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Conducting Communication Research

In our time and for some centuries to come, for better or for worse, the sciences, physical and social [including communication], will be to an increasing degree the accepted point of reference with respect to which the validity (truth) of all knowledge is gauged.

George A. Lundberg
Can Science Save Us? 1947

"How can you make such a silly claim," Martin protested. "What you are saying is impossible. There is no way that you are going to convince me that you can study human communication 'scientifically.' It just won't work. Communication is far too complex. Besides, people have free will and that means they do not follow regular patterns, like trained seals, in any of their behavior—including communication."

"Well," Hanna replied, "first of all, it depends on what you mean by 'science.' If you think of science only in terms of white coats, laboratories, microscopes, or electronic instruments that go 'bleep,' 'bleep,' 'bleep,' then you are absolutely right. However, if that were the only type of setting in which science can be pursued, you would have to leave out about 75 percent of the fields that are now conducting scientific research. Only a few of today's sciences use that kind of stuff."

"Take astronomy or meteorology," Hanna continued. "You can't get solar systems and galaxies, or warm fronts and hurricanes, into a laboratory—and microscopes would make little sense for studying them. Indeed, in the majority of scientific fields it is not the *place* where investigations are pursued, the *instruments* that are used for various purposes, and certainly not the *clothing* worn by the researchers that defines it as a science."

"You will have to admit, though," Martin countered, "that people really are capricious in their behavior. They can choose whether, when, and how they will communicate, and with whom. Because all that behavior is so random, there is just no way that you can develop any kind of regular 'formulas' or 'laws' that govern communication. After all, that is precisely what they do in the real sciences, like biology, chemistry, and physics. Look at Newton's laws and the atomic table. What do you say to that?"

"I say that they are wonderful examples of how the scientific method paid off long ago in physics and chemistry, and why it is so important to use it now in other fields," Hanna replied. "However, because those traditional sciences have already developed such laws does not mean that parallel discoveries cannot be made in newer areas, such as the study of communication. They will come in time. After all, the use of a scientific approach in studies of communication began only a generation or so ago. The physical and biological sciences got their start centuries earlier."

"Maybe," said Martin, still resisting. "But I still say that communication research just can't be scientific because it studies how people talk and act, and everybody knows that it is impossible to predict human behavior."

"Martin," Hanna sighed, "if you are willing to make the effort, I can show you how the scientific method has already revealed numerous examples of patterned ways in which human beings communicate, and many verified explanations that enable us to predict how people are likely to commu[illegible] great variety of contexts and circumstances."

Like Martin, many people are reluctant to accept the idea that human communication can be studied scientifically. That is understandable, because communication behavior is very complex; it can be difficult to observe; it is not easy to develop explanations that predict with great accuracy how well or in what ways people will communicate. But "difficult" is not the same as "impossible." Further, few would argue that searching for ways to communicate better is *unimportant.* We all know that untold problems arise in society, sometimes bringing suffering and misery, because of inadequate, inaccurate, or inappropriate communication. If human relationships are to be improved, the development of a body of trustworthy knowledge concerning ways to communicate more accurately and effectively is *absolutely essential.* That is precisely why it is important to conduct research on the process and effects of human communication.

The use of a scientific approach to understanding human communication began decades ago. In fact, great strides have been made in developing *methods of research*

that can be used effectively in this important task. Many of these methods were originally developed for use in the physical sciences (e.g., the experiment). Then they were adapted and used successfully in the basic social sciences, such as psychology and sociology. Other methods originated in the social sciences themselves (e.g., the survey) and were found to be very practical for communication research. Still others have been invented by communication researchers themselves.

But whatever the origins of these methods, researchers who study human communication within the scientific perspective now use a significant number of procedures that, taken together, can be called the "methodology" of communication research. Collectively, they can be thought of as a kind of "tool kit," consisting of logical strategies of observation, techniques of measurement, criteria for assessing the quality and importance of what is observed, and rules for making conclusions known to others. Through the use of that methodology, trustworthy knowledge can be accumulated about how people communicate and what consequences such behavior has for them. This chapter describes some of the main features of communication research methods and provides examples of how studies are conducted when those tools are used.

The Postulates of the Research Perspective

Exactly what is meant by "research"? As our opening vignette suggests, for some people, the term conjures up images of nerds with thick glasses working in laboratories with electronic gadgets and glass tubes that make gurgling sounds. That image, possibly derived from early science-fiction movies, misses the point completely. Research is a *strategy* for studying some aspect or feature of the real world. What is studied may be physical, biological, or a form of human behavior—like communication. Thus, it is not the object of study that defines research but the way one goes about it. Simply stated, **research** (in any field) is *a set of systematic procedures for gathering trustworthy information about some object or process that is studied under controlled conditions of observation in such a way that objective conclusions can be reached with a minimum of error.* For present purposes, the "object or process" studied consists of the various verbal, nonverbal, and contextual features of human communication that have been discussed in all the previous chapters of this book, including their effects on people.

Communication researchers conducting a scientific investigation are committed to three general but essential *assumptions* about the nature of what they are investigating and how they go about it. Broad assumptions of this kind are sometimes called *postulates,* and they apply to all fields that conduct scientific research, not just communication.[1] The term **postulate** means a shared belief of a very fundamental nature—so basic that it is not subject to proof or disproof. If this idea seems esoteric, examining the assumptions listed in the sections that follow will provide ample clarification.

The Assumption of an Orderly Universe

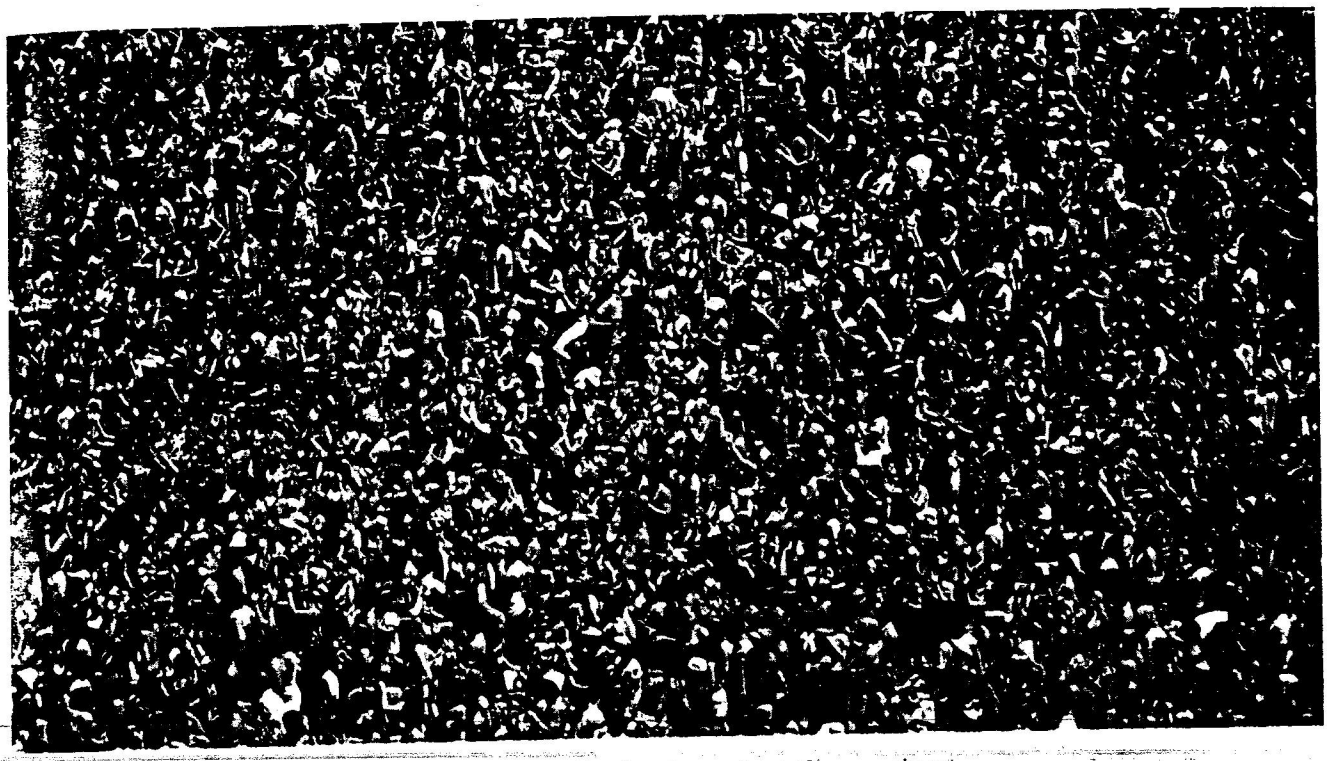
As a foundation postulate, communication researchers using the scientific method must assume that what they are studying follows *regular and discoverable patterns.* The important point here is that it must be assumed there is order in human communication behavior, just as there is in physical or biological phenomena. All scientists subscribe to this postulate; it is a "given" and does not have to be tested or proved.

The importance of making the assumption of an orderly universe is that it provides the beginning point and reason for the existence of science. If one were to reject this assumption, scientific research on any subject matter would be completely unnecessary. For example, in a totally chaotic world of communication behavior, no patterns could possibly be discovered—it would be merely a jumble of random events. That is clearly not the case. Each of our previous chapters has shown that a great deal of order in human communication behavior already has been identified by research.

Research aimed at revealing and describing order—stages, tendencies, configurations, or processes of human communication—is called **descriptive research.** Studies done for this purpose reach conclusions—trustworthy knowledge—that delineate or portray some significant feature of the way in which people relate to each other using verbal, nonverbal, contextual, or mediated communication. The models of the human communication process presented in Chapter 1 are examples of the end product of such research.

The Assumption of Cause-Effect Relationships

A second foundation assumption of the research perspective made by communication researchers is that it is possible to discover, through scientific investigation, *why* events occur. That is, their causes can be uncovered,



At first glance, much human behavior may seem like a jumble of random activity. However, those who conduct research within the scientific perspective assume that there is an order and that cause-effect relationships can be discovered by careful studies in what may appear to be merely chance behavior. While the study of human behavior, such as verbal and nonverbal communication, is one of the younger sciences, it has made significant progress since the beginning of this century.

whether they are dreaded diseases, financial recessions, nuclear reactions, or inaccurate communication between unlike people. To be sure, at any particular time their causes may be poorly understood, or even unknown, but scientists reject the idea that things "just happen" in random ways with no causes at all.

The need to develop explanations of causes and effects points directly to the role of *theory* in the research perspective. **Theories** are the form in which cause-effect relationships are stated. In other words, theories provide *explanations* of how one set of events brings about or influences another. As we will see, they also provide invaluable guides as to *what* needs to be studied in order to gain understanding. Thus, one major goal in communication research is to formulate theories that explain the consequences and influences of communication. A related goal is to test and evaluate those theories to see if they are adequate. We saw examples of theories used as explanations in Chapter 14. Both adoption theory and accumulation theory help in explaining some of the effects of mass communication.

