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3 What Communication Scientists Do

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THE question this chapter addresses is, What sets communication scientists apart from others who study communication, or indeed from everyone else? It would be hard to live as a human being without developing some expectations—we could even call them implicit theories—about how we and others communicate. Our answer lies in the way communication scientists *think,* more than anything else; so we will review here some key features of thought that are common among communication scientists but rare in everyday life. Many of the principles we will discuss are shared with other social and behavioral sciences, but some are peculiar to communication science and are points of contention between it and other forms of communication study.

BACKGROUND ASSUMPTIONS

The concept of a science of human communication rests upon the optimistic assumption that behavior can be both understood and improved through systematic study. Further, it assumes that improvement must be based upon understanding, which is the primary goal of a science. Like all assumptions, these beliefs are not tested within the science itself. Instead they provide a working point of view, which derives its validity in the long run from the value of the knowledge produced. If we did not believe that we could understand human communication, and so perhaps improve upon it, we would not undertake scientific study with those goals in mind. Still, we know that there are limits beyond which communication is not subject to further understanding or improvement through scientific research.

These limits do not concern us when we are acting in the role of communication scientist. The working assumptions of a scientist are called into question only after the research is done. If it fails to produce the

hoped-for understanding or improvement, we might consider approaching the communication problem through methods other than science (see Farrell, Chapter 4 in this volume).

Besides explanation, basic goals of science include prediction and control. By control we do not mean that communication scientists want to manipulate individuals or institutions for their own purposes; scientific control means that we would know how to produce a phenomenon in which we are interested by setting up the conditions that account for it. Understanding those conditions is the essence of prediction.

Whether the phenomenon we produce has a positive or a negative impact is a question that lies beyond scientific discourse. For example, the ability of physicists to produce atomic reactions has led to both nuclear weapons and nuclear medicine. Theories of communication are used both to sell people cigarettes and to persuade them not to smoke. As citizens we can certainly oppose nuclear weapons or cigarette smoking. That has little to do with our work as scientists, except that our selection of research topics might reflect our personal values. Whether knowledge about nuclear fission or how to market cigarettes should be suppressed "for the good of society" is not a question to take up here. But communication scientists know that our explanations and predictions could be used to produce effects we would not want.

THEORY

Communication scientists think and talk about theory a lot. They work toward development of theory, and they bemoan the fact that there is not more good theory in the field. This raises two basic questions: What is "theory"? And what makes a theory "good"?

We will spend some portion of this chapter describing what theories are and how they can be evaluated. We will also present a way of thinking about communication at four levels of analysis, which we believe can promote more useful theoretical work. This effort is not itself a theory, but a way to integrate many disparate domains of communication inquiry. The world offers an incredible variety of communication phenomena begging for explanation, so there is ample room for the development of communication theories.

What Is a Communication Theory?

This entire book is filled with examples of communication theory. Behind them lies an ongoing debate over the proper approach. We cannot possibly deal with the full variety of positions here. Some advocate rule-governed approaches, in which communication acts would be interpreted as the result of people following certain rules for behavior; research would seek to find out what those rules are (Cushman, 1977). Others hold to a classically scientific law assumption; that is, that there are general laws of human behavior as there are in, say, biology or chemistry, and that research should test predictions from general propositions to see if they hold up (Berger, 1977; Hempel, 1965). Another position is to assume that a general form of theory cuts across all sciences and will be equally applicable to communication, such as the general systems approach (Monge, 1973, 1977). A decade ago this kind of debate occupied an entire issue of *Communication Quarterly* (1977, Vol. 25). These meta-theoretical issues are important because they influence the directions researchers take. But overemphasis on them can discourage researchers from developing *substantive* theories to explain communication.

A useful working definition of a theory is *a set of constructs that are linked together by relational statements that are internally consistent with each other. Constructs* are concepts that are formed inductively by generalizing from particulars. An example is "interpersonal influence," which is a name that has gradually developed to refer to a variety of observations of human activity. Constructs are abstractions; they are given meaning through theoretical definitions. Interpersonal influence may be defined conceptually as a change in one individual that is produced by another individual or a group.

Constructs vary in levels of abstraction. The more abstract they are, the more of a particular domain they cover. Interpersonal influence is more abstract than "salesmanship" but less abstract than "persuasion."

Constructs may also be thought of as theoretical *variables,* which means they may take on different values. The relational statements in theories of communication are about two or more variables. For example, we may theorize that there is more interpersonal influence between people of great "empathy." This is the most common kind of theoretical statement: a prediction that two constructs will *covary* together.

Not all relationships are so simple; in human communication few are. There are a number of types other than the *positive* relationship exemplified by empathy and interpersonal influence. Relationships can also be *inverse* or *negative,* which means that increases in one variable are associated with decreases in another. For example, increases in self-disclosure produce decreases in one's attractiveness. Other, more complex relational statements can be used to link constructs. *Nonlinear* relationships are common in communication. For example, it may be that increases in empathy heighten interpersonal influence up to a certain level, but beyond that make no further improvement; this is called an *asymptotic* function. Or perhaps very high levels of empathy are associated with a decline in interpersonal influence, in which case the

relationship is *curvilinear*. It is very important to know about asymptotic or curvilinear effects in communication so that extensive effort is not put into activity that is useless or counterproductive. For example, in political advertising a candidate can gain support by simply having his name repeated several times—but lose support if it is mentioned so often that people get tired of hearing it (Becker & Doolittle, 1975). It is rarely the case that the more communication, the better.

