe three types of music played on the radio. Please tell me if, during a typical week, you DO listen or WOULD listen *often*, *sometimes*, or *never* to each type

of music. How frequently DO you listen or WOULD you listen to music on the radio by artists such as . . . [READ EACH]

a. Rolling Stones, Creedence Clearwater Revival, Beatles, and The Doors?
 1 = Often
 2 = Sometimes
 3 = Never/DK/NA ....................................................................4

b. Fleetwood Mac, Doobie Brothers, The Eagles, and The Steve Miller Band?
 1 = Often
 2 = Sometimes
 3 = Never/DK/NA ....................................................................5

c. ZZ Top, Foreigner, Led Zeppelin, and Boston?
 1 = Often
 2 = Sometimes
 3 = Never/DK/NA ....................................................................6

[MUST SAY "OFTEN" TO AT LEAST TWO OF THE TYPES OF MUSIC]

5. Including yourself, how many members of your household or friends are employed by a radio or TV station, a company that owns or manages a radio or TV station, a newspaper, advertising agency, or market research company? [TERM IF ANY]

6. Considering that you can listen to the radio at home, in your car, at work, and elsewhere, about how much time during a typical day do you spend listening to the radio? [TERM IF LESS THAN 1 HOUR]

7. Which radio stations, if any, do you choose to listen to during a typical week for MUSIC? [PROBE:]

 Which others? ________ ________ ________ ________ 7

[RESEARCH NOTE: MONITOR STATIONS FOR MINIMUM]

8. When you have the choice, which radio station do you listen to most often for MUSIC? . . . . ________ 8

9. Now I'd like to move to a new topic and have you think about the *tempo of music* played on the radio overall, excluding special night time programming. Please tell me what your overall ideal music tempo is when you listen to the radio. Use a 1 to 10 scale, where "1" means only *slow, mellow music,* "10" means only *fast, uptempo music,* and 2 thru 9 are in between. [1–10. X=DK/NA] ..........................................................9

10. I'd like to read a brief list of radio stations and have you rate the overall music tempo played on each one. If you don't know enough about a station to rate it, please say so. Using the same scale of 1 to 10, where "1" means only *slow, mellow music,* and "10" means only *fast, uptempo music,* how would you rate the overall tempo of music played on . . . [READ EACH. 1–10. X=DK/NA. Y=UNFAMILIAR.]

 a. Soft Rock 95.5 ..........................................................................10
 b. Hawk 102.7 ...............................................................................11

11. Next, I'd like you to think about the *era or decade of music* played on the radio over-all. Please tell me what your overall ideal music era is when you listen to the radio. Use a 1 to 10 scale, where "1" means *only music from the 60s,* "10" means *only music from today,* and 2 thru 9 are in between. [1–10. X=DK/NA] ................................12

12. As before, I'd like you to rate the decade of music played on a few stations. If you don't know enough about a station to rate it, please say so. Using the same scale of 1 to 10, where "1" means only *music from the 60s* and "10" means only *music from today,* how would you rate the overall era of music played on . . . [READ EACH STATION. 1–10. X=DK/NA. Y=UNFAMILIAR.]

    a. Soft Rock 95.5 ................................................................................13
    b. Hawk 102.7......................................................................................14

13. The next question is in two parts. I'd like to read a list of things about radio stations, overall. First, I'd like you to tell me how important each item is to you when you listen to the radio OVERALL. Use a scale of 1 to 10, where the higher the number, the more important the item is. Then, I'd like you to tell me which one area radio station, if any, best fists each statement. [ROTATE. RECORD 1–10. X=DK/NA. RECORD STATION]

    [FOR EACH SAY:] Overall, how important is it to you that a radio station. . .
    [THEN:] Which Big City area radio station, if any, . . .

    a. Does not *talk over* the beginning and ending of songs ...............................15
       . . . .is the best at not talking over the beginnings and ending of songs________ 16
    b. Plays several songs in a row without interruption ........................................17
       . . . .plays the most songs without interruption ...............................________ 18
    c. Tells you the titles and artists of songs they play...............................................19
       . . . .is best at telling you the song titles and artists ..........................________ 20
    d. Has games and contests for listeners .......................................................21
       . . . .has the best games and contests for listeners.............................________ 22