The Assumption of Scientific Integrity

The third foundation assumption of the research perspective is based on what we will call a rule of *experto credite,* which means literally, one can "have confidence in the expert." It is almost the opposite of the rule of *caveat emptor* ("buyer beware") that prevails in so many other fields of human endeavor. The assumption of scientific integrity refers to the confidence that the community of scholars can have in each other's *published reports* of research findings. It is definitely not a matter of blind trust in the personal virtues of researchers as individuals. Indeed, scientists are perhaps the world's greatest skeptics, and they demand the highest standards of proof that prevail in any procedures for assembling trustworthy knowledge. The assumption of *experto credite* rests on three requirements concerning the nature of research reports, plus the skeptical and "self-policing" nature of science. These requirements are that science is *public;* that research reports be rigorously *screened* before publication; and that *secrecy* in research is unacceptable.

The requirement that science is public Scientific skepticism is nowhere more evident than in the requirement that research findings be *published*—spelling out what was under study, the methods used, the findings observed and their implications. To accomplish this requirement, candidate research reports are usually submitted for publication as "articles" in technical journals. Such journals are specialized magazines devoted to reporting research findings and related matters in various fields.[2] An acceptable article must describe in detail how the research was done and exactly why the conclusions were reached. One benefit of this requirement is that it enables other researchers to check the author's conclusions by **replication** of the study, if they care to repeat it, using the same methods and conditions. Findings that cannot be duplicated in this manner are regarded as controversial and under suspicion.

The requirement that research reports be screened Editors of scientific journals receive many candidate reports for publication from researchers in all parts of the world. Each report is then assessed by a panel of "peers," selected by the editor. These are experts in whatever [illegible]. This means that the report is closely scrutinized by highly qualified researchers to detect errors in procedure, or in reaching conclusions from findings. Only if it gets by this demanding review can it be accepted for publication. To protect the integrity of the assessment, this is almost always done "blind." Neither the author of the report nor any of the judges know the names of the others. (Only the editor knows.) Since many journals reject up to 90% or more of the candidates for publication that they receive, this is a pretty rigorous system.

If they survive this screening process, reports on scientific findings and conclusions become *public* knowledge. Those that are published are usually referred to as being in "the literature"—meaning the body of research reports on any particular topic that have previously appeared in reputable journals, dissertations, or other publications. In this manner, a body of trustworthy knowledge accumulates. This accumulative feature keeps the "cutting edge" of science moving forward.[3]

The requirement that secrecy is unacceptable The requirement that research reports be made public eliminates from consideration (as scientific knowledge) "secret" findings of projects conducted by industry, government, advertising agencies, or any other organization that does not publish its reports. If it is conducted with high standards, this type of **proprietary research** can provide a competitive edge to the group that generates it. However, such proprietary studies *may not* be conducted with meticulous attention to scientific procedures and methods. Because they escape scrutiny, proprietary studies may be the work of sloppy researchers, or even outright charlatans. Whatever their quality, they contribute nothing to science as a shared body of knowledge.

One of the positive benefits of all of these "self-policing" features is the belief that prevails in virtually every field of science that published research reports have *scientific integrity.* Thus, the community of scholars need not routinely be concerned with chicanery or falsification of research reports. Such misconduct has happened in some fields, but fortunately it is quite rare. Thus, the rule of *experto credite* is a consequence of the system, and not of naive beliefs that scientists as individuals are uniformly virtuous.

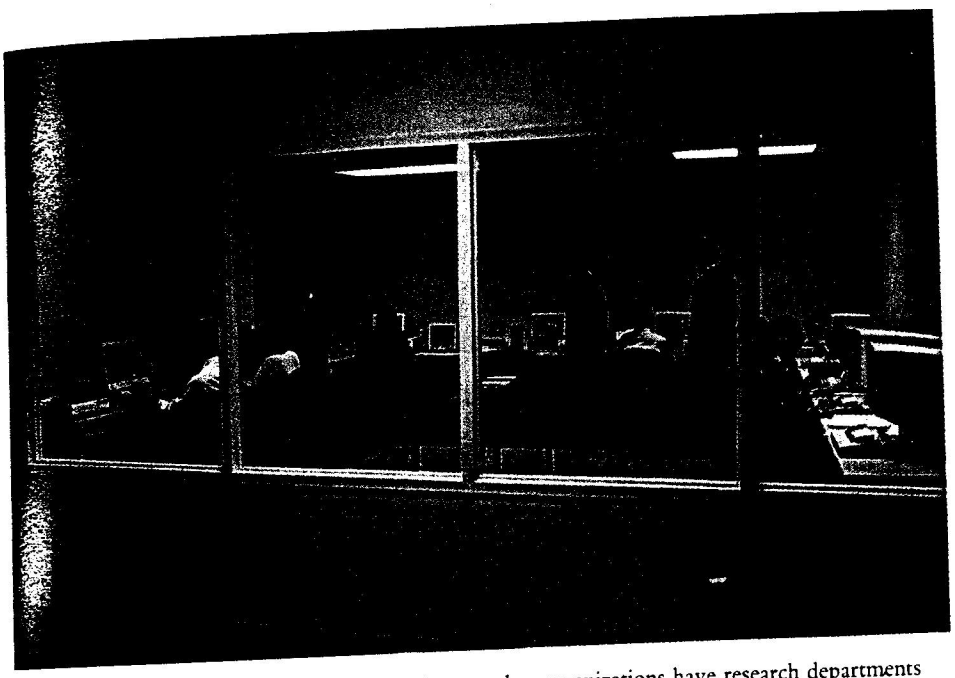
This system for achieving scientific integrity does not mean that there are no inconsistencies or controversies in published research reports on various topics. They are abundant. Honest researchers, diligently using sound methods, often reach different conclusions on the same issues. However, the system described above, based on a reluctance to accept conclusions unless they are consistently supported by a body of research, is the best one yet devised to develop shared, accumulated, and trustworthy knowledge.

General Steps in a Research Project

Communication research is conducted in a systematic way. It is not a matter of making observations randomly and then hoping that some dramatic new knowledge will be uncovered. The six basic steps listed below are followed by researchers in all fields as general guides to their activities as they move through a project from planning what they are going to study to the final step of publishing their results.

Specifying the Goals of the Research

One of the most critical steps in the research process is specifying the goals of the investigation, including exactly what is to be studied and why. First, the problem has to be identified in a general way. Then, each phase



Many large corporations, advertising agencies, or other organizations have research departments that conduct studies to provide information that will give them a competitive edge over their rivals. The findings of such "proprietary" research are seldom made public through publication in refereed journals. There is no way, therefore, for other researchers to judge whether or not the procedures used conform to accepted scientific standards, whether they meet ethical norms, or ... the findings have any relevance to the advancing frontier of knowledge. On that basis, proprietary research is not considered a part of science.

and step has to be stated clearly in a carefully defined plan so that the research can be conducted realistically with the greatest level of precision that resources will allow.

Identifying the relevant variables The first consideration in planning a research project is to understand just what *variables* are to be observed. The term "variable" derives from what we discussed as "concepts" in Chapter 2. It will be recalled from the "meaning triangle" (p. 56) that each concept has a *label* (name) and some set of *meanings* that people experience in response to either the name or whatever it is in reality that is labeled. A simple example would be "age." By convention we use this term to label the number of birthdays an individual has had since she or he was born. "Age," then, is a concept. And, obviously, it can *vary* quantitatively from one individual to another. Thus, age is a "variable concept." Researchers shorten this phrase and say that age is a "variable." Hundreds of other examples could be discussed—gender, income, years of education, average hours spent viewing TV per day, size of vocabulary, and so on.

Where relationships between variables are under study, some are said to be *independent*. Others are called *dependent*. These terms, originally drawn from statistics, can have two different implications. In some cases, variations in **dependent variables** are thought to be due to the presence and influence of **independent variables**. That is, the two variables are in a relationship that implies cause and effect. In other cases, the two merely take larger or smaller values in a coordinated manner with each other in a relationship of correlation, without implications of causation. For example, in a causal way, a variable like "communication apprehension" (p. 340) might influence the level of "social efficacy" (p. 105) of a person in a context that arouses anxiety. On the other hand, such apprehension might be correlated with a person's lack of education—which it could not possibly have "caused." It is very important for the researcher to understand which of these two cases is implied by his or her findings—cause, or correlation only.

Variables are *observed* in a research project. This idea is based on the most ancient definition of science—that it is a means of accumulating knowledge founded on observation—as opposed to traditional wisdom, speculation, religious interpretation, and so on. In a research

project, observation usually consists of some form of measurement—deciding whether a variable is present or absent, or present to some variable degree.

Identifying the general objectives A research project begins with a decision as to its overall goals. If it is simply a *descriptive* study, then the problem is to set forth what must be observed to describe some pattern of communication behavior, such as differences, or some other relationship, between variables. If the research is designed to help develop or test one or more *theories,* then the problem becomes more complex. The researcher has to identify the exact observations that will be needed, how each variable will be measured, what patterns are expected in the results, and just how to make decisions as to whether the findings do or do not support the theory or theories being considered.

Often, a research problem can be formulated in terms of one or more **hypotheses.** These are statements that pose tentative (possible) relationships between variables. Ideally, a hypothesis is derived from a theory that "predicts" what variables should be related to others—that is, if the theory is correct. Assembling careful observations on those variables makes it possible to accept or reject the hypothesis, as long as standard procedures for making such judgments are followed. If the hypothesis can be accepted, then it provides support for the theory from which it was derived. If it must be rejected, then the theory is called into question.

In many research projects, it is difficult to derive hypotheses in this way because there are no well-articulated theories yet formulated. In that case, researchers often turn to the body of evidence that has been accumulated by other researchers about what it is they want to study. Often, that evidence turns out to be less than clear. In such cases the researcher can formulate a "working" hypothesis that indicates what he or she expects to find in the results of the investigation, given the evidence to date.

Reviewing Prior Research Reports

Researchers always review the "literature" to locate reports of other investigators who have already studied the problem on which they plan to focus. This can be very helpful because it is most likely that any problem one can think of has been studied before and *some* knowledge is already available.

In addition to the journals, there are numerous books, monographs, convention papers, and government documents in which research is reported. All of these sources must be scrutinized before plans for a research project are made final. This is no easy task. There are aids that make a "review of the literature" somewhat simpler than trying to sort through all the originals. One is a publication called *Communication Abstracts* in which all of the articles in communication-related journals are carefully abstracted (summarized) each month. This source is available by subscription, or it can be found in most college libraries.

In recent years, procedures have been developed for achieving in a few minutes a review of the literature that formerly could have taken days or even weeks to accomplish. Commercial providers of database services offer electronic duplicates of printed abstracting publications. Such databases can be quickly and efficiently searched with the aid of a desktop computer equipped with a modem. Summaries of virtually all journal articles, books, reports, and monographs are posted promptly into these databases soon after publication. In these sources, all earlier research findings can quickly be located and reviewed. The value of a careful review of the accumulated research reports is that it not only can avoid duplication but also can reveal problems, procedures, conclusions, and areas needing further research that may not otherwise come to the investigator's attention.