Most theories have more than two constructs in them, and relationships can become complex. They should, because human communication is quite complex. A three-variable theory may involve an *interaction,* where the relationship between two variables depends upon values of other variables. For example, self-disclosure might be positively related to attractiveness for females, but for males these two variables might be negatively related. In this example, sex, the third variable, determines the relationship between the other two. Again, interactions are the rule rather than the exception in communication. The most defensible answer to many questions about relationships between communication constructs is "It depends."

Theories also contain boundary conditions. Boundary conditions specify the domain of events the theory explains, and what lies outside it. A theory constructed to explain communication in work groups might not apply to family groups. Or a theory about media use based on the middle class might not successfully predict what very wealthy or very poor people do. Boundary conditions can be introduced a priori as part of the theory, but more often they grow out of empirical research findings when it turns out that the theory does not work under some conditions.

Scientific theories are useful to the extent that they can be tested to assess their validity. To test theoretical relationships, it is necessary to measure theoretical variables. The move from the theoretical level to that of empirical research is accomplished by *operationally defining* theoretical constructs. Operational definitions specify how constructs are measured. For example, self-disclosure might be measured by a set of questions asking the person how much she provides others with information about herself. Or alternatively, the researcher might observe people in interactions and keep track of how often they say things about themselves. Finally, one might manipulate self-disclosure by having people interact with a confederate who systematically varies the amount of disclosure. In fact, all three of these ways of operationalizing self-disclosure have been used.

Several important points should be made about operational definitions. First, no one operational definition can possibly capture the full meaning of a theoretical construct. Second, it is difficult to create an operational definition that represents *only* the construct intended. There is always some slippage between constructs and what is done in a specific study. Therefore, multiple operations of a construct are preferable to singular operations. If we operationalize a construct several different ways, and get approximately the same result each way, we have much more confidence that the research represents the construct intended. There have been strong arguments for a multiple operations procedure (Blalock, 1984; Webb, Campbell, Schwartz, & Sechrest, 1966) but it is rarely used in studies of communication. Somewhat the same purpose is served by *replication* of a study, when the second study uses different operational definitions. This presumes, however, that the comparison of the two studies will be made by someone in a *review of the literature;* examples can be found in many chapters of this book, frequently pointing up discrepancies between studies that lead to reformulated theories.

While many theories contain constructs that are not amenable to operationalization ("nominal" constructs), a theory with too many is hard to test. Psychoanalytic theory is an example. A theory that cannot be tested may contain valuable insights, but it is difficult to evaluate. Often in communication research we use operational measures to represent dispositional constructs that may not exist. For example, the notion of "attitude" originated from observing consistencies in behavior, but no one has ever seen an attitude. The term is deeply entrenched in our literature, but the validity of the measures rests upon the success with which they enter into relationships specified in theories.

Once theoretical constructs are operationally defined, we can test specific hypotheses deduced from the more general theory. Since operational definitions never fully represent their theoretical constructs, there is always some degree of doubt about the theoretical significance of a particular hypothesis test. Even when specific hypotheses are supported by research findings, one cannot be confident that the general theoretical proposition tested is fully supported. Replications with different operational definitions under varying conditions are needed. For example, if we postulated a positive relationship between exposure to violent media content and propensity to act aggressively, we would want to test this proposition using a number of measures of the two constructs, as well as a number of people and situations. Corroboration of each specific prediction would increase our confidence in the general proposition. This is not often the case, however. For example, the predicted positive relationship between media violence and aggressiveness is usually found when the operational measure concerns what is actually watched, but not when it concerns the persons's "favorite programs"; it is also more often found in junior high school samples than at other ages (Chaffee, 1971). Communication scientists spend a great deal of effort trying to adjudicate such conflicts between studies. Are they due to faulty operations, or to poorly specified boundary conditions, or is the

theory simply inadequate? These possibilities are discussed in detail by Blalock (1984).

Theories typically contain a number of theoretical relationships, and it is not unusual for some propositions to be better supported than others. Assuming that the lack of empirical support for a proposition is not due to faulty operationalizations or an inappropriate test domain, the theorist may be forced to abandon a theoretical proposition. Because theories are internally consistent systems of propositions, the deletion of one proposition will most probably entail changes in those that remain. Such modifications are commonplace in communication, as in any science. The theories of many of the most venerated names—Galileo, Newton, Einstein—contained errors.

Evaluating Theories

In discussing how communication scientists think about and develop theories, we have also used many of the criteria for evaluating theories. It is time to specify these. The following list of attributes of a good theory is similar to those most communication scientists—who are typically professors—outline for their beginning graduate students. We summarize our own list here to help theory builders (and borrowers) be critical of theory construction efforts they encounter or undertake.