14. Now I'd like to ask about traffic reports on the radio. On a scale of 1 to 10, where the higher the number, the more important, how important are radio station traffic reports. . .[READ EACH. RECORD 1–10. X=DK/NA]

    a. Weekday mornings from 5:30 to 9 a.m. every 15 minutes ................................23
    b. Weekday mornings from 5:30 to 9 a.m. every 30 minutes ................................24
    c. Weekday mornings from 5:30 to 9 a.m. every 60 minutes ................................25

15. During a typical week Monday thru Friday, do you usually listen to the radio in the morning between 5:30 and 9 a.m.? [DON'T READ]

    1 = Yes......................[ASK Q. 16]
    2 = No......................[SKIP TO Q. 20]
    3 = DK/NA .............[SKIP TO Q. 20]..........................................26

16. Which radio stations, if any, do you choose to listen to weekday mornings between 5:30 and 9 a.m.? [PROBE:] Which others? ________ ________ ________ ________ 27

17. Which radio station do you listen to most often weekday mornings between 5:30 and 9 a.m.?

Station: ______ 28

18. A radio station's morning show can take several approaches. I'd like to read two approaches and have you tell me which one, if either, you prefer. Approach 1 is to emphasize music and not have much news and information or DJ humor and entertainment. Approach 2 is to emphasize DJ humor and entertainment and not have much news and information and music. Which of these two approaches do you prefer? [READ AGAIN IF NECESSARY]

1 = Approach 1: Emphasize music
2 = Approach 2: Emphasize DJ humor and entertainment
3 = Doesn't matter/both equal
4 = DK/NA ........................................29

19. In your opinion, should a radio station's weekday morning show have only one DJ or personality or should there be several DJs or personalities who interact with each other? [DON'T READ]

1 = One DJ or personality
2 = Several DJs or personalities
3 = Doesn't matter/both equal
4 = DK/NA ........................................30

20. Next, I'd like to read a list of items that a radio station could give away as contest prizes. Please tell me how much each prize would encourage you to listen more often to the station. Use a scale of 1 to 10, where the higher the number, the more the prize would encourage you to listen. [ROTATE. READ EACH. RECORD 1–10. X=DK/NA/DON'T ENCOURAGE LISTENING]

a. Concert tickets ........................................31
b. $100 in cash ........................................32
c. A Harley motorcycle ........................................33
d. $1,000 in cash ........................................34
e. $500 in cash ........................................35
f. Vacation trips ........................................36

21. Next, to save time, I'd like to ask you a few questions about only one station and I need your help to select it. Please choose one number from 1 to 5. [PAUSE] You picked Hawk 102.7. Are you familiar with Hawk 102.7? [DON'T READ]

1 = Yes ..................[ASK Q. 22]
2 = No ..................[SKIP TO Q. 36]
3 = DK/NA ..............[SKIP TO Q. 36] ........................37

22. So that I may be sure, do you listen to Hawk 102.7 during a typical week? [DON'T READ]

1 = Yes ..................[SKIP TO Q. 26]
2 = No ..................[ASK Q. 23]
3 = DK/NA ..............[ASK Q. 23] ........................38

23. Did you ever listen to Hawk 102.7 in the past? [DON'T READ]

    1 = Yes ......................[SKIP TO Q. 25]
    2 = No ......................[ASK Q. 24]
    3 = DK/NA .............[ASK Q. 24] ................................................39

24. Why don't you listen to Hawk 102.7? [PROBE:] What else? 40

    [RECORD AND SKIP TO Q. 36] 41

25. Why don't you listen to Hawk 102.7 any longer? [PROBE:] What else? 42

    [RECORD AND SKIP TO Q. 36] 43

26. How would you describe Hawk 102.7 to someone who has never heard it? [PROBE] What else? 44

    45

27. As compared to a few months ago, are you NOW listening to Hawk 102.7 *more, less,* or *about the same*? [DON'T READ]

    1 = More ..................[SKIP TO Q. 29]
    2 = Less ....................[ASK Q. 28]
    3 = Same ..................[SKIP TO Q. 29]
    4 = DK/NA .............[SKIP TO Q. 29]..........................................46