Making the Necessary Observations

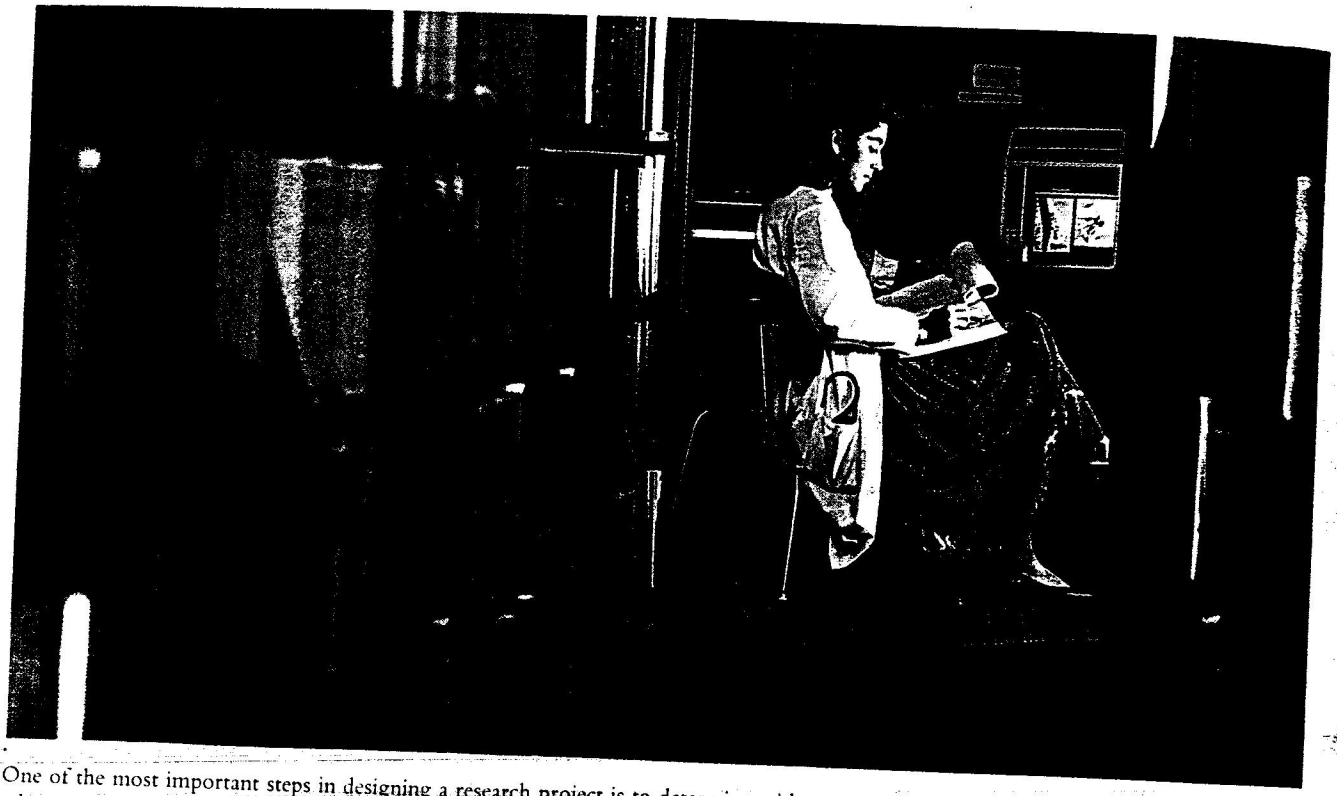
Yogi Berra, the famous baseball player, perhaps said it best when he reportedly remarked, "You can observe a lot by just watching!" Amusing though it is, his analysis actually has a great deal of merit. In scientific research, "watching" is called **empirical observation,** which is most often done visually. More specifically, observation for the purpose of scientific research begins with an investigator's *sensory discriminations*—judgments as to whether certain attributes are present or absent (or present in some numerical amount) in whatever is under study. This means that the researcher *watches* (in one form or another) and makes *judgments* as to how to *classify* what has been observed by deciding where the behavior fits into some set of *qualitative categories* or along some *numerical continuum.* To illustrate, imagine a researcher who is watching a person talking to another in a small-groups experiment. One goal of observing is to decide whether that person has played an "active" or "passive" role as a communicator. On the basis of that discrimination, the judgment is recorded in one or the other of those categories as a *datum.* A series of such observations, properly recorded, are *data.*

Designing a research project begins by specifying the goals that are to be sought. An important step in this process is to identify and define the independent and dependent variables and additional factors that may influence findings. This can be a difficult task, because many types of human communication take place in complex sociocultural situations where it may be difficult to make precise observations. Nevertheless, a variety of research strategies have been developed, ranging from qualitative observation and content analysis to surveys and experiments, to study processes of human communication systematically in virtually any context.

The nature of data The term **data** means "information known as fact." To make something known as fact requires that it be communicated. Therefore, observations that are to become scientific data must be *recorded* as symbols so that other scientists can see and understand what was observed. This can be done with detailed verbal descriptions in the case of subtle qualitative observation. Or it can be done with numbers where quantitative observations are possible with the use of an "instrument."

Transforming internal sensory discriminations into external records can introduce distortion and change, so the procedure has to be designed with care. For example, where the researcher depends on interviewing subjects, a questionnaire of some sort is normally used. It has two purposes: It poses each question to be used in a standardized way so that all subjects or participants are asked the same ones. This, in turn, helps the interviewer to observe each case in a uniform manner. However, such standardization can obscure subtle information that may be important in the life of an individual. For example, suppose the interviewer asks the subject, "Are you single, married, divorced, or widowed?" That seems clear enough. But suppose that a male participant is legally married but has recently separated from his wife. Suppose further that he is now living with another woman and they intend to marry. All of these subtleties and complexities are lost when he answers, "Well, actually I am married." The interviewer then records the discriminatory decision "married" on the form, missing all the rest. In the subsequent analysis, that subject is included in the "married" category, presumably living in a stable manner with his spouse. If several such people are included, the conclusions drawn from the data might be incorrect.

Qualitative versus quantitative observation There is no perfect way to make empirical observations for research purposes. Many techniques and strategies can be used to observe communication behavior, and each has its advantages and limitations. Some scales and questionnaires produce remarkably precise numerical data that can be analyzed by refined statistical techniques—*but at a cost.* Such procedures can be quite insensitive to subtle aspects of communication that may be of critical importance in



One of the most important steps in designing a research project is to determine with great care what previous researchers have discovered about the problem. This step permits the researcher to avoid mistakes made by others, identify ways to measure variables that have worked in the past, and make sure that the project being designed does not merely duplicate efforts of the past. In earlier times this was a time-consuming task because only printed summaries (abstracts) of prior published research reports were available. Today, huge databases of summaries of previous research can be efficiently searched with computers to identify those publications that bear directly on the problem at hand. Once identified, these publications can be obtained in most college or university libraries.

shaping people's behavior. On the other hand, purely qualitative techniques may provide sensitive insights into complex human feelings and values that help shape people's messages and interpretations—again, *at a cost*. They do not produce numerical data that can be easily summarized and subjected to statistical tests. This means that it may not be possible to assess how likely it is that a conclusion reached from purely qualitative observation should be regarded as true or not. This can be a serious shortcoming. However, despite the limitations with either approach, both play an important part in the accumulation of knowledge about human communication.

Awareness of subjects or participants Another choice among modes of observation concerns whether those being observed are to be *aware* or *unaware* of the process. It can make an important difference. An old dictum from physical science is called the "Heisenberg principle." It states that the procedures used in observation often alter the behavior of whatever is being observed. The same is true of human subjects. People who know that they are being observed do not necessarily behave in the same way as those who do not. The old television show "Candid Camera" illustrated the point. People behaved naturally when they were unaware they were being photographed, but when they found out they were, their behavior changed. In research on human beings, the idea is often called the Hawthorne effect. We discussed this in Chapter 7, where subjects in the lighting experiments changed their behavior and became "good subjects" because they wanted to do a good job for their employer.

Reactive versus nonreactive procedures Still another decision concerning which mode of observation to use concerns whether or not gathering the data requires that the participants respond or react in some way to the

observer or to some device or condition imposed by the research. This can make a difference in the results. Taking an IQ test, talking to an interviewer, or performing a task in an experiment are examples of **reactive** procedures. A *nonreactive* observational procedure does not require that subjects modify their activities for the sake of supplying data.

Direct versus indirect observation Choosing to observe the behavior to be studied directly or indirectly is an important decision. In *direct* observation, communication behavior is watched as it is acted out by the subjects. In the case of *unobtrusive* direct observation, the participants do not know that they are being observed. *Indirect* observation is a procedure in which communication activities have to be inferred from information obtained after the fact. This is an important distinction. Direct observation reveals what people actually do here and now. Observations made unobtrusively probably reveal a more accurate account of what people actually do. Indirect observation reconstructs what they probably did, or might do, at some other time.

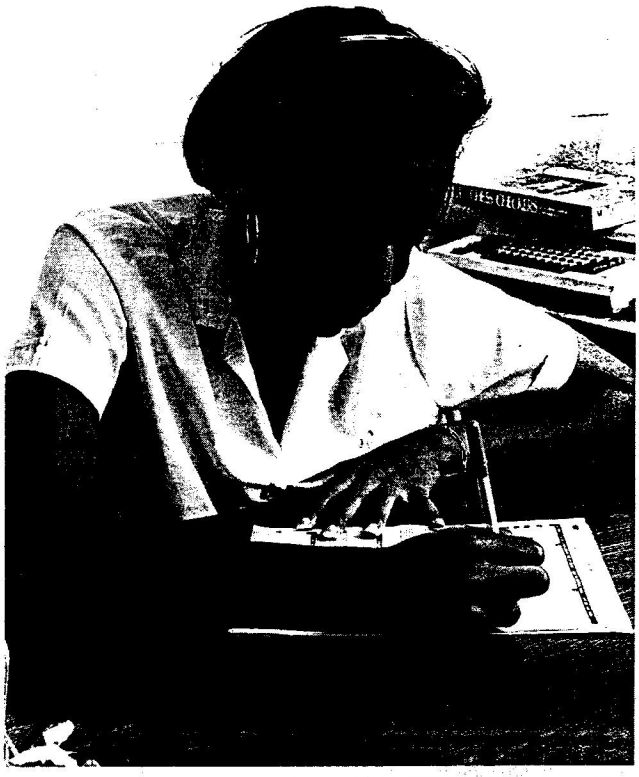
Unobtrusive direct observation is very difficult. Indeed, in most circumstances it is *impossible!* It is not easy to observe people communicating in "natural" settings without them being aware of being watched. They communic[illegible] cook, watch TV, f[illegible] cat, have sex, work, enjoy recreation, and generally carry on their daily routines. Few families would welcome a communication researcher, or anyone else, skulking around in their kitchens, bathrooms, and bedrooms recording what they say to each other.

So, until someone invents a way that a communication researcher can become like the famous "invisible man" of fiction, there is no way that ideal conditions of observation can be met. Even if some magic potion could be found to make an observer completely undetectable, it would be outrageously unethical to invade people's privacy to observe them without their knowledge and consent.

Perhaps the closest researchers can come to such an unobtrusive strategy is through **participant observation.** In some ways this does make the observer "invisible"—at least in a certain sense.[4] In its classic form, the investigator joins the group that is under study and participates fully in its activities so as to observe its communication patterns directly. The group does not know that the person is a researcher. There are many variations on this strategy; however, in some versions the role of the observer-member is made known to the members.

Participant observation is a difficult and time-consuming mode of observation because the researcher must learn the special language, norms, roles, and life style of those being observed. For example, one might wish to study communication processes among inmates in prison. This would require having oneself committed to a penitentiary (hopefully with a prearranged means of getting back out). If done successfully, the researcher would become "invisible" and be able to make direct observations on the communication behavior of the subjects under study. A minor problem here would be that if his or her cover were blown, and the convicts identified the person as a "spy," "rat fink," or "snitch," the investigator might be killed.