(1) *Explanatory power:* Here we are concerned with the theory's ability to provide plausible explanations for the phenomena it was constructed to explain. Also considered here is the range of phenomena that the theory explains; the greater the range, the more powerful the theory.
(2) *Predictive power:* This criterion assesses theoretical adequacy by measuring the theory's ability to predict events. It is, however, possible for theories to predict but not be able to provide plausible explanations.
(3) *Parsimony:* Simple theories are preferred to more complex ones, assuming that both predict and explain equally well. The complexity of a theory is directly related to the complexity of the reality it seeks to explain.
(4) *Falsifiability:* Theories should be capable of being proved false. If a theory is not, it cannot be said to have survived a test even if research is consistent with it. Popper (1963) suggests that theoretical propositions be attacked from a variety of angles to see whether they can withstand efforts to disprove them. If there are numerous nominal constructs in a theory, it may be difficult to falsify since negative evidence can be explained away.
(5) *Internal consistency:* The internal logic of a theory can be assessed independently of empirical tests. Theoretical propositions should be consistent with each other. If they are not, empirical findings may be difficult to interpret within the theory.
(6) *Heuristic provocativeness:* Good theories generate new hypotheses, which expand the range of potential knowledge.
(7) *Organizing power:* Useful theories not only generate new knowledge, they are able to organize extant knowledge.

Theory at Work: Agenda-Setting

A good example of how communication scientists use theory can be found in the study of "agenda setting" by the news media. Cohen (1963) wrote that the media may not be successful much of the time in telling people what to think, but they are "stunningly successful in telling people what to think *about*." McCombs translated this comment into a prediction that topics emphasized in the press would be the topics people think are important. This was first tested in the 1968 election campaign; the researchers found that coverage of issues by a newspaper corresponded fairly strongly with the issues voters used in deciding how to vote (McCombs & Shaw, 1972).

The hypothesis has not always been suppported in subsequent research. Weaver (1977) showed that it applies only to people with a high "need for orientation," and other researchers found the results hard to replicate in a two-newspaper city (McLeod, Becker, & Byrnes, 1974) or for local television (Palmgreen & Clarke, 1977). But the theory held up well in a field experiment where people watched TV newscasts that had been purposely altered to emphasize different political issues (Iyengar, Peters, & Kinder, 1982). Their preferences among candidates were strongly affected by the issues stressed in the experimental news programs.

Agenda setting meets some of the tests we have outlined better than others. As a simple two-construct prediction it is certainly parsimonious, and in its matching of the orders of two sets of issues it is internally quite consistent. Most important to researchers, it has been heuristically provocative; many studies have been organized around the idea. So it has fairly strong predictive power. It is falsifiable, in that several studies have searched for agenda-setting effects and not found them, although there is some tendency for the term "agenda-setting function" to survive data that seem to falsify its prediction. On the other hand, it is a relatively narrow theory, not very useful for organizing knowledge beyond the studies specifically directed at it. Its explanatory power is limited, although it was improved by adding the "need for orientation" proviso. We know how to look operationally for agenda-setting effects, and we can recognize them clearly when they occur; but we do not know much yet about how or why they occur—or why they often do not.

This brief example illustrates how theory relates to research in communication science. There is an ongoing dialectic between the two. Initially, one scholar thought of a way of operationalizing the constructs, tested the theory, and found encouraging results. Then, as this scholar

and others tried to expand on the original findings, they discovered some of its limitations and trimmed back the theory accordingly. In the absence of a theory, this research would have had little point. Even when it turns out to be incorrect in some ways, a theory is indispensable to a communication scientist trying to formulate new directions for study.

Theories of the Middle Range: Limited Effects

Scholars sometimes lament the absence of a grand theory, such as the atomic table or evolution, in communication science. We have many specific hypotheses; but typically when many implications of a general postulate are tested, the results include quite a few falsifications. Lazarsfeld's pioneering group at Columbia University (see Delia, Chapter 2) suggested that we should be aiming instead to develop "theories of the middle range." Their idea was that specific findings from replicated studies would cumulate into empirical generalizations.

Unfortunately, communication scientists can be an impatient lot. Many broad generalizations were drawn *without the necessary replications*, on the basis of one study or perhaps a couple of studies that used very similar operationalizations. McLeod and Blumler (Chapter 9) discuss some premature conclusions about limited media effects that were advanced by the Columbia group in the 1940s and 1950s. These propositions have not stood the tests of time and replication under different operational conditions.

These theories of the middle range have not held up well partly because they were not sufficiently modest in the scope claimed for them—they might better have been labeled "upper-middle-range" theories—but perhaps more because they were seized upon for their organizing power rather than for predictive power or falsifiability. That is, the limited-effects view of media was advanced as *general knowledge* about communication, written into books (Berelson & Steiner, 1964; Klapper, 1960) and soon after into introductory textbooks. That is not the main purpose of theory for a communication scientist, who is instead looking for ideas *to guide research*. The precepts of the limited-effects model were later used to organize research presentations demonstrating their falsity. For example, Chaffee (1978) derived a series of predictions about the effects of the presidential debates of 1976 from the limited-effects model, and then showed how they had mostly been falsified by various studies. The heuristic value of this middle-range theory was considerable, even as its organizing power was being reduced.

This example illustrates the important point that the criteria for evaluating a theory are not all consistent with one another. A communication scientist must make some choices, emphasizing one criterion or another. Early proponents of middle-range theory were anxious to demonstrate that their research was producing knowledge, and they built theories to organize what had been found to that time. When a theory is framed for that purpose, it is not being designed with falsifiability and further empirical testing in mind.