28. Why are you now listening less to Hawk 102.7? [PROBE:] What else? 47

    48

29. Now, I'd like to read a brief list of statements about Hawk 102.7. Please tell me if you agree or disagree with each one. If you don't know enough about a statement to rate it, please say so. [ROTATE. 1=AGREE, 2=DISAGREE, 3=DK/NA]

    *Do you agree or disagree that Hawk 102.7 . . .*

    a. repeats songs too often ..........................................................................49
    b. should have news reports 7 days a week ...................................................50
    c. DJs talk too much..........................................................................................51
    d. should play more slow or soft rock music ....................................................52
    e. should continue to play music from the 1970s .............................................53
    f. should play more music from the 1980s .......................................................54

30. So that I may be sure, during a typical week, do you listen to the weekday morning show on Hawk 102.7 between 5:30 and 9 a.m.? [DON'T READ]

    1 = Yes......................[ASK Q. 31]
    2 = No ......................[SKIP TO Q. 32]
    3 = DK/NA .............[SKIP TO Q. 32]..........................................55

31. As compared to a few months ago, are you NOW listening to the Hawk 102.7 weekday morning show *more, less,* or *about the same*? [DON'T READ]

    1 = More
    2 = Less
    3 = Same
    4 = DK/NA..........................................................................................56

32. I'd like to read a brief list of statements about the weekday morning show on Hawk 102.7, and have you tell me if the show has *enough, too much,* or *not enough* of each item. If you don't know enough about a statement to rate it, please say so. [ROTATE. USE CODE.]

    1 = ENOUGH. . .2 = TOO MUCH. . .3 = NOT ENOUGH. . .4 = DK/NA

    *In your opinion, does the Hawk 102.7 morning show have enough, too much, or not enough* . . .[INSERT EACH]?

    a. local news reports....................57
    b. contests and games for listeners....................58
    c. local weather reports....................59
    d. humor....................60
    e. sports reports and scores....................61
    f. mentions of the time of day....................62
    g. information about what's happening in the Big City area....................63
    h. music....................64

33. Next, I'd like to read a list of feature programs that Hawk 102.7 could include during the week. Please tell me how much you like each program idea. Use a scale of 1 to 10, where the higher the number, the more you like the program idea. [ROTATE. READ EACH. RECORD 1–10. X=DK/NA]

    a. Block parties on weekends....................65
    b. Noon time request hour....................66
    c. 5-in-a-row at 5 o'clock from a specific year or artist....................67

34. Some people we have talked to say the Hawk 102.7 has been a good radio station for many years and continues to be a good station. Other people say the Hawk 102.7 was a good radio station but is no longer as good as it used to be. Which of these opinions, if either, do you agree with? [DON'T READ]

    1 = Good and continues to be good..................[SKIP TO Q. 36]
    2 = Not as good as it used to be..................[ASK Q. 35]
    3 = DK/NA..................[SKIP TO Q. 36]..............68

35. Why is Hawk 102.7 no longer as good as it used to be? [PROBE:] What else? 69
    ............................ 70

36. Thanks for participating in the survey. For verification purposes, may I have your name? [FIRST NAME ONLY OK] ________________________________

*Appendix 5*

# Research Reports

- *The Need for Accurate Reporting Procedures*
- *The Mechanics of Writing a Research Report*
- *Writing Style*

The first step in writing any research report is to identify the intended readers. This is an important decision because the organization, the style, and even the mode of presentation depend on the target audience. In mass media research, there are typically two types of audiences and research reports:

1. Reports aimed at colleagues and intended for publication in scholarly and professional journals or for presentation at a convention
2. Reports aimed at decision makers and intended for in-house use only

In the first case, the format, length, style, and organization of a published report must conform to the guidelines of the journal in which it appears. Since colleagues are the target audience for such reports and papers, writers must pay close attention to the theory underlying the research, the methods used, and the techniques of analysis. In the second case, there is more flexibility. Some decision makers prefer to be briefed orally by the researcher. A verbal presentation may be supplemented by written summary handouts, visual aids, and on request, a detailed report. In other circumstances, the researcher might prepare a written report with a short executive summary, confining most of the technical material to appendixes. No matter what the situation or audience, the primary goals in all research reports are accuracy and clarity.