The participant observation strategy has the additional limitation that it is difficult to make accurate rec-



Many of the measuring procedures used in research on human behavior are "reactive." That is, they require that the person being studied fill out a questionnaire or otherwise react to a condition or situation imposed by the researcher. This can pose problems if participants in the research feel that they ought to respond in a way that the researcher expects, in socially acceptable ways, or in some other manner that misrepresents their actual behavior, beliefs, or feelings. The tendency for the research procedures themselves to alter the way people behave is sometimes called the "Hawthorne effect." If such an effect is possible, results must be interpreted with caution.

ords of the behavior under study while it is occurring. People tend to become suspicious of a person who constantly photographs or makes notes on the activities of other members of their group. Thus, data must be recorded in private. There is always the problem of inaccurate recall or even discovery. Hidden tape recorders, video cameras, and the like, are cumbersome and pose potential dangers.

Because direct and undetectable observation in a pure sense is all but impossible, various alternative and "indirect" strategies for observing people's communication behavior have been invented. The most important are the *experiment* in its several forms, the *sample survey,* and *content analysis.* Each of these will be discussed at length later in this chapter.

Data Processing, Entry, and Analysis

Data have little meaning in themselves. They must be processed in various ways before they can be analyzed to determine what conclusions they may imply. Data processing and data analysis are two distinct steps, and each can take many forms. In quantitative research, **data processing** generally refers to transforming the recorded observations from a questionnaire, laboratory record, or content analysis into numerical form. Since computers are so widely used today, data processing often implies getting research findings ready to be accepted into computer memory. **Data entry** follows when the processed information is fed into the computer. Both data processing and data entry can be laborious procedures. They are still done mainly by human beings making decisions, one after the other, regarding each specific observation made on every subject. The next step, **data analysis,** usually refers to subjecting the processed observations to a variety of statistical tests, with a computer doing the drudgery of extensive calculation.

A number of points can be made about all of these procedures. First, not all communication researchers use a quantitative approach with computers and statistics to determine what they have found in a research project. If a participant observation strategy, or some other form of qualitative data gathering, has been used, the findings do not consist of a mass of numbers to be manipulated. Many sensitive and significant studies have been completed by communication researchers using qualitative observational strategies to study very complex problems.

Where computers and statistics *are* used, extensive planning is always completed before the research is undertaken. It is at the beginning, rather than after the data have been obtained, that the complete plan for data processing, entry, and analysis is developed. The reason for this is that computers are *incredibly stupid!* All they can do is blindly follow orders, like the mechanical robots that they are. They cannot create, imagine, advise, suspect, hypothesize, or conclude anything. They are unbelievably good at storing bits of information, such as numbers or letters converted to numbers. Their memories can take in astronomical amounts of such information. Then, if given the right instructions, they can add, subtract, divide, and multiply long lists of numbers in a wink of an eye. Before you can catch your breath, computers can manipulate masses of numbers through complex mathematical formulas, printing out the final answers in neat reports, but they cannot interpret what all this information means.

Whatever the topic of the research, when the analysis is complete, the researcher has reduced large numbers of observations to indexes, coefficients, averages, or other convenient quantitative summaries. Findings of a qualitative nature usually are set forth in more lengthy descriptive reports with verbal summaries provided at the end.

Reaching Conclusions

The "bottom line" in research is the set of conclusions and interpretations that the data imply. However, moving from the data analysis to interpreting what they mean is done with great care. Often, various kinds of criteria are invoked to make sure that unwarranted conclusions are not reached.

Descriptive generalizations In descriptive research, whatever the goals and strategies used in a study, its conclusions are likely to be stated in the form of **generalizations.** These are accurate statements that communicate in precise language what was found with respect to the regularities or patterning among variables under study. Generalizations do not indicate what was found with respect to every specific case or subject under analysis. As the name implies, they focus on what was "generally" the case in the observations—they describe what tendencies, trends, relationships, or differences between categories of subjects seemed to thread through the findings.

Many generalizations apply only to the particular people or situations that have been involved in the study. However, as we noted earlier, an important assumption

of the research perspective is that there is *order* in the universe. In some cases, the investigator may feel that what was found in his or her particular study is an accurate description of what exists among all similar people and situations. In such a case, the generalization may extend beyond the data. There is ever the danger of **overgeneralizing**—extending the implications of the results too far by claiming that conclusions found to characterize the kinds of subjects observed also apply to categories of people who were not actually studied.

If a research project has as its goal the testing of a specific hypothesis, the conclusions must indicate whether or not that hypothesis was *accepted* or *rejected*. This is a much more complex procedure than developing accurate descriptive generalizations. We saw earlier that a hypothesis is a statement of a tentative or possible relationship between variables formulated when the research is in the planning stage.

Accepting or rejecting hypotheses In testing hypotheses to determine if they can be accepted, statistical procedures are invaluable. We cannot review the nature of statistical analyses in the present chapter. But briefly, they provide information based on probability for making a clear-cut *decision* as to whether the results of a data analysis are likely to have occurred by chance alone, rather than as a result of some cause-effect relationship between variables. If chance seems as good an explanation as any other, the rule is to accept the conclusion that chance has indeed been at work and reject the hypothesis that the findings are due to causal influences. It is a good system, primarily because the standards for accepting a hypothesis are *very conservative*. Thus, the use of statistical reasoning and difficult standards of proof is another example of the skeptical nature of science.

Assessing theoretical implications Reaching conclusions where the goal of the research is theory-testing can be complex because the process has several stages: First, decisions have to be made as to what conclusions are indicated by the findings of the research. If hypotheses derived from the theory were tested, were they accepted or rejected? Then, additional interpretations are needed as to the implications of those outcomes for one or more theories that attempt to explain whatever is being studied. As if this isn't enough, the problem is further compounded by the need to sort out cause and effect—if the variables or conditions set forth in the theories really do produce the suspected consequences or not.

The role of replication We noted earlier the *replication* procedure for reaching reasonably firm conclusions in research. If the same kind of communication behavior is repeatedly studied and the same general conclusions emerge time and time again, then the trustworthiness of the findings is enhanced greatly. This is particularly true when independent investigators have found the same thing. Sometimes in communication research (and other fields as well) a single study is completed with dramatic findings. The conclusions are then taken as the final answers, violating the principle that replication is needed.

A classic example of the importance of replication is a well-known study of fear appeals in persuasion that was completed decades ago. Social psychologists Irving Janis and Seymour Feshbach exposed high school youngsters to slide-illustrated lectures about dental hygiene.[5] In one condition the lectures contained a *strong* fear appeal, with gruesome slides showing terrible mouth conditions caused by poor dental hygiene. A second condition presented similar subjects with a *moderate* fear appeal. Here, the slides showed troublesome but less severe mouth problems. Finally, a third group of subjects received a *minimal* fear appeal—a lecture with slides showing only very minor mouth difficulties caused by poor dental practices. The goal was to see which level of fear produced the greatest personal concern about, and actual change toward, improved dental practices. The results were dramatic: Those subjects who were exposed to the strongest fear messages changed the least! Those who received minimal fear changed the most.

This "topsy turvy" conclusion took on a life of its own and was quoted as gospel in textbook after textbook, even after replication studies found opposite results.[6] In the end, the strange finding was not well supported and it is not now widely accepted as valid.[7]

Reporting the Results

As our earlier discussion made clear, when a research project has been completed it must be reported to other interested scientists. Their assessment of the importance of the findings is in a real sense the ultimate test of its merits and worth. A lone genius working in isolation may solve the communication problems of humankind. But if he or she never makes them public, they do not become part of the accumulated knowledge of science.

Research reports published in journals have a rather standard organization. There are many variations, of course, but most good articles contain the following top-

ics: (1) a statement of the problem under investigation, (2) a summary of what previous researchers have found, (3) a description of the research methods used, (4) a presentation of the findings, and (5) a section on conclusions, implications, and interpretations.

The literature is of critical value to researchers, but many others make extensive use of its articles, reports, and monographs. Professors who teach in colleges and universities, but who may not conduct research, use such information as sources for their lectures and presentations. In addition, communication research findings are often of great interest to people in business, government, and indeed in many walks of life. After all, communication processes are central to the human condition and touch the lives of us all. While some of the reports generated by communication researchers are written in technical language that can be understood only by other specialists, many can be read and comprehended by laypersons, particularly if they have had a little training. Thus, the literature serves as a rich source, not only for research specialists but also for other users who need to understand some particular aspect of human communication.

Formal Research Designs

A research design is a detailed plan that indicates in a very specific way how each of the preceding steps in the research process will be carried out. Among the designs frequently used by communication researchers are the experiment, survey, field or observational study, and content analysis.

Experiments

The **experiment** had its origins in the physical sciences many centuries ago. It remains the major research strategy of modern physics, chemistry, and biology. However, the idea that experiments are a suitable strategy for observing human behavior came late. It was not until well into the present century that such experiments became common. They were pioneered by social psychologists who brought small groups of subjects into laboratory settings to simulate real-life behavioral processes where they could be studied under highly controlled conditions. After World War II, the small-groups experiment was adopted for research in many other fields related to the social and behavioral sciences, and it has become a standard observational strategy suitable for many forms of communication research.

Some experiments are conducted on small groups in laboratory simulations of communication activities in which people commonly engage. Other experiments, of larger scale, are conducted outside of laboratory settings, using large groups as subjects, even entire communities. In such studies the experimenter manipulates conditions that are experienced by the participants and measures what influence this has on them. Another category is the "quasi" experiment. Here people experience situations in the natural course of events without actual intervention by an experimenter. Observations of how they respond to those events are analyzed within the logical framework of the experiment—just as though they were deliberately manipulated.

The logic of the experiment is straightforward. In its simplest form in communication research it is essentially this: Empirical observations are made on a number of human subjects, some of whom are designated as a "control" group and others as an "experimental" group. The experimental group receives some sort of treatment deliberately introduced by the experimenter. The control group does not receive this treatment but usually undergoes some experience of a neutral nature. The *treatment* applied to the experimental group is some manipulation of an independent variable that is suspected of having an influence on a dependent variable (p. 437). Measures of the dependent variable are made both *before* and *after* the application of the treatment to see if the experimental group shows some change on the dependent factor. If such a change occurs, it can presumably be attributed to the influence of the independent variable involved in the treatment. Since the control group did not receive the treatment, it (logically) should not show any change.

There are dozens of variations. Sometimes there are several independent variables, a number of different kinds of treatments, and elaborate controls. Nevertheless, the underlying logic is basically the same. With extraneous variables eliminated or controlled, the researcher can see if the treatment resulted in some observable consequence. In this sense, the experiment is an enormously effective research design for assessing cause-and-effect relationships.

Communication researchers use both laboratory simulation experiments for the study of small groups under controlled conditions and field experiments for the study of communication processes in more natural settings. There are important differences between the two types.[8]

In conducting quantitative research, processing the data involves two major steps: One is data entry—preparing the numerically symbolized data in a suitable form and then entering it into the working memory of a computer. The second is analyzing the data with the use of suitable software to produce statistical indices. These describe differences between central tendencies and/or other relationships between variables that exist in the body of data. These statistics are interpreted in terms of the probability that they may have occurred by chance. The machine merely does the arithmetic. All decisions about the meaning of the statistics, conclusions, implications, and inferences are made by the researcher.

