Chapter 5
Communication

"It is remarkable that human communication works at all, for so much seems to be against it; yet it does." (Colin Cherry, On Human Communication. MIT Press, 1965, p. 12.)

THE UNEXPECTED COMPLEXITY OF COMMUNICATION

Given the orientation of this book toward organizations as information-processing and decision-making machines, it is clear that communication is one of the central processes of interest. As with the earlier discussion of perception and inference, we need first to take a step backward, in order to take two steps forward. That is, we generally think of ourselves as good at communication. It is relatively rare that we experience a serious breakdown in communications, to find ourselves having difficulty making ourselves understood. While most of us would agree that we could sharpen our communication skills, we feel that we have plenty of skills to sharpen. Communication is one of those things that most of us regard as a pretty straightforward business.

The quotation from Colin Cherry above suggests that our notions about this "straightforwardness" are not entirely justified. It is not that communication is a simple business, but that we are extremely skilled at it. Think, for a moment, about a wink—the act of closing one eye for an instant. First, most of us have little trouble telling when this is, in fact, a "communicative act" and when it is merely a blink. Second, think of all the possible messages this wink might convey. It might tell us that the person winking is playing a joke on someone else, and is letting us in on the joke. It might be a signal that some sort of mischief is starting—or it might be the signal that starts the mischief. It might even be a parody of the whole business, with the speaker demonstrating to us how someone else, perhaps a clumsy plotter, gave some game away with a clumsy, obvious wink. This single wink, then, is most ambiguous; it might easily mean all sorts of different things. What is truly remarkable is that most of us would have no trouble figuring out which of these meanings was intended. As Colin Cherry's remark suggests, human communication is astonishing in that it generally works so well, when there are so many things that can go wrong with it.

In this chapter, we shall be looking in some detail at how this success is accomplished, and how failures arise. In the first section, we shall focus on the basic elements of a communication process, involving one person sending, and the other receiving, messages. In the second section, we shall examine the consequences of stringing many of these individual links together in an organizational context. Before we take up these issues, however, it will be useful to look briefly at just why communication is so important to working professionals.

COMMUNICATION SKILLS AND TECHNICAL SKILLS

You have just graduated from engineering school with a degree in electrical engineering and a specialty in heavy electrical machines. You have taken a job as a designer of large electric motors. What skills do you bring to the job? What skills do you need to do it effectively?

Your academic training has given you considerable expertise in the technical aspects of the work. You will know a good deal about the relative advantages of AC and DC machines, about series and parallel connection, about start-up torque and full-load losses, about cooling arrangements and lubrication systems, about overload protection and noise reduction—in short, you will have mastered the basic technical skills of designing electric motors. But will this mastery guarantee your success on the job?

The answer is, emphatically, "No!" The skills we have just described cover only one part of what an effective engineer needs to know—the part that extends from having a well-formulated set of design specifications (the technical problem) to coming up with a satisfactory design (the technical solution). Learning such skills is the core of academic training in engineering. On the job, however, we need a variety of other skills, especially skills in communication. We need to be able to communicate effectively with:

Clients. The motor we are trying to design is not just an abstract solution to an abstract problem; it is intended to solve a real problem for a real client. A 1,000 horsepower motor intended to drive a rock-crushing machine, for example, is very different from one intended to haul coal out of a deep mine. Working with the client to develop a realistic set of design specifications requires excellent communication skills.

Colleagues. It is rare for any individual, however competent, to solve a significant technical problem entirely alone. Much more commonly, one calls on one's colleagues for advice, suggestions, second opinions, and specialized expertise. Being able to ask for, and to give, such informal consulting help demands skill at communication.

Other co-workers. There is a long step from specifying and solving the technical problems of a given design to having a workable piece of hardware ready to ship to the client. The technical solution one has chosen has to be communicated to a draughtsperson to prepare detailed manufacturing drawings. The production department must be consulted to work out how and when the machine is to be built. The test department must be consulted to work out the tests the machine will have to pass before being certified as meeting the design specifications.