LEVELS OF COMMUNICATION ANALYSIS

As we pointed out at the beginning of this chapter, the paucity of theory in communication science is often bemoaned by its practitioners. In this section we present a pretheoretical conceptual scheme meant to help promote interrelated theory-building efforts. Communication scientists assume they can find important patterns in social behavior through observations of many similar actions. No one instance of communication, in this view, is especially important, although sometimes a single event produces significant consequences. People are rarely conscious that they are communicating and often have difficulty recalling details of their communication after the event. Everyday activities such as talking, reading road signs, or listening to the radio are not important enough for us to mark carefully in time or space so that we can later reconstruct them. The researcher faces a difficult task in imposing order upon communication because it is taken so casually by the people involved in it.

One valuable approach to ordering the study of communication is to think of several *levels of analysis* of communication events (Cushman & Craig, 1976; Wright, 1959). Part II of this book is broken down by the levels at which research is conceived and conducted. There is not total agreement within the field on the precise definitions of levels, but most of our colleagues are comfortable with a four-level breakdown.

The four levels of analysis we employ here are (1) the intraindividual level, of processes that occur within the person in relation to communication activities; (2) the interpersonal level, where communicatory relationships involving two or a slightly larger number of persons are studied; (3) the network or organizational level, where larger sets of persons are studied in the context of a set of ongoing relationships; and (4) the macroscopic societal level, where the communication properties and activities of large social systems are studied, often without immediate reference to the people in those systems.

There is more than a heuristic value in organizing our presentation of communication science in this way. These different levels tend to involve different researchers, in pursuit of different goals. Research methods vary widely across levels, as do the kinds of theories tested.

Levels of analysis should not be confused with topics of communication. Many communication scientists are drawn to their work by a

concern for a specific communication function or context, such as the socialization of new members to society or the conduct of political communication. These substantive topics may be studied at several levels—and often at all four. For example, in socialization there are individual processes (learning), interpersonal (parent-child interaction), network and organizational influences (peer groups, schools, churches), and macrostructural factors (cultural influences of mass media). Each level needs to be considered for a full picture of communication in the overall process of socialization. Similarly, in political communication we find studies of opinion formation (intraindividual), family influence (interpersonal), reference groups and ethnic groups (network/organizational), and campaign broadcasting policies (macrosystemic).

Just as a research topic cuts across levels, there are generic issues and questions about communication at each level. These questions may receive different answers in the hands of researchers faced with different theoretical problems. But they must be resolved in some fashion by each researcher.

ANALYTIC AND SYNTHETIC ISSUES FOR RESEARCH

An important function of our levels scheme is to demonstrate how general questions about communication can be asked at each level, and how questions can foster *integration* of levels. Communication scientists typically confine a research effort to one level. This means that, for example, those who study informal interactions could overlook influences of individual cognitive mechanisms or wider social networks. Their theories in turn would have only limited explanatory power.

Analytic Issues Within Levels

In this section we consider questions and issues to be dealt with at each level. These questions are general, and responses to them are considered in each level chapter of Part II.

Structural issues. "Structure" refers to ways in which units of a communication system are linked. First, what units make up the communication structure? At the individual level, the unit of analysis is often a person's behavior, belief, or cognition; at the macro level, the units might be communication institutions. The problem of specifying units at any level can be difficult. For example, some interpersonal communication researchers argue that interactions are best understood from an intraindividual cognitive perspective (Planalp & Hewes, 1982); others (Millar & Rogers, 1976), however, insist that interpersonal communication needs to be examined at the level of the "interact" rather than the individual act. Our point is that only after an investigator has settled upon a unit of analysis is it possible to specify what *linkages* exist among units.

Early theories of social cognition (Festinger, 1957; Harvey, Hunt, & Schroder, 1961; Rokeach, 1960; Schroder, Driver, & Streufert, 1967) were concerned with the ways cognitions are linked. Models of semantic memory emphasized linkages among memory nodes and how these linkages influence recall, as in Anderson and Bower's (1973) and Anderson's (1976) model of human associative memory (HAM). Models of discourse comprehension and processing also concern themselves with linkage issues (Abelson, 1981; Schank & Abelson, 1977; van Dijk, 1980; van Dijk & Kintsch, 1983).

Similar questions can be raised at the other three levels. In dyadic communication systems we can look at linkages between persons, which can have attributes such as reciprocity. Analysis of different linkage patterns is an active area of organizational communication research (Farace, Monge, & Russell, 1977; Rogers & Agarwala-Rogers, 1976). Institutions can be linked too. The broadcast networks in the United States are linked by competition with one another in the marketplace, but in mutually supportive ways in their collective opposition to public regulation. Some mass media institutions are controlled by corporate conglomerates, making it difficult for the media to be critical of capitalist institutions (Golding & Murdock, 1977).

Once linkages are specified, we can ask how *active* they are in relationship to each other. Network analysts of formal organizations focus on this variable, asking, "What units of the system are highly active information processors?" or, "What units are relative isolates?" Directional studies distinguish information "receivers" from "givers." A related issue is *complexity*. A communication system becomes more complex with more links. How does complexity influence communication in the system? What does increasing complexity do to the units? Can a system be "too complex"?

We can also consider the *organization* of a system. Are the units linked as a hierarchy? Or in a linear fashion? Many models of individual cognition and of formal organization favor a hierarchical structure. Before the 1940 voting study (Lazarsfeld, Berelson, & Gaudet, 1948), academics assumed that influential people were of higher social status than their followers. On many topics, though, "opinion leaders" are a lot like the people they influence (Katz & Lazarsfeld, 1955).