## ▪ The Need for Accurate Reporting Procedures

Researchers need to report research accurately for two reasons. First, a clear explanation of the investigator's methods permits readers to understand the project more completely. Researchers should keep in mind that most readers' knowledge of a given project is based solely on the information contained in the report. Since readers do not instinctively understand each procedure used in a study, these details must be supplied. Second, an accurate report provides the necessary information for those who wish to replicate the study. As Rummel (1970) suggests:

> In non-proprietary research, enough information must be included or stored somewhere to allow for replication of the study without the necessity of personal contact with the researcher. This is to ensure that a study is always replicable despite the decades or generations that may pass.

Rummel even argues that researchers should be able to replicate a published study from the information contained in it. Realistically, however, this is not always possible. Mass media journals have limited space, and journal editors do not have the luxury of printing all the raw data, tables, and graphs generated by a study; they are forced to eliminate some essential information. Therefore, Rummel's alternative—data archives—is very important. Unfortunately, the mass media field has yet to establish its own data archive service for researchers to use. Thus individual researchers must take full responsibility for accurately reporting and storing their own research data. To facilitate this task, the following sections describe the important elements of research that should be included in a published study. Some of the lists appear to be long, but most of the information can be expressed in a few short sentences. At any rate, it is better to include too much information than too little.

## ▪ The Mechanics of Writing a Research Report

Beginning researchers may find the writing style used for research reports awkward or cumbersome, but there is a definite purpose for the rules that govern scientific writing: clarity. Every effort must be made to avoid ambiguity. Here are some suggestions, adapted from Saslow (1994), that are helpful in achieving clarity in a research report. First, do not assume that the audience has prior knowledge of the topic. Research articles and reports are generally quite specialized, but a report written as though it were intended for only those readers with particular expertise will appeal to a limited readership. Researchers should make a distinct effort to make their writing accessible and understandable to all; overly technical language should be avoided. Second, remember that the audience may not have much time to ponder the intricacies of the research. Decision makers may have many reports to read; scholars may be reading the article as part of a lengthy literature review. In both cases it is necessary to present the rationale, methods, and findings in a clear, coherent, and organized fashion. Finally, remember that readers may not grasp the implications of the report as readily as you do. As the person closest to the data, the researcher has the responsibility to integrate the research findings into a larger conceptual and social framework. Putting the results into a larger context is more helpful than simply reporting the findings.

Given the wide variety of approaches to research, it stands to reason that the approaches to writing a research report are equally varied. Most research reports, however, include only seven basic sections: abstract, introduction, literature review, methods, results, discussion, and references.

***Abstract.*** An abstract is a short (100–150 words) summary of the key points of the research. Most readers scan the abstract to decide whether they want to read the rest of the article.

***Introduction.*** The introduction should alert the reader to what is to follow. Most introductions contain the following information:

*Statement of the problem.* The first job of the report writer is to provide some information about the background and the nature of the problem under investigation. If the research topic has a long history, then a short summary is in order. This section should also discuss any relevant theoretical background that pertains to the research topic.

*Justification.* This section should address why it is important for us to spend time and energy researching this particular problem. Research can be important because it deals with a crucial theoretical issue, because it has practical value, or because it has methodological value.

*Aims of the current study.* Most introductory sections conclude with an unequivocal statement of the hypothesis or the research questions to be answered by the study.

***Literature Review.*** The second major section is the review of the literature. (In some formats, the literature review is incorporated into the introduction.) As the name suggests, this section briefly recapitulates the work done in the field. The review need not be exhaustive; the writer should summarize only those studies most relevant to the current project. The researcher should strive for accuracy and relevance.