Small-group experiments The "small groups" laboratory simulation experiment can be used for a variety of research purposes. The laboratories used are rooms where small numbers of subjects can engage in various forms of communication behavior and be carefully observed by investigators. Such labs are often equipped with elaborate technical apparatus for presenting various independent variables to subjects and measuring dependent variables. Often, the labs are equipped with one-way vision screens, and direct observation is possible without the subjects being aware of it.

In such experiments the investigator tries to create a miniature version of some important communication process and study it within a tight system of controls. For example, beginning in the 1960s, a substantial number of experiments have been conducted on the process of decision-making in juries. Such studies have been conducted not only in the United States but also in England, Australia, Nigeria, and other countries where the jury system is in use.[9] The laboratory experiment is one of the few ways in which empirical evidence can be accumulated on this important practical problem since it is neither ethical nor legally permissable to observe juries actually deliberating real cases.

Jury deliberations are recreated in simulation in the laboratory by selecting various kinds of participants and instructing them that they are to act "as though" they were a jury. The mock jury is usually shown a summary of a legal case via videotape, film, or some other medium and asked to render a verdict after suitable discussion. By selecting subjects with specific characteristics, or by presenting different versions of a trial, a considerable amount of control can be exercised over the situation. A host of independent and dependent variables that can influence jury deliberations have been studied with this experimental strategy.[10]

One of the limitations of experimental simulations is that even though they do provide for a great amount of control over the variables under study, they are by no means natural settings for studying communication behavior. Many impose **demand characteristics**—activities the subjects must perform, or other conditions they experience, that can potentially produce influences other than those brought about by the independent variables. These can be troublesome because the researcher may not suspect their influence. Moreover, subjects in an experiment may suspect that they are serving as "guinea pigs" in some sort of contrived situation and misbehave deliberately. In many cases, they become convinced that some form of behavior is "expected" of them. They may either comply with the perceived demands or deliberately resist them. Even if deception is used to prevent the subjects from guessing the true nature of the research goals, biases may be introduced. There can be no assurance that the communication behavior being observed is identical to what would be found by our hypothetical invisible observer in a completely natural setting.

Large-scale experiments in natural settings Another type of experimental design, and one that has fewer problems concerning simulation versus real life, is the large-scale **field experiment.** In this research design, the subjects to be treated and observed are people living in a community, working in a factory, going to school, or carrying on their normal activities in some other natural setting. The control group is a similar community, factory, school, or the like, that does not get the treatment. While this tends to avoid the issue of simulation, problems of measurement and control in a field experiment can be very difficult.

An interesting example of a large-scale field experiment was conducted by mass communication researchers Sandra Ball-Rokeach, Milton Rokeach, and Joel Grube.[11] In overview, the design was this: Two communities in Washington State (Tri-Cities and Yakima) were designated as Experimental City and Control City, respectively. The investigators used a survey approach for "before" and "after" measurements of selected attitudes and values of a sample of residents in each community concerning a number of topics. Then, a special 30-minute television show was presented in Experimental City that included persuasive messages aimed at changing viewers' attitudes and values—and persuading them to make certain charitable donations. Viewing the program was the experimental treatment. Thus, the study used the logic of the experiment—a before and after measure, an experimental and control group, and a treatment. The differences between the two groups regarding attitude or value change, and the amount of money donated, showed the influence of the treatment.

Quasi-experiments This research design is difficult to use because it depends on something happening to which the *logic* of the experiment can be applied without actual intervention by the researcher. To illustrate, suppose that you want to do research on how people communicate after a large-scale natural disaster strikes. That is, with media not functioning, on what communication networks do survivors rely to get medical attention, find loved ones, seek shelter, obtain food, and try to understand what happened?

Obviously, there is no way you can "intervene" and cause a flood, an earthquake, or a volcanic eruption. But, as we know, such natural events do occur from time to time. If you are in an area where such a disaster does strike, you could organize a research effort to interview survivors and record their accounts of how they communicated, with whom, and so on. Fairly elaborate data could be gathered in this way, using questionnaires, possibly supplemented with in-depth interviews for more qualitative assessment of what happened.

At this point, however, you would merely have interesting descriptions of what people did *after* the disaster. You do not have any way of comparing your findings with what they did *before,* so as to really assess the differences. To turn your descriptive study into a **quasi-experiment** you now have to take additional steps: First, you have to identify a community or an area that is *very like* the one in which the disaster occurred—but one in which no such event took place. This can serve as a control group. You can interview people in that area who are like the survivors (in a sampling sense) whom you questioned. It is reasonable to assume that they will behave like those in the disaster community before the tragedy struck.

By looking at your project in this way, you have before and after data to compare, almost like the earthquake had been arranged for that purpose. The example shows how the logic of the experiment can sometimes be applied in an *ex post facto* sense through the use of a quasi-experimental design. Actually, the study described would have many faults, and more complex quasi-experimental designs are available with better controls.[12]

Surveys

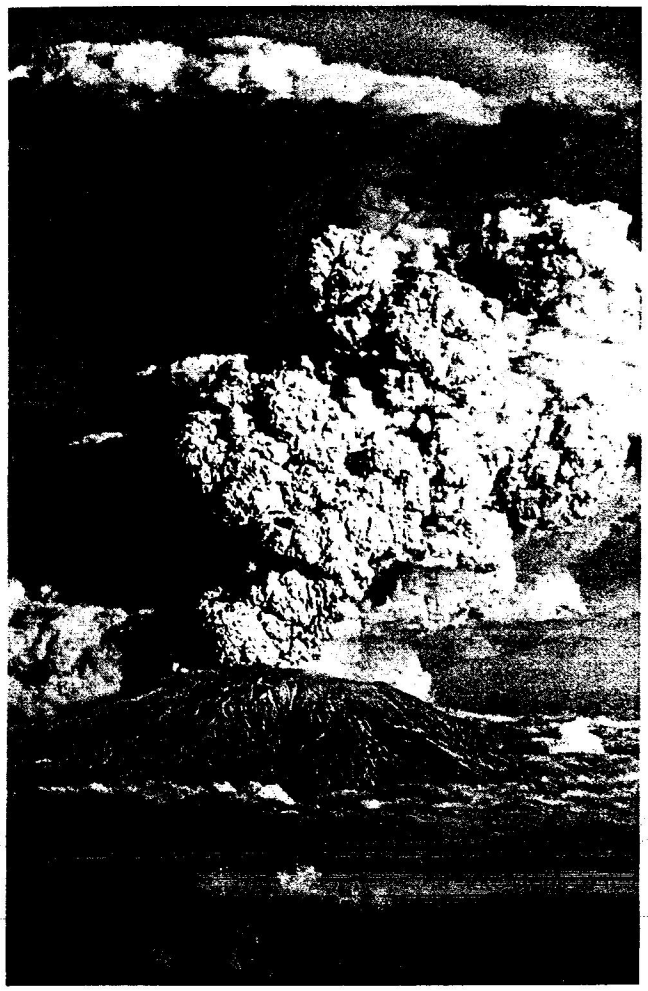
The survey had one of its origins in the *census,* a procedure that goes back to ancient times for counting and assessing attributes of a population. The survey's other roots are in *statistical theory,* especially the concept of sampling, which was well understood even in the 18th century.[13] Essentially it provides ways of selecting a limited and manageable number of people from communities or other populations in such a way that they have the same distribution of personal and social characteristics as the population itself. Then, that limited number can be contacted and asked questions.

The sample survey has found application in many kinds of research related to communication. These include public opinion polling, election trends, response to persuasive techniques, personality assessments, and a variety of other topics. It remains as one of the central strategies used by researchers for investigating communication behavior where the purpose includes uncovering relationships between independent and dependent variables among relatively large populations that cannot be observed in other ways.

As in any kind of investigation, the initial steps in conducting a survey are to make certain that the purposes of the study are entirely clear, that the independent and dependent variables have been fully identified, and that decisions have been made concerning procedures for analyzing the results and reaching conclusions. Once these have been achieved, a combination of additional steps are taken. These include: (1) using a procedure for picking the specific people who are to be studied, (2) contacting those selected and getting them to cooperate, and (3) extracting the relevant information from them and recording it as data.

Selecting representative samples Sampling is a procedure for picking from a **population** (usually a very large number of people with clearly defined characteristics) an adequate and manageable smaller number who on average are like those in the larger group. This smaller number can then be contacted and observed. A population, for research purposes, is all the people about whom generalizations are to be made from the results of the survey. Obviously, it is not possible to study every member of a large population, given the resources of most researchers. For example, the residents of a small city of 25,000 people would pose a formidable task if each one had to be contacted personally. Even contacting a few thousand who work for a large corporation could take years. Fortunately, researchers discovered many years ago that careful study of a small part of such a population can yield results nearly identical to those obtained from observing all members. For example, public opinion pollsters and market researchers (all of whom use the survey design) now know that a meticulous study of 1,200 to 1,500 people selected with great care from the entire U.S. population can reveal the basic patterns of behavior and belief that characterize the entire nation! Doubling or tripling the number of people studied might make the results a bit more trustworthy, but it certainly would not double or triple their accuracy.

The key to obtaining accurate results from the study of a relatively small number of subjects, rather than the entire population, is to select them in a particular way so that they are **representative** of the population as a whole. A representative sample is one that has been chosen in such a way that the people included are like those in the entire population in all important respects relevant to the research. Usually this means that on average they are generally of similar age, male/female composition, income level, years of education, religious affiliations, range of political preferences, and so on.



On occasion, nature manipulates conditions in such a way that researchers can make use of the basic logic of the experiment to study people who experience an event while remaining in their natural settings. These are called quasi-experiments. For example, if a natural disaster strikes, it may be possible to study how people's patterns of communication suddenly change. Those in the disaster area can be compared with similar people in areas not afflicted to see how their behavior was altered. It is "as though" the natural event were introduced as an experimental independent variable.

Choosing a representative sample is not easy because the researcher usually doesn't know the exact nature of the personal and social characteristics of the population. Even if they are known, it would be difficult to screen people one-by-one so as to pick a small number who accurately represent the population as a whole. One might as well just study everybody. Fortunately, a representative sample can be obtained by using a **random procedure** to select people to study, even if the charac-

teristics of the population are not fully known. To do this, the researcher makes use of the same *laws of probability* that make games of chance, like poker, roulette, and dice, so much fun.

There are many different random procedures for selecting samples that are likely to be representative. All are supposed to ensure that only *chance* factors dictate the specific individuals who are selected. A completely random sample is one in which every person in the population has an *identical* chance of being selected. This can be accomplished in several ways. The simplest to understand is the classic (but not practical) idea of using slips of paper and a big rotating drum. First, a small slip of paper is placed in the drum for every member of the population, with one person's name on each slip. Then the drum is closed and turned over and over until all the slips are thoroughly mixed. Finally, the sample is drawn out one slip at a time until the number wanted has been obtained. While the slip and drum procedure illustrates the idea, the mechanics are very cumbersome and it has not been used for decades. Today, many alternate computer-based procedures can accomplish the task.[14]

A purely random and totally representative sample is more of an ideal than a reality in actual practice. It is a model that one works toward, like the concept of a perfect score on the SAT, a flawless performance by an athlete, or a straight-A record through 4 years of college. Such events are rare in real life. The same can be said about the samples used in actual research. Researchers do the best they can, and some departure from ideal models is tolerated—but not too much!

In some cases, excellent samples can be obtained if it is possible to construct a good **sampling frame,** a true and current list of every person who is in the population under study. Then random selection is rather easy. Each name can be given a number, and a computer can select randomly those numbers to be included in the sample. Far more frequently, the population about which information is needed may be all but impossible to identify in full, and complex procedures must be used to approximate a random sample.