Other kinds of organization are possible too. Some cognitive psychologists argue that sometimes people process information in a relatively linear fashion, by "scripts" (Abelson, 1976, 1981; Schank & Abelson, 1977). Scripts are expectations for event sequences that people encoun-

ter repeatedly. In a restaurant, for example, we expect a series of events to unfold because the restaurant script is structured in about the same order every time. A script represents a linear-order organization principle that can occur at many levels of abstraction (Abelson, 1976). In social or institutional relations, nonhierarchical forms of organization can develop. Nations maintain elaborate formal protocols for diplomacy (and even war).

For the communication scientist, the structural organization of communication systems affects such variables as communication frequency and time, direction of influence, message content, communicator style, and who interacts with whom. These parameters may be related to the evolution of structural organization. For example, forming a task-oriented group whose members vary in communicative style can affect the power structure that evolves. Once formed, that structure influences people who later join the group. Similarly, at the individual level the structure of prior knowledge influences processing of new information; current information may in turn alter knowledge structures.

Communication goals. In the 1970s some social psychologists (especially Harré & Secord, 1973) raised philosophical issues about dominant theories and methodologies. One criticism was that social psychology is based on a mechanistic conception of behavior, as if humanity is at the mercy of powerful environmental influences that shape behavior through stimuli, reinforcements, and punishments. Harré and Secord (1973) charged that by searching for *causes* of behavior in laboratory experiments, social psychologists make the same assumptions about human actions as do radical behaviorists. They proposed instead that social behavior should be viewed as emanating from the person, as an actor capable of making choices. They contended that people specify goals in social situations and take action to achieve those goals.

Current theory in cognitive science and artificial intelligence allows for both kinds of explanations. System units, either persons or groups, do formulate and pursue goals. In some contexts, such as family communication, individual members may not have well-articulated goals, and yet the family as a unit may have goals. A number of questions can be asked within each level concerning these goals.

The "uses and gratifications" approach to mass media suggests that *individuals* may consume media content to gratify such needs as passing time, acquiring information, arousal, and companionship (Blumler & Katz, 1974; Greenberg, 1974). A person might also generate symbols in order to persuade, inform, or entertain an audience. At the level of social and group interaction, Bales (1950) suggested that communication can serve either task or socioemotional group goals. Parsons (1955) distinguished between instrumental and socioemotional goals in families. It is questionable whether persons, groups, or institutions can give adequate verbal descriptions of their goals. Norman's (1981) activation-trigger-schema (ATS) model of cognitive processes and human action argues that people may be aware of their general goals but not of the many specific subgoals that must be reached to accomplish the main goal.

Another problem is the multiplicity of goals in many situations. When individuals, groups, or institutions act, they may be pursuing several goals with a single action. Researchers on natural language processing recognize this problem in their attempts to develop computer programs that understand and produce natural language (Wilensky, 1983). The utterance, "I like you very much," might be an attempt to induce the recipient to like the person making the statement (ingratiation), or to make the recipient more receptive to future requests for favors, or both. It is difficult to design computer programs to understand such statements.

Individuals, groups, and institutions may intentionally mislead their constituents. Statements about one's communicative goals may in turn mislead the researcher. Goffman (1969) analyzed the moves and countermoves individuals and governments make to mislead observers about their true intentions. There is a considerable literature on deception in interpersonal communication (Knapp, Hart, & Dennis, 1974; Miller, de Turck, & Kalbfleisch, 1983; also see Knapp, Cody, & Reardon, Chapter 13), but the practice is certainly not limited to this level. There is evidence, for example, that television advertisements are regarded as deceptive by many people, including grade school children (Ward, Wackman, & Wartella, 1977).

Unintended effects. While communicative goals are being pursued, unanticipated effects may be produced. Such effects have been observed in public information campaigns and diffusion studies, but are not confined to these settings. A person may produce messages for one purpose only to find that they have also produced outcomes that were both unanticipated and undesired. Unintended effects can also occur at the group and organizational levels. Communication scientists are especially attentive to "side-effects" or "latent functions" of communication.

Unintended effects can occur simply because the creator of a message is unaware of the usual effects it might have. An example is television violence, which has the primary purpose of attracting large audiences but can also have the unintended effect of stimulating aggressive behavior (National Institute of Mental Health, 1982). Or, a non-native speaker of English might utter a statement in a way that produces a humorous or angry response. The receiver's noncompliance may stem from the foreign speaker's lack of knowledge about appropriate communication. For example, an employee does not "give orders" to the boss.

A second source of unintended effects is unanticipated contingencies in the communication episode. During a conversation, a person may disclose information related to other issues so that the emotional tone of

the conversation changes quickly. For example, two interactants may intend an amiable conversation, but end up in an argument due to sensitive comments. Information from mass media is especially prone to unintended effects; once a message is sent via the media, it is difficult to "take it back." In face-to-face encounters, retractions can often prevent major damage.

Predispositions of message receivers can also cause unintended effects. While a given communicator may know what is appropriate to say in a situation, individual differences in the audience may interact with incoming messages in unforeseen ways. In persuasion, influence agents may overgeneralize about their audiences, imagining for example that they are more (or less) hostile than they actually are. Often people in everyday interactions are surprised to find that others disagree (or agree) with them on an issue.