The list of those with whom the designer must deal could easily be extended, but these three examples are sufficient to establish the central point: technical skills are needed to solve technical problems, but communication skills are needed to bring the technical solution into being as an actual working device. Working in an organization is, crucially, working with other people. The first requirement of doing this effectively is to be able to communicate with them. The remainder of this chapter looks at how the communication process works, and offers some suggestions as to how it can be made to work better.

COMMUNICATION BETWEEN INDIVIDUALS

The basic elements of a communication link are two individuals, a sender and a receiver, connected by some channel over which a message can be transmitted. For example, if I want to invite you to a party, I might send you a written invitation (message) through the mail (channel); or, if we worked in the same office, I might ask you orally (message), using the air between my vocal chords and your eardrum as the channel; or I might call you on the telephone, using the electrical impulses transmitted along the wire (plus our two telephone instruments) as a channel. These basic elements are sketched in Figure 5.1.

In Figure 5.1 we have labeled three additional features of considerable importance in showing how communication works. First, there is an encoding step between the sender and the channel. Encoding represents the complex process by which the sender's meaning is transformed into a signal on the channel—for example, my writing and mailing your invitation. At the receiver's end, there is a decoding process, by which the receiver transforms the signal back into a meaningful message. (My handwriting is terrible, so "decoding" is a good description of what the receiver must do to figure out my message!) Finally, as the figure shows, there is noise at each point in the communication

Figure 5.1.   The Basic Elements of a Communication Link
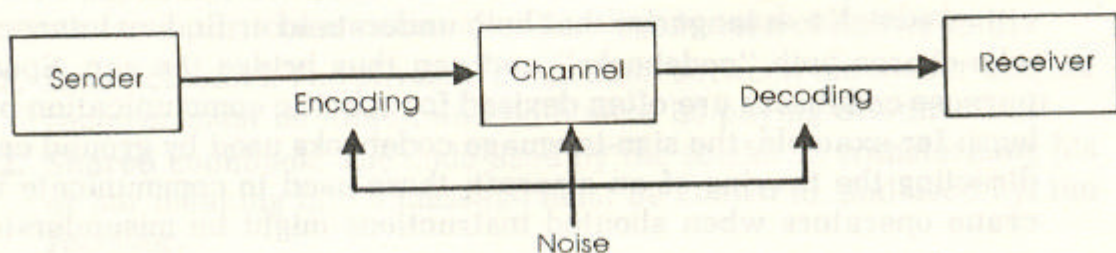
process—unwanted or irrelevant signals that can get confused with the intended signal. With the spoken message, noise can be taken literally to include other conversations going on in the room, or the sounds of construction work outside the window. Similarly, noise on a telephone link includes the crackling and hissing sounds we hear when the connection is bad, or other conversations that might break in. We also use noise to include irrelevant signals that creep into a written message, such as writing that shows through the page from the other side. "Noise," in short, is used to describe any unwanted or irrelevant signals. If I wrote my party invitation on a sheet of newspaper, the printed news would be "noise" in relation to my invitation; you might read the news instead of my invitation, making the news an unwanted or irrelevant signal from my point of view.

Communication Breakdowns

We can use the simple diagram of the communication link to develop a list of what is necessary for a link to work effectively (or, looked at the other way, what elements can lead to communication breakdown). Some of the requirements are obvious. If the sender's meaning is to be encoded, transmitted, and decoded accurately by the receiver, the two must be plugged into the same channel. This includes both "physically in contact" with the channel and "paying attention to" it. We are all skilled at tuning out most of the signals to which we are exposed, enabling us to pay attention to the few in which we are interested. As teachers find, merely saying something in class is no guarantee that students will receive the message. In any class, it is probably safe to assume that some significant fraction of the students are "tuned in" to something other than the teacher, such as the attractive person in the next seat, the newspaper folded under the desk, the view from the window, or a mental replay of last night's party. The receiver, then, must be both physically in contact with, and paying attention to, the sender's channel before accurate communication is possible.