*Accuracy.* A concise and accurate distillation of each study is a prerequisite for any literature review. The main points of each study—hypotheses that were tested, sample, method, findings, and implications—should be briefly summarized. The review should be selective but thorough.

*Relevance.* A literature review should be more than a rote recitation of research studies; it must also contain analysis and synthesis. The writer is obligated to discuss the relevance of the past work to the current study. What theoretic development can be seen in past work? What major conclusions have recurred? What were some common problems? How do the answers to these questions relate to the current study? The ultimate aim of the review is to show how your study evolved out of past efforts and how the prior research provides a justification for your study.

***Methods.*** The methods section describes the approach used to confront the research problem. The following topics are usually addressed in this section:

*Variables used in the analysis.* This includes a description of both independent and dependent variables, explaining how the variables were selected for the study, what marker variables (see Chapter 3), if any, were included, and how extraneous variables were controlled. Each variable also requires some justification for its use; variables cannot be added without reason. The mean and the standard deviation for each variable should be reported when necessary.

*Sample size.* The researchers should state the number of subjects or units of study and also explain how these entities were selected. Additionally, any departure from normal randomization must be described in detail.

*Sample characteristics.* The sample should be described in terms of its demographic, lifestyle, or other characteristics. When human subjects are used, at least their age and gender should be indicated.

*Methodology.* Every research report requires a description of the methods used to collect and analyze data. The amount of methodological description to be included depends on the audience; articles written for journals, for instance, must contain more detailed information than reports prepared in private sector research.

*Data manipulation.* Often the collected data are not normally distributed, and researchers must use data transformation to achieve an approximation of normality. If such a procedure is used, a full explanation should be given.

***Results.*** The results section presents the findings of the research. It typically contains the following subsections:

*Description of the analysis.* The statistical techniques used to analyze the data should be mentioned. If the analysis used common or easily recognized statistics, a one-sentence description might be all that is needed, such as "Chi-square analyses were performed on the data" or "Analysis of variance was performed. . . ." If appropriate, the particular statistical program used by the researcher should be identified. Finally, this part should include an overview of what is to follow: "This section is divided into two parts. We will first report the results of the analysis of variance and then the results of the regression analysis."

*Description of findings.* The findings should be tied to the statement of the hypotheses or research questions mentioned in the introduction. The author should clearly state whether the results supported the hypothesis or whether the research questions were answered. Next, any peripheral findings can be reported. Many researchers and journal editors suggest that interpretation and discussion of findings be omitted from this section and that the writer stick solely to the bare facts. Others believe that this section should contain more than numbers and suggest the implications of the findings as well. In fact, for some short research articles, this section is sometimes called "Findings and Discussion." The choice of which model to follow depends upon the purpose of the report and the avenue of publication.

*Tables.* Tables, charts, graphs, and other data displays should be presented concisely and, if the article is being submitted to a journal, in the proper format. Remember that many readers turn first to the tables and may not read the accompanying text; consequently, tables should be explicit and easily understood by themselves. Visual materials for any research report can be produced easily with a variety of commercially available software packages. In combination with a color printer or plotter, the visual materials can be the predominant part of a research report, especially in reports for the private sector.

***Discussion.*** The last section of a research report is the discussion. The contents of this section are highly variable, but the following elements are common:

*Summary.* A synopsis of the main findings of the study often leads off this section.

*Implications/discussion/interpretations.* This is the part of the report that discusses the meaning of the findings. If the findings are in line with current theory and research, the writer should include a statement of how they correspond with what was done in the past. If the findings contradict or do not support current theory, some explanation for the current pattern of results should be provided.

*Limitations.* The conclusions of the study should be tempered by a report of some of its constraints. Perhaps the sample was limited, the response rate was low, or the experimental manipulation was not as clean as it could have been. In any case, the researcher should list some of the potential weaknesses of the research.

*Suggestions for future research.* In addition to answering questions, most research projects uncover new questions to be investigated. The suggestions for research should be relevant and practical.