Unintended effects are not always "bad," of course. Sometimes people who initially interact to solve a problem become close friends. Influence agents might not only persuade their audiences, they may inform and entertain them as well. However, unintended effects are probably negative as often as not. People who influence others may also induce those others to dislike them, for example.

Processing capacity. Miller (1956) noted that humans are limited to the perception of about seven ("plus or minus two") items at one time, which he took to be an individual's maximum information processing capacity. This work spawned an enduring interest among experimental psychologists in information processing. Individuals can process only a fraction of the information available in a given situation; they rely on internal knowledge structures to help "fill in the gaps" due to these limitations. Taylor and Fiske (1978) demonstrated how judgments can be inordinately affected by a salient stimulus in the environment. Target persons who are made more salient than other group members are judged by observers to be most influential in the group, even when their contributions do not exceed those of the other members. People erroneously "recall" actions from stereotyped sequences they have observed, although the recalled action did not actually occur. What is being accessed is the scripted expectation that the action should have occurred, not the action itself (Bower, Black, & Turner, 1979). Nisbett and Ross (1980) and Kahneman, Slovic, and Tversky (1982) have documented several biases among people making judgments about others. These biases arise, in part, because of various "heuristics" we use to overcome our inability to process all relevant information.

Communication scientists have developed some evidence on limitations of social systems. Allport and Postman's (1947) classic studies of rumor transmission concluded that messages sent in sequence through a communication system become distorted. Bartlett's (1932) demonstrations of memory distortion in serial transmission suggests memory limitations are a primary cause. But later authors (e.g., Shibutani, 1966) questioned the serial nature of rumor transmission, asserting that rumors are frequently generated by groups trying to construct an explanation for events they cannot otherwise explain. He argues that when people do not get adequate information from the mass media about causes of various events, they will concoct a plausible explanation. Rumors arise, in this view, not because an original story gets distorted as it passes from person to person, but because people combine their individual explanations to form an overall story. Coleman (1957) notes the limits of the media, when rumor and slander circulate rapidly during a community controversy. The information-processing limitations of organizations and institutions have also been studied (March & Simon, 1958).

New technologies. Communication scientists are highly alert to the introduction of new communication technologies, which have major impact on the capacities of communication systems to process large amounts of information. Widespread use of computers in institutional, organizational, and individual settings expands the abilities of these systems to process, store, and retrieve messages. Current emphasis in discussions of computer technologies is on the *quantity* of information that can be handled. Less attention has been paid to the issue of information *quality* (Lester, 1981). Similarly, promoters of cable television stress the number of channels available rather than programming quality.

Some communication scientists become so enamored with the quantitative aspects of new technologies that they overlook more important questions connected with their widespread adoption. There is not much healthy skepticism concerning the future impact of these technologies. For example, advertising for home computers emphasizes that tasks such as balancing a checkbook and finding recipes and telephone numbers can be facilitated by home computers. But these mundane tasks can usually be handled faster, more easily, and more economically using what might in reaction be called "low technology" (e.g., pocket calculators, index cards). The home computer may still be a technology in search of uses (and gratifications) for most consumers, despite the enthusiasm of some academics.

The expanding memory capacity of computers raises issues of individual and institutional privacy. With the increased use of computers by government and commercial agencies, many groups have become concerned about the kinds of information the government collects, security of stored information, and possible invasive uses. Instances of home computers being used to "break in" to data storage systems raise issues about the status of information stored in government, hospital, and business computers. As personal use of computers expands *beyond* playing computer games, which was the main early use of home computers

(Rogers, 1986), problems of social management proliferate. So do negative societal side-effects that stem from socioeconomic inequalities.

System constraints. At each level of analysis there are other constraints on communication systems that limit their capacities to achieve certain goals. At the individual level, the way human sense organs are arrayed determines how well people can adapt to changes in their environments. Because our eyes are set the way they are and because we do not have a very well-developed ability to localize sound (i.e., to determine its direction), it is difficult for us to respond in a discriminating manner to events that occur behind us. People can make considerably finer adjustments in their actions when stimuli are within their view and when both the eyes and the ears can help to locate things.

At the dyadic and social network levels, there are additional constraints too. People meeting for the first time are expected to converse in pleasant ways rather than unpleasant ones. In dating relationships, individuals may be especially careful to observe norms of politeness and social appropriateness in order to make themselves attractive. Conformity to these conventions can prevent people from knowing one another as *individuals* (Jones & Davis, 1965). One of the few things conformity tells an observer is that the person is like many others; it thus prevents leakage of information that might give one insight into the other's personality. Social norms and rules may make interactions in public places more congenial, but these interactions may be vacuous when it comes to learning about the people in them.

A similar problem occurs in the context of interactions in formal organizations. When people perform organizational roles, those roles may be functional for task accomplishment but dysfunctional for emotional satisfaction or the development of friendships. This is a problem if people expect work not only to provide them with material rewards but with socioemotional rewards as well. The same difficulties occur in interactions between parents and children; parental role demands (e.g., supervision, training) may preclude the parents from some behaviors (e.g., play) they might want to share.