A second obvious requirement for effective communication is that sender and receiver share a common "codebook." If you are "coding" your messages in Spanish and your listener does not know the language, you will not communicate effectively. In such simple cases, of course, the problem becomes obvious at once, and the two individuals either switch to a language that both understand or find an interpreter who shares both "codebooks" and can thus bridge the gap. Special-purpose codebooks are often devised for specific communication problems: for example, the sign-language codebooks used by ground crews directing the taxying of an aircraft; those used to communicate with crane operators when shouted instructions might be misunderstood;

and the sign languages used by the deaf to converse. In most of these cases, it is clear that a special language is being used, and a potential receiver is aware almost immediately whether or not the "code" is a familiar one.

The danger arises when two people think they are using the same codebook when in fact they are not. North Americans, for example, learn a language that is only roughly the same as the language one learns growing up in England. The small but important differences have provided Hollywood with hundreds of easy jokes, and sometimes lead to annoying confusions. A friend of mine, for example, spent a frustrating couple of weeks trying to straighten out travel arrangements with an English university that had promised him a "return ticket" to attend a conference. He was about to purchase a one-way ticket himself, before I pointed out to him that, in England, a "return ticket" means what Americans call a "round-trip" ticket!

In technical settings, "unshared codebook" problems often occur when we use jargon or technical terms that also have an everyday, nontechnical meaning. Jargon terms are often useful within a group of technical specialists, as a convenient shorthand for referring to some concept or procedure. When a term gets outside the group, however, it can cause confusion. For example, computer users communicate with one another swiftly and accurately with terms such as "booting" a system, "crashing" a program, or attempting to make a procedure "friendly." These terms also have meanings in nontechnical English, and it is easy to imagine the misunderstandings that nonspecialists can get into if they interpret such terms in their nontechnical sense.

A third source of communication error is noise. We may break this down further into channel noise, encoding noise, and decoding noise, focusing on the step in the overall process at which the undesired signal enters. The notion of a "signal-to-noise ratio" (SNR) is useful here. When the signal is strong and noise is weak, the SNR is high, and signals are easily distinguished from the noisy background. As the SNR drops, we finally get to the point at which the signal cannot be distinguished from the background, and communication breaks down. If, for example, a teacher writes on a chalkboard lightly (weak signal) and is careless about cleaning off what was written on the board earlier (high noise), the SNR may be too low for the students to be able to decode the message being written on the board.

In summary, as suggested by Figure 4:1, there are three requirements for a particular communication link to work effectively:

1. **Intact channel:** The physical connection between the sender and the receiver must be intact, and both must be paying attention to it.
2. **Shared codebook:** The code used by the sender in transforming his or her meaning into a message must be known to, and used by, the receiver.

3. **Adequate signal-to-noise ratio** (SNR): The signal on the channel must be powerful enough, or the noise on the channel weak enough, for the receiver to be able to tell one from the other.

Overcoming Communication Breakdowns

If communication is really so vulnerable to breakdowns and errors, how is it that we normally manage to communicate effectively? Several general error-reducing strategies are available:

1. **Improving SNR:** We can often find a way to improve the signal-to-noise ratio of a noisy channel. We can move a conversation to a quieter location, clean the chalkboard more carefully, or redial a telephone number in hopes of getting a better connection.

2. **Channel switching:** We may be able to switch from an unsatisfactory channel to a more satisfactory one. If we are having trouble describing a technical drawing over the telephone, we may switch to a visual channel by sending the receiver a copy of the revised drawing. If we are having trouble conveying our ideas in a letter, we can try the telephone, or arrange a face-to-face visit.

3. **Serial redundancy:** In speaking, we routinely repeat what we have said several times, perhaps in slightly different words. This can compensate both for channel noise (because the probability of getting the same noise signal interfering each time is reduced) and for coding noise (because the rewording of the message is not likely to be as confusing as is any single choice of words).

4. **Parallel redundancy:** We often try