Face-to-face interviewing Once the people who make up the sample have been identified, they must be contacted. This sounds simple enough, but the question is *how?* One answer is to go to the address of each and conduct a face-to-face interview. This ensures that those selected are actually those studied. Also, a lot of information can be obtained in an interview.

The interview as an observational strategy has advantages and disadvantages. For one thing, it is expensive. Interviewers have to be recruited and trained; they have to travel to where the subjects live; they want to earn salaries; and they might just cut a few corners if not supervised. On the other hand, people like to be interviewed and have their views known. Also, when interviewed, they tend not to lie or conceal information excessively, although some people will refuse to cooperate. There is also the problem of those "not at home." It becomes prohibitively expensive to return many times trying to catch a missing survey subject.

The interview is clearly reactive. That is, the subjects know that they are being studied and this may change what they claim. In addition, interviews often probe recollections of past behavior, which they may or may not recall accurately. The interaction between interviewer and subject may also have an influence on the answers that are obtained. For example, a subject who is asked a question about her or his annual income by an attractive member of the opposite sex may exaggerate in an effort to impress the interviewer.

Nevertheless, the procedure is the observational strategy of choice for surveys, if resources permit. Researchers who use interviewing techniques are completely aware of their potential problems and take steps to minimize errors.

Interviewing subjects by telephone If it is impractical to interview a sample of subjects face-to-face, there is always the telephone. Many surveys are conducted in this manner, but the quality of the results is always a question. Not everyone has a telephone, and a sample drawn from a telephone book cannot truly represent the entire population in an area. Furthermore, it is not always clear who is being interviewed. If the subjects are supposed to be female heads of households, is it actually that individual, a grown daughter, or a visiting relative who answers the phone?

Another problem is that many people have unlisted numbers. Some survey researchers use computer programs that select and dial telephone numbers randomly—reaching potential respondents even if their numbers are not listed. A few have even programmed computers to ask the questions! All of this gets a mixed reception. Some subjects find it amusing; others are offended. Some people love to talk on the phone, even to a computer. Others resent the interruption, even by a live interviewer.

While telephone surveys are widely used for many legitimate research purposes, they have gotten a bad rep-

utation in some areas. Many salespersons pitching their wares by telephone begin by claiming that they are conducting a survey. This has resulted in wariness, a loss of credibility, and frequent unwillingness by respondents to cooperate in legitimate research.

Contacting subjects by mail A survey technique that can potentially limit costs and get around many other problems is to let Uncle Sam do the walking. In other words, the subject can be sent a questionnaire by mail with an appeal to fill it out and send it back. It is a lot cheaper per subject than face-to-face interviews, and the subject can complete it at his or her own convenience. On the other hand, many problems can arise. Maybe the people in the sample will cooperate and maybe they won't. The proportion of a sample who voluntarily return a questionnaire sent in the mail can be hopelessly low. What if only half send it back after repeated appeals? Perhaps they are quite different than the others who did not. There are no real ways of knowing. Any loss, and especially an exceptionally low return, reduces the confidence one can have in the final results of a mail survey.

Using questionnaires Most surveys—whether conducted by face-to-face interviews, over the phone, or by mail—use a formal and highly structured *questionnaire.* These are the familiar printed lists of questions in response to which participants select their answers from categories provided on the form. They vary in flexibility; some are even open-ended and allow the person being interviewed to give more elaborate answers.

The structured questionnaire has advantages and disadvantages. Critics of survey methods maintain that with the use of a highly structured questionnaire, participants are led lock-step through a series of rigidly posed questions and their answers are reduced to categories and boxes, preconceived by the researcher, that are checked during the interview. As a result, the critics charge, the participants' more subtle meanings, feelings, and perceptions are either lost or distorted. Defenders of such methods maintain that this is an efficient way in which to transform observations to data, and it makes it easy to perform numerical computer analyses. Obviously, there is much to be said on either side.

Field Observational Studies

Sometimes referred to as **field research,** this type of design for qualitative investigation is much less formal than the experiment or the survey. Field observational studies were pioneered by cultural anthropologists in their ethnographic research among inhabitants of indigenous societies during the early 20th century. They went to live among people in remote parts of the world, often learned their language, and spent long periods of time understanding the subtleties of their cultures. Field research remains an important design for making observations under conditions where experiments or surveys would be completely inappropriate. Today, communication researchers are more likely to employ this approach to study various kinds of contemporary specialized cultures or sensitive social situations in urban societies, rather than people in faraway places.

The central observational strategy of the field study is participant observation. As was indicated previously, this means that the investigator enters and becomes a member of—or at least is accepted by—some group. The first problem is to gain *rapport* with the other group members, which means gaining their trust so that there is full disclosure of the meaning of what is going on. After this, the researcher seeks *intimate familiarity* with the communication patterns under study. This implies that an understanding is obtained of all the communication strategies, tactics, assumptions, and meanings that the members use as they deal with whatever confronts them. If such a strategy is successful, investigators can prepare detailed descriptions as to how the members communicate and even think about situations confronting them.

Field studies based on participant observation can be difficult. There is so much going on that singling out what should be recorded as data can become a problem. Nevertheless, systematic procedures are used for recording notes on conversations and other communication episodes that can be used later to reconstruct and identify significant features and patterns in the process. In an effective field-study report, the conclusions take the form of *disciplined abstractions,* which summarize typical patterns of verbal and nonverbal communication and related action that are central parts of the process under study.

A fascinating example of the use of the field observational study design focused on instruction in the college classroom. Communication researcher Ann Darling studied ways that college students signal to professors that they fail to understand something in class. She sat in on and observed three different undergraduate classes for an entire academic quarter. She was introduced to the students as a researcher studying classroom interaction. At first, students were very aware of her presence, and this inhibited their behavior. However, within 2 weeks they were ignoring her. Darling then began to observe,

In using the survey as a research strategy, the most effective way of making observations is within the framework of a direct face-to-face interview (as opposed to contacting participants by phone or by mail). Often, a well-constructed questionnaire can be used to make the process of questioning and gathering the answers of respondents more uniform. Various kinds of sample designs have the goal of ensuring that every member of the group or population under study has an equal chance of being selected. However, in market research and other proprietary studies, "quota" samples are often used, with participants selected from among available people on the basis of specific and visible characteristics.

code, and record all failures to understand—every time a student signaled "noncomprehension." By the end of the quarter she had compiled an extensive body of data. Thus, by observing participants in a natural environment, and not imposing interactive measures, this researcher was able to describe accurately how students signal problems when they don't or can't understand the instructor.[15]

Content Analysis Procedures

Content analysis has its roots in World War II. Allied intelligence units routinely monitored the broadcasts of radio stations in occupied Europe. They discovered that when the stations stopped playing music that appealed to the local population, and began broadcasting songs that were popular among German soliders, troop movements into the area had taken place.

During the 1950s, communication researchers developed **content analysis designs** for studying virtually any kind of message systematically. Such analyses begin with definitions of "units" that are relevant to the research goals. Such units might be a particular word, a theme, a depiction of some sort of social role, an act of violence, or some other identifiable entity or episode. Once a set of categories defining such units has been developed, an analyst can count the frequency of each. These frequencies can then be subjected to various kinds of calculations and analyses. It is a very useful way for obtaining an objective summary of just what a complex message contains.

An interesting application of the content analysis design is in the study of suicide notes. Researchers have analyzed the themes and other content of hundreds of such messages left behind by people who have taken their own lives. Typically, it has been found that such notes contain advice, instructions, and requests as well as expressions of feelings of hostility, sorrow, and guilt. The themes and expressions in such notes provide important insights into the thoughts and preoccupations of those who are about to commit the final act.[16]

Measuring Variables

Measuring variables, as we have explained, is the process of converting subjective sensory experiences into numerical symbols that can be counted, added, subtracted, multiplied, and divided. Stated more simply, measurement is a process of observing in a numerically ordered manner. It results in data that are *external* to the observer and that can be manipulated in quantitative analyses.

It is not possible to conduct empirical research without measurement in some form. Even the sensitive processes of participant observation result in identifying whether or not there are certain qualities in messages or repetitions of patterns in verbal or nonverbal communication, thought, meaning, or related action. At the simplest level, then, measurement may be little more than deciding whether some quality is *present* or *absent* (sym-

bolized as a 1 or a 0) in a particular instance under observation. At the most complex level it may involve the use of sophisticated scales, tests, and indices designed to assess numerical differences among people in their personal or social characteristics. In any case, measurement in some form is at the heart of almost any investigation of human communication regardless of the goals of the research, the designs within which it is conducted, or the specific features of communication under study.

Two general features of measurement can help place a particular assessment in perspective. These are what research specialists refer to as the *level* of measurement and the general *quality* of the resulting data in terms of whether they are really trustworthy.

Levels of Measurement

There are four distinct forms or levels of **measurement.** The first, and simplest, is *nominal* measurement. The second is *ordinal* measurement, which is simply a ranking procedure. The third, a somewhat more complex form, is *interval* measurement. Finally, *ratio* measurement is the most sophisticated level—although it seems very simple because it is so familiar to us. The figure on p. 452 shows in graphic form the basic differences between these four levels of measurement.

Nominal measures This elementary form of measurement is widely used in communication research for classifying people into meaningful categories that permit study of their similarities or differences. Examples are religious preference, political affiliation, rural versus urban residence, the employed versus the unemployed, and so on through a host of possibilities. The number in each category can be counted, and simple percentages or other indices can be calculated. Thus, **nominal measurement** is a simple idea but vastly useful.