At the level of social institutions there is at least one rather glaring institutional constraint that makes achievement of goals difficult. The American public has demanded progressively more services from government at all levels. Various sectors of the public have looked to government to solve social problems concerned with education, health care, poverty, and the like. But even with massive infusions of tax money, government cannot ameliorate many of these problems. Most likely, the government could not solve these problems no matter how much money it has. It is not so much a matter of size ("big government") as it is the organizational structure of government agencies and the "top-down" problem-solving approach it fosters. Perhaps a structure that encourages a "bottom-up" approach to problem solving would be more satisfying. It has been noted that government authorities who live in the environs of Washington, D.C., have little awareness of issues confronting other social classes and regions of the country. Some communication scientists think this isolation might be remedied by strategic use of new communication technologies, which could enable more people to have direct access to political elites (e.g., Siune & Kline, 1975).

System change. Natural communication systems evolve over time, but some changes are more rapid and dramatic than others. Human anatomy might very gradually evolve so that the eyes would be repositioned to increase the width of the visual field, or the internal structure of the eye might be altered. But technologies could much more quickly be developed to compensate people for evolutionary shortcomings. Examples include optical instruments that allow people to see for long distances in the dark, or devices to project voices far away (amplifiers).

In contrast to the slow pace of human anatomy and physiological evolution are the sometimes rather rapid changes in people's beliefs, attitudes, and behaviors. One of the most extensively researched areas in communication has been persuasion. The early genres of persuasion research were cast at the individual level; almost all the studies viewed influence as a one-way process in which a source induced change in individual audience members. It has become apparent to communication scientists that persuasion can be more fruitfully studied in the context of interpersonal influence. Most probably, a majority of persuasive attempts occur in situations where the person being influenced can resist the influence and try to exert counterinfluence. While the early persuasion research paradigms concerned themselves with resistance issues, little attention was paid to counterinfluence. Investigators of communication at the relational level (Ericson & Rogers, 1973; Millar & Rogers, 1976) have explicitly incorporated counterinfluence into their coding schemes.

Despite considerable interest in effects of organizational and institutional changes on productivity and satisfaction, little attention has been paid to organizational and institutional change itself. Like individuals, large formal social entities undergo both evolutionary and revolutionary changes. Some are purposely induced and some are unintentional. Communication scientists seek to find conditions that produce these changes. That is, what variables are responsible for producing change and what conditions trigger these causal variables? We also need to understand how and why changes are *resisted* by individuals, groups, organizations and institutions. System goal conflicts are important to change and resistance, but information-processing capacity, constraints, and structure are also involved.

Outcome evaluation issues. A critical issue in public communication is "communication effectiveness." Whether one is concerned with the

individual or the institutional level, communication practitioners are deeply concerned with promoting effective communication. This notion is variously offered as a panacea for marital problems, voter apathy, and corporate image difficulties. Criteria of effectiveness obviously vary with these different situations. Effects sought in communication may be to inform, to persuade, to be liked, to resolve a dispute, and so forth. A journalist or teacher may be "effective" if their efforts are informative, while a salesperson must sell, a mediator must resolve disputes, and a public health campaign must reduce morbidity and mortality. Most organized communication programs are undertaken to achieve many proximal, intervening, and ultimate mission-determined goals (see Rogers & Storey, Chapter 26). Evaluation research, the measurement of communication effectiveness, usually involves matching the criterion measures to this complex set of pragmatic goals. Communication scientists often shy away from these "mundane" questions. But this attitude may be doing their research enterprise a disservice in the name of intellectual purity. There are many examples of healthy collaborations between "pure" physical sciences and engineering. Communication science has yet to develop an identifiable cadre of "communication engineers," but mission-oriented agencies see communication problems at the root of many social evils and seek solutions.

Who should be the judge of communication effectiveness? Some argue that judgments of communication experts or critics should be employed, rather than the impact a communication has on its audience. In this view, the message and its presentation would be judged effective or not on its own merits. The alternative view, which is shared by most communication scientists, is that communication should be evaluated in terms of goal achievement. Messages that accomplish their goals are effective; those that do not are ineffective. Most people appear to understand the importance of effective communication; perhaps what the public does not understand are the conceptual complexities that arise when effectiveness indicators are examined critically. It is a responsibility of communication scientists to analyze these complexities and develop theories and research programs that examine them in detail.

Designing communication systems. Given that communication systems have goals, can systems be designed to assure that their goals will be realized in an efficient manner? We noted earlier individuals often process information in ways that produce judgmental biases. Nisbett and Ross (1980) suggest that one way to ameliorate these information processing deficits is to train people in statistical inference. (Unfortunately, elsewhere in their book they cite evidence that persons with extensive training in statistics are almost as likely as naive subjects to make inferential errors.)

At the interpersonal level, there is some interest in redesigning various kinds of relational arrangements. The 1970s saw considerable attention to redefinition of marriage arrangements (O'Neill & O'Neill, 1972) and gender relationships. Kramarae (1981) argues that because males were primarily responsible for development of language, most languages contain biases that prevent females from expressing themselves as they wish. Some minor linguistic changes have been effected, but languages are notoriously resistant to significant change.

Organizations have a longstanding concern for design of "optimal" communication systems to achieve goals. In businesses, the profit motive has a lot to do with this interest, but it is also true that effectiveness criteria are less ambiguous in organizations than at the individual or interpersonal levels. McClelland (1961), in his work on achievement motivation, pointed out that money earned is a rather unambiguous index of success, whereas emotional outcomes of interpersonal relationships are considerably more difficult to evaluate.