***References.*** The authors, article titles, sources, and publication dates of the research mentioned in the research report are contained in the references. Each academic journal has a particular style for listing references. Some journals prefer listing all the references at the end of the article, and others use a system of footnotes that appear throughout the article.

## ▪ *Writing Style*

Since the writing requirements for journal articles and business or government reports vary in several ways, our discussion is divided into two sections.

### *Scholarly Journals*

There are eight principal guidelines for writing for scholarly journals:

- Avoid using first-person pronouns: *I, me, mine, we,* and so on. Research reports are almost always written in the third person ("Subjects were selected randomly," "Subject A told the researcher . . . ," and so on). First-person pronouns should be used only when the article is a commentary.
- When submitting a paper for professional publication, place each table, graph, chart, and figure on a separate page. This is done because, if the article is accepted for publication, one department of the printing company will print these pages, and the text will be typeset by another. (In management reports, tables, graphs, and other displays are included in the text unless they are too large, in which case they should be placed on separate pages.)
- Read the authors' guidelines published by each journal. They provide specific rules concerning acceptable writing style, footnote and bibliography formats, number of copies to submit, and so forth. A researcher who fails to follow these guidelines may decrease the chance that his or her report will be accepted for publication—or at least substantially delay the process while alterations are made.
  - Be stylistically consistent concerning tables, charts, graphs, section headings, and so forth. All tables, for example, should follow the same format and should be numbered consecutively.
  - Clearly label all displays with meaningful titles. Each table, graph, chart, or figure caption should accurately describe the material presented and its contribution to the report.
  - Keep language and descriptions as simple as possible by avoiding unnecessary

and overly complex words, phrases, and terms. The goal of scientific writing is to explain findings clearly, simply, and accurately.

- When possible, use the active rather than the passive voice. For example, "The researchers found that . . ." is preferable to "It was found by the researchers that . . . ." Writing in the active voice makes reading more pleasant and also requires fewer words.
- Proofread the manuscript carefully. Even researchers who are meticulous in their scientific approach can make errors in compiling a manuscript. All manuscripts, whether intended for publication or for management review, should be proofread several times to check for accuracy. It is not enough to run a computer spelling or grammar check. There our many errors that spilling checkers will not ketch, as this sentence proves.

Miscellaneous considerations:

- Avoid phrases or references that could be interpreted as sexist or racist.
- Check all data for accuracy. Even one misplaced digit may affect the results of a study.
- Use acceptable grammar; avoid slang.
- Provide acknowledgments whenever another researcher's work is included in the report.
- Include footnotes to indicate where further information or assistance can be found.

## Business and Government Reports

Guidelines for writing a report for business or government decision makers include the following:

- Provide an executive summary at the beginning of the report. Since decision makers may not read anything else in the report, great care must be taken in constructing this section. Here are some useful hints:
  - Get right to the point and state the conclusions quickly.
  - Keep the language simple and concise. Do not use jargon, clichés, or overly technical terms.
  - Be brief. Keep the summary to a page or two. Anything more ceases to be a summary.
  - Place detailed and complicated discussions of methods in a technical appendix. Summarize the procedures in the body of the report.
  - Use clearly defined and easily understood quantitative analysis techniques. Most decision makers are not familiar with complicated statistical procedures. Keep the basic analysis simple. If advanced statistical procedures must be used, explain in the body of the report what was done and what the results mean. Include another technical appendix that describes the statistical technique in detail.
  - Use graphs and charts wherever appropriate to make numerical findings more understandable and meaningful. Never let tabular material stand alone; to ensure that its importance is not overlooked, mention or explain each such item.
- Decision makers like research that answers their questions. Put the conclusions reached by the investigators and, if appropriate, recommendations for action in the last section of the report.

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## About the Authors

**Roger D. Wimmer** (Ph.D. Bowling Green State University) is President/CEO and co-founder of Wimmer-Hudson Research & Development, LLC, a full-service marketing research company located in Denver, Colorado.

**Joseph R. Dominick** (Ph.D. Michigan State University) is a professor in the College of Journalism and Mass Communication at the University of Georgia. He has authored several books and published numerous articles in communication, media, advertising, and research journals.

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