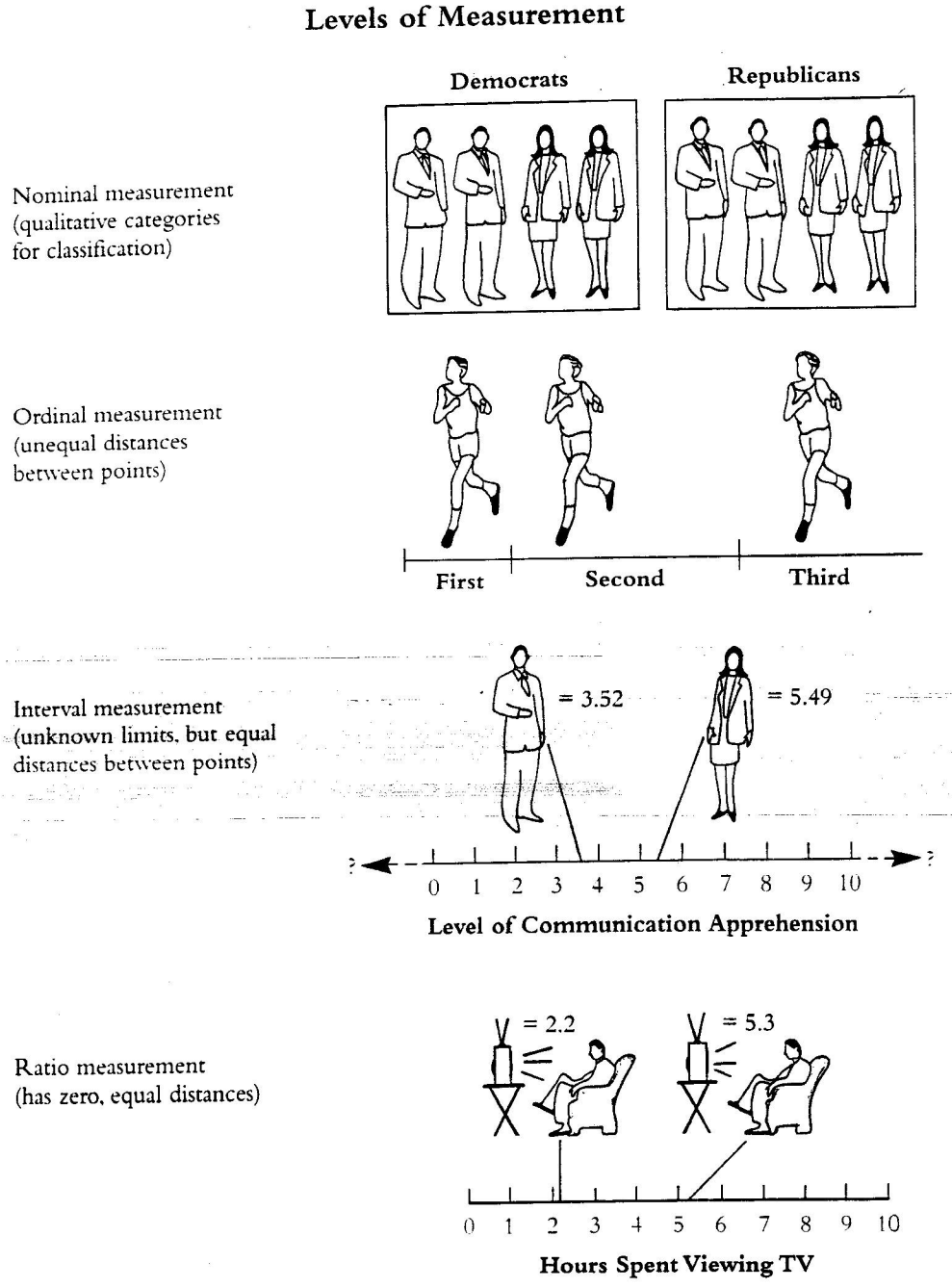
Ordinal measures In **ordinal measurement,** each person, or whatever is being observed, often has "more" or "less" of some quality or attribute than others in the same category. This permits them to be arranged (i.e., ranked) from "first" to "last" or "most" to "least" with respect to the observable quality. This was not the case in the nominal measurement example above. There, the people being studied were placed in a particular category because they had an observable attribute (were Republicans, Democrats, senders, receivers, or whatever).

Ordinal data have a limitation: Rank positions cannot be added or subtracted. How much of a true *numerical* difference would there be between a pair of people who were ranked third and fourth in a group of subjects in terms of their levels of communication apprehension? Would that numerical difference be identical with a pair that was ranked seventh and eighth? It is impossible to say. It is like a horse race, in which the animals win, place, or show. But the distances in feet or yards between those positions can vary greatly from one race to another. Thus, mathematically speaking, ranked (ordinal) positions cannot be added, averaged, or otherwise manipulated numerically. Despite this limitation, ordinal data can provide valuable information on the *relative* position, high, low, or somewhere in between, of subjects with respect to any variable being assessed.

Interval measures At a more sophisticated level, interval measurement does provide numbers that can be added and subtracted, even though there are limitations to how they can be numerically manipulated. **Interval measurement** is based on the idea of a regular *scale* or continuum, with equal divisions into numerical units. Subjects can be observed to see "how much" of a variable they have and then assigned a particular point on the scale corresponding to that number. An example would be a person being judged in a debate tournament. Each of five judges might assign from 1 to 10 points to the person's performance. Then these would be averaged over all the judges. This would give a clear numerical value along the 1 to 10 scale. If the average were something like 7.3, that debater would be placed at that particular point on the scale. It is a familiar idea, and we use systems like this for many kinds of measurement purposes. In communication research many of the questionnaires, such as those presented in various chapters of this book, provide interval measurement.

The only limitation on the numbers yielded by interval scales is that they lack a true zero point. Thus, even if a judge assigned a zero rating to a debating contestant, it would not mean that the person had absolutely no debating talent. That individual would have to be totally tongue-tied and incapable of any kind of presentation for that to be real. Numerical arrays that lack a true zero origin should not be used in mathematical operations involving division.

Ratio measures Although this is the most sophisticated level of measurement, it seems the simplest because it is very familiar. In **ratio measurement,** the continuum or scale actually begins with a zero point (e.g., annual income or age). In addition, the distances between any



two numbers are the same as between any other two—unlike the win, place, or show situation of the ordinal scale. Therefore, ratio measures can be used in any form of numerical manipulation. Ratio measures are so widely used in communication research that they are found in virtually any study. Examples of variables measured at this level are age, income, years of formal education, number of hours of TV viewing daily, and so on.

Judging the Quality of Measurement

Whatever the level of measurement used in a research project, problems creep in. Measurement in communication research—or any other field—is never perfect. Two basic questions concerning the quality of observations always need to be asked: The first is the question of *validity*, and the second concerns *reliability*. These two

A widely known method of contacting respondents in surveys is by telephone. This can be effective, and telephone contacts of subjects are used by many large research services. However, there are significant limitations to telephone surveys: Not everyone has a phone. Many who do, have answering machines and will not respond to a survey. Some numbers are unlisted. People who do not live at the residence with the phone sometimes answer. Children may answer the phone and prevent the survey team from reaching the desired respondent. Nevertheless, telephone surveys of samples are financially efficient and yield data that can be used for many purposes.

terms may sound like much the same thing, but there are important differences.

Validity A major concern about any procedure for measurement is whether or not it actually measures the variable for which it has been designed. For example, let us assume that an experimenter is studying the hypothesis that the *prestige* of a subject in the community in which that person lives will have an important influence on how the individual communicates within a small-groups experiment. How can such prestige be measured? A complex answer would be that the investigator would have to go to the community and talk to everyone who knew him or her (and the other participants in the study as well). Then, some average assessment or ranking could be obtained on each. Actually, that would be a good way to proceed, but it would be a massive undertaking, involving hundreds of interviews.

Now suppose that the researcher knows accurately the annual *income* of each subject in the experiment. A decision is made to use income as a measure of the prestige of the subject in his or her community. The justification offered is that income is an important aspect of people's level of prestige or social honor in American society. But would this always be a *valid* measure of prestige? The answer is probably not. Some people might have high incomes from socially disapproved sources—prostitution, drug sales, gambling, or occupations or businesses to which people assign limited social honor (e.g., junk dealer or undertaker). Others might have low income but have high social honor, such as an esteemed minister, priest, or rabbi. Thus, a person's income would not be a faithful reflection of that same person's prestige in the community. In other words, the measure could have low **validity.**

Sometimes researchers know the validity of their measures and sometimes they do not. If they do not, it is a shortcoming that reduces the quality of the results. Careful researchers make every effort to assess the validity of their measures and include such information in their research reports.

Communication Questionnaire

We are interested in studying how people relate in their everyday interactions with others. We would appreciate it if you would take a few moments to help us by completing this survey. Your participation in this study is voluntary. Your responses will be kept confidential; and of course, your answers will be anonymous. Thank you very much for your participation!

Please take a few minutes to complete some initial, demographic information before continuing on.

1. What is your age? _____
2. What is your sex? (check one) _____ MALE _____ FEMALE
3. Please indicate your major: _____

Instructions The following statements apply to how various people use humor when relating to others. Indicate the degree to which each of these statements applies to you by noting whether you:

5 strongly agree
4 agree
3 [illegible]
2 disagree
1 strongly disagree

_____ **1.** I regularly tell jokes and funny stories when I am with a group.

_____ **2.** People usually laugh when I tell a joke or story.

_____ **3.** I have no memory for jokes or funny stories.

_____ **4.** I can be funny without having to rehearse a joke.

_____ **5.** Being funny is a natural communication style with me.

_____ **6.** I cannot tell a joke well.

_____ **7.** People seldom ask me to tell stories.

_____ **8.** My friends would say that I am a funny person.

_____ **9.** People don't seem to pay close attention when I tell a joke.

_____ **10.** Even funny jokes seem flat when I tell them.

_____ **11.** I can easily remember jokes and stories.

_____ **12.** People often ask me to tell jokes and stories.

_____ **13.** My friends would not say that I am a funny person.

_____ **14.** I don't tell jokes or stories even when asked to.

_____ **15.** I tell stories and jokes very well.

_____ **16.** Of all the people I know, I'm one of the funniest.

_____ **17.** I use humor to communicate in a variety of situations.

And finally, rank-order, from 1 to 4, how humorous you think the following individuals are—relative to each other. Use 1 as the "funniest" and 4 as "the least funny." Don't hesitate; just rank-order your first impression.

_____ Myself

_____ My best same-sex friend

_____ My best opposite-sex friend

_____ My teacher in this class

Calculating Your Score: Humor Orientation (HO)

1. Add your responses to items 3, 6, 7, 9, 10, 13, and 14 = _____.
2. Add your responses to items 1, 2, 4, 5, 8, 11, 12, 15, 16, and 17 = _____.
3. Complete the following formula:
   HO = 42 − Total from step 1 = _____.
   Then, + Total from step 2. YOUR TOTAL SCORE = _____.

Interpreting Your Score

Possible range of HO scores: 17–85. (If your own final Humor Orientation score does not fall within that range, you made a computational error.)

The average or mean score for the HO is typically 59 or 60. If your score falls below 50 (or below the mean of 60), you are among those who are low in Humor Orientation (not frequently funny and not particularly adept at telling jokes). If your score falls above 70 (or above the mean of 60), you are classified as high in Humor Orientation. HI HO's (HI HO?) use humor a lot and consider themselves able to tell a joke quite well.

Now that you have your Humor Orientation score and know how to interpret it, take a few moments to label each level of measurement indicated on the questionnaire. All four levels of measurement are represented; nominal, ordinal, interval, and ratio. Can you correctly identify and locate each type?

Examine the instructions to the overall questionnaire carefully. What purpose did the reasearchers give for the study? Why was it so vague? If the researcher isn't forthright and doesn't tell you exactly what she/he intends to find out about you, is she/he being deceptive? Just when is deception justified in communication research? Assuming you were part of an actual survey study, what ethical responsibilities do the researchers have after they have collected participants' responses? Why are participants assured of their anonymity and confidentiality? If your teacher asks you to complete a survey of this type in class in order to collect data that she/he can later use to publish, your teacher will also indicate that your participation is totally voluntary. And yet, if you can get extra credit for a grade in the course by completing the survey instrument, just how "voluntary" is it?

Reference

Booth-Butterfield, S., & Booth-Butterfield, M. (1991). Individual differences in the communication of humorous messages. *Southern Communication Journal, 56,* 205–218.

Reliability Another aspect of the quality of measurement in research is its **reliability.** The question here is whether the procedure used for measurement would yield the same results if used repeatedly on the same subjects. Such repeated measurements would be unusual, but if a procedure gives one result today, but a different result tomorrow on the same persons and the same variable, it would not be very useful. Reliability, then, is the degree to which a measurement procedure yields consistent results with the same individuals. It is an important consideration because a measure *must* be highly consistent if it is to be valid. These two features of measurement quality are related in a particular way: A measuring procedure could be totally consistent but always measure incorrectly—like a bathroom scale that consistently reads 5 pounds high. Thus, reliability would be high but validity low.