There has been some interest in redesigning certain institutions to optimize their performance. Proposals for reorganization of the federal government are often made, and there has been significant change in religious institutions because of decreases in church membership across many denominations. But threat of extinction may be necessary before some institutions will initiate internal modification. In any event, communication scientists are often involved in redesign of communication systems at all levels.

Synthetic Issues Among Levels

Our previous discussion has dealt with questions *within* each level of analysis; we now consider relationships *between and among* levels. We are *not* advocating a reductionist position that argues for the explanatory primacy of any one level of analysis. For example, we would reject the position that all other levels can ultimately be explained by individual cognitive processes or, at the other extreme, by social structure. But in some instances one level may offer a better explanation of a communication phenomenon than does another level. Research at one level is sometimes more satisfactorily explained by theory at another level.

Interlevel effects. A number of questions can be raised regarding interlevel effects. For example, we can ask how interactions between individuals and institutions influence individuals' cognitive development, as in Newcomb's (1947) classic Bennington College study. Research has demonstrated how individual attitudes and cognition can be changed by different organizational milieux (Lieberman, 1956). Large formal organizations consist of interrelated smaller work groups, and these

smaller units have an impact upon the entire organization; in turn, organizationwide actions influence each group.

For many of the phenomena communication scientists study, events at one level of analysis may be at least partially explained by recourse to events at another level of analysis. But at this point in the history of communication science it is difficult to say that any one level is most likely to provide satisfying explanations. Our more modest hope is that communication scientists will become sensitive to the influences that phenomena at each level can exert.

Transcendent principles. Finally, let us consider the search for principles that operate in a similar fashion across all levels. This kind of "horizontal" integration of levels is akin to the basic objective of general systems theory (GST; von Bertalanffy, 1968). While the vocabulary of systems has made a strong impact upon communication science (e.g., Monge, 1973, 1977), actual implementations of systems approaches are rare. The systems approach has been at most a stimulating metaphor.

This does not, however, mean that the global objective of GST is not a reasonable one to pursue in communication science. We could well explore such questions as, Are there similarities between the ways individual cognitive systems are organized and the structure of formal organizations? Both models of human cognition and models of formal organization stress that superordinate units exert influence over subordinate units. Given this isomorphism, do the systems operate in any similar ways? Rokeach (1960) discusses the organization of belief systems that are open to discrepant information from the environment and those which are less permeable. We should expect to find structural parallels between the openness of belief systems and the openness of groups, organizations, and institutions to outside information.

It is most unlikely that we could find a communication scientist who would undertake to test such a relationship across all four levels. Moreover, given the current structure of communication science, even if individual researchers were investigating our hypothesized relationship at each level, they would probably be unaware of one another's research efforts, or would not recognize the similarities. We have in the later sections of this chapter shifted somewhat from describing what communication scientists do to discussing what we feel they ought to do in order to advance the discipline. We have continually stressed the different levels because few communication scientists are used to thinking across levels. There may indeed be principles that transcend our analytic levels, and which have already been verified by research. But the relative isolation of research literatures may prevent us from discerning these transcendent generalizations.

CONCLUSION

We have addressed a number of issues surrounding the conduct of communication research and the building of communication theory. Not all communication scientists will subscribe to the assumptions we have presented, the issues we have raised, or our blandishments to consider multiple levels of analysis. The concept of communication science is not yet an established, operating reality. We have noted many more discontinuities between levels of analysis than commonalities. Still, we have been able to locate and describe the heart of what appears to be an emergent, unified discipline. In addition to a central core of assumptions and issues, a field of study must also have its outer boundaries. Not all communication phenomena are studied by scientific methods. Our purpose here has been to outline the work of those who are within the scientific tradition.

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4 Beyond Science: Humanities Contributions to Communication Theory

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THE phrase "beyond science" should be understood in a nontranscendental sense. There is no doubt a version of the term "science," as it was employed by Hegel and Vico, in which we can never be "beyond" science so long as we are engaged in some aspect of knowing. While I endorse this larger usage, that is not the way the term is employed here. It is my challenge to address scholarly work that brings special competencies to the study of communication—competencies that are not "scientific" in the usual empirical sense of that term. Perhaps it is one sign of advancement in the study of communication that increasing specialization and reflective speculation can exist side by side. Even if aesthetic, historical, and philosophical inquiries into communication practice never quite yield the empirical confirmation that "normal" science has sought, there is some agreement that nonscientific approaches still admit to tests of rigor, insight, and heuristic value that might benefit the discipline generally.

Some additional qualifiers may help clarify the intent of this chapter. First, I will argue that theory in human communication is a sufficiently underdeveloped enterprise as to require the concerned reflection of communication scholars from many different perspectives. But this does *not* imply that scientific theory may properly be debunked on purely aesthetic or political grounds alone, any more than a criticism of communication may be cast aside as unscientific. The price of intradisciplinary detente has been to grant that standards of adequacy, while communicable across perspectives, are—at least for now—incommensurable. Second, the categories I will use for interpretation are designed to distinguish among certain levels of analysis in the *nonscientific* study of communication. They are not intended to be exhaustive; there are no doubt many nonscientific approaches to this topic that are outside my range of familiarity. Third, I am not a scientist; this means that actual ranges of application to scientific research must be confined to a layperson's intuitions.