Finally, we can note that the terms *reliability* and *validity* are also used in a different way to judge certain qualities of a research project as a whole and its findings. The questions are, does the project actually address the questions it is supposed to, and can one extend the generalizations from the sample studied to the relevant population? For example, in an earlier section we discussed the laboratory simulations of jury deliberation. Are such mock jury experiments *really* valid representations of actual jury deliberations? If so, the experiment has **internal validity.** Furthermore, if it is consistently found that the "jurors" almost always found the attractive, young defendant innocent and the old, unattractive one guilty, does this generalization characterize real juries? If so, the conclusion would have **external validity.**

Ethical Issues in Communication Research

Suppose that an enthusiastic researcher wants to understand how real juries work in reaching their decisions. One way to proceed would be to place hidden video cameras in jury rooms and secretly tape the deliberations. Analysis of the communication patterns recorded would provide the data needed. It might be considered a bit devious to do this without telling the jurors or judges in such cases, but the fact is, our society needs to know if there is anything wrong with the legal system. Would not that need justify the deception?

Or assume that in a highly controlled, sophisticated experiment, the research findings did not support the theory that the investigators had developed. This would

be a disappointment. After all, a lot of time, effort, and money goes into such research. Inconclusive results provide little reward in the way of honor or prestige for those who conduct it. It would be easy to throw out some of the cases that do not fit the theory. Perhaps some data could even be invented so that the research findings look impressive. No one would ever know, and where's the harm? In a society where advertisers, politicians, and businesses all make exaggerated claims, would such minor misrepresentation be so bad?

Both of these procedures would violate critical ethical norms governing scientific research and would not be permissible under any circumstances. Communication research is done within the same set of ethical norms that apply to all the social sciences.[17] These norms are particularly important because human beings are the subjects of investigation. One category of scientific concern is for the truth of findings of research. The second focuses on the protection of human subjects from harm—including deception, loss of privacy, and violation of confidentiality.

Truth in Findings

Conducting research is a lot of work, and it takes a great deal of time. It can be very expensive, and often it yields results that are inconsistent with the researcher's own personal hopes or theories. Since the reputations of individual investigators come in large part from publishing important new findings on significant research problems, the temptation is always there to falsify findings to reap the rewards of scientific fame. But there is an iron-bound rule that research findings must be reported honestly, even though faked results might not be detected in the rigid screening we described earlier.

While hoaxes are extremely rare in any area of research, if they do occur they are cruel for several reasons. For one thing, they mislead other investigators who study the same issues in replication research. Naturally, they usually come up with different findings. This confuses everyone. In addition, legitimate evidence consistent with the falsified findings will always be clouded by suspicion. Even more important, the central claim of science—that its data, conclusions, and explanations are the most trustworthy that can be obtained from any source—brings respect and financial support from the public. It is little wonder that scientists are outraged even by rare violations of ethical rules that destroy the integrity of the research process and violate the rule of *experto credite*.

Protection of Subjects

Communication research is usually benign in a physical sense. It does not involve dangerous drugs, surgery, or confinement, as may be the case when animals are used in medical experiments. Nevertheless, there are several ways in which the research process may *harm* human subjects, and professional ethics require their protection. Research projects may be based on *deceptions* that result in unusual stress and anxiety. Investigators may intrude on *privacy* to an unacceptable extent. *Confidentiality* may be violated concerning behavior that has social disapproval with a resulting loss of reputation. Communication researchers are concerned about all of these issues.

Assessing risks versus benefits A very real problem that has no clear solution is the issue of potential risk of harm to people versus probable benefits that may flow to society from a particular research project. Where should the line be drawn? Clearly, research that results in death, injury, or illness is not tolerable under any circumstances, even if important information can be gained from it. The Nazis and the Japanese in World War II conducted "medical" experiments on human beings that were widely condemned. That end of the scale is clear. But what about research that may merely annoy people or cause them embarrassment? If useful findings can be obtained, are such harms acceptable? Again, there are no clear answers to such questions. Every specific project must be carefully evaluated *before* it is conducted by responsible and independent judges who can decide if the risk/benefit ratio is acceptable. In fact, most colleges and universities, and major private or governmental agencies that provide money for research, conduct formal analyses for the protection of human subjects before allowing research to be conducted under their auspices.

Privacy, confidentiality, and deception There are occasions when the disclosure of information gained in a research project may have serious consequences for the people involved. A classic case was sociologist Laud Humphreys's study of male homosexual activity.[18] The initial observations were made in a public restroom located in a park. The researcher observed some 100 men participating in homosexual activities, even serving as a "lookout" on occasion. As the subjects left, the researcher noted the license numbers of their cars. Later, after obtaining their addresses, he appeared at their homes (with a different appearance) posing as an interviewer for

messages transmitted either orally or via various media is still another alternative.

- Whatever the design used, a central problem is measuring the relevant variables. Nominal measurement is essentially placing observations into qualitatively distinct categories with no implication that one is greater or better than another. Ordinal measurement provides a ranked hierarchy of positions for subjects on some specific variable. Interval measurement adds the factor of equal units of distance along an underlying scale defining some quantitative aspect of the variable. Finally, ratio measurement provides for a zero point, for regular intervals, and for unlimited ability to manipulate data according to arithmetic rules.
- Ethical considerations are critical in communication research. An iron-bound rule demands that findings be reported truthfully because the integrity of science rests on the requirement. Other ethical considerations concern the protection of people from harm as they are studied in research. The risks to participants versus the benefits of the research must always be assessed carefully. Deception, invasions of privacy, and loss of confidentiality can place people at risk. Some research results in considerable stress and anxiety. However, most communication research is enjoyable and carries no risk at all.

Key Terms

Content analysis design A research plan in which recorded messages are the subject of the investigation. Various units of analysis are defined, whose occurrences can be identified and counted in the message.

Data Information known as fact. To make something known as fact in science requires that it be communicated. Therefore, observations that are to become scientific data must be *recorded* as symbols so that other scientists can see and understand what was observed.

Data analysis Subjecting data-processed observations to a variety of statistical tests, usually with a computer doing the drudgery of extensive calculation. Other, more qualitative analyses are sometimes performed.

Data entry Placing the numbers or other symbols of data into the memory of a computer.

Data processing Transforming recorded observations from a questionnaire, laboratory record, notes, or content analysis into a numerical form suitable for systematic analysis.

Demand characteristics (of an experiment) Activities that subjects must perform, or conditions they experience, that may produce influences other than those brought about by the independent variables. These can be a problem if the researcher does not suspect their influence.

Dependent variable A variable whose numerical values are influenced by the presence of independent variables.

Descriptive research Research aimed at revealing and describing order—stages, configurations, or processes of human communication.

Empirical observation A term that implies "apprehended by the senses." Thus, observation for the purpose of "data-gathering" in scientific research is based on noting with the senses the presence or absence of certain attributes in what is being studied.

Experiment A design for research in which systematic observations are made on a number of human subjects, some of whom are designated as a "control" group and others as an "experimental" group. The experimental group receives some sort of treatment deliberately introduced by the experimenter. The control group does not receive this but usually undergoes some neutral experience. Measures of the dependent variable are made before and after the treatment to see if only the experimental group has changed. There are many variations.

External validity (of research conclusions) The degree to which the findings of a research project can be extended beyond the sample studied and used to interpret what takes place in a larger population.

Field experiment A large-scale research design in which subjects to be treated and observed are people living in a community, factory, school, or other natural setting. The control group is a similar group that does not get the treatment.

Field observational study (or field research) A type of qualitative research in which the investigator lives, works, or regularly interacts in depth with those being observed. The central observational strategy of participant observation.

Generalization An accurate statement that communicates in precise language what was found with respect to the tendencies, relationships, regularities, or patterning among variables under study.

Hypothesis A statement that poses tentative (possible) relationships between variables. Ideally, hypotheses are derived from theories that "predict" what variables should be related to others in what way if the theory is correct.

Independent variable A variable that exerts influences on others. In a limited sense these are the "causes" that produce consequences (different numerical values) in dependent variables.

Informed consent A requirement that research subjects be apprised fully of the nature of the treatments they will receive in an experiment or other study and that they agree in writing to participate under those conditions.

Internal validity (of a research design) A quality of an experimental or other research design referring to the degree to which it actually represents the "real life" process that is supposedly under study.

Interval measurement Observing in a numerical manner using a procedure identifying that something being observed is not only greater than another but greater by some identifiable numerical amount on a scale in which all intervals between positions are equal.

Measurement A process of observing in a numerically ordered manner—converting subjective sensory experiences into numerical symbols that can be counted or, in some cases, added, subtracted, multiplied, or divided.

Nominal measurement Observing in a numerical manner by "naming" something that is observed and placing it into some qualitatively defined category.

Ordinal measurement Observing in a numerical manner by ranking whatever is being observed into positions, such as "first," "second," and so on.

Overgeneralizing Claiming that generalizations found to prevail among the kinds of subjects observed in an investigation also apply to categories of people who were not actually studied.

Participant observation A strategy of observation in which an investigator joins the group under study and participates fully in its activities to observe its communication patterns. The group may or may not know that the person is a researcher.

Population A statistical term meaning the entire aggregate of whatever is under study in a research project. In communication research, mainly all of the people about whom generalizations are to be made in a study.

Postulate A shared belief of a very fundamental nature—so basic that it is not subject to proof or disproof.

Proprietary research Research conducted by industry, government, advertising agencies, or any other organization in which the findings are kept secret.

Quasi-experiment A research design that incorporates the *logic* of the experiment without actual intervention by the researcher. The treatment is a naturally occurring condition. There are many variations.

Random (sampling) procedure A set of steps for selecting a sample from a population in such a way that each member has an equal probability of being included.

Ratio measurement Observing numerically using a procedure that places each item observed on a scale that has a true zero as well as equal intervals between adjacent pairs of positions along the continuum.

Reactive (observational procedure) One in which subjects must modify their behavior by using some device, questionnaire, or instrument so as to record their actions or reactions. A nonreactive observational procedure does not require that subjects modify their activities for the sake of supplying data.

Reliability (of measurement) A quality of measurement in research referring to whether the procedure used yields the same results if used repeatedly on the same subjects.

Replication Conducting a study again under the same general circumstances and with the same types of subjects to see if the findings of the first investigation prevail in the second.

Representative (sample) One that has been chosen in such a way that the personal and social characteristics of the people included are like those in the entire population in all important respects relevant to the research.

Research A set of procedures for gathering trustworthy information about some object or process that is studied under controlled conditions of observation in such a way that objective conclusions can be reached with a minimum of error.

Sampling A procedure for picking from some population an adequate and manageable smaller number of people who can be contacted and studied, given the researcher's resources.

Sampling frame A true and current list of every person who is in the population from which a sample is to be drawn.

Theory The form in which cause-effect relationships are stated in scientific analysis. Theories provide explanations of how one set of events brings about or influences another.

Validity (of measurement) A quality of a measurement procedure referring to whether or not it actually measures the variable for which it has been designed.

Notes

1. Those who use nonscientific approaches to the analysis or study of human communication have the obligation to set forth *their* postulates, whether they are based on ideological convictions, shared frameworks of moral values, or some set of personal opinions.

2. Most of the several hundred journals in which communication research reports appear are published regularly by a professional organization, a university, a government agency, a foundation, or some other private group. Most are published in the United States and are in English. Articles tend to run from a few pages up to perhaps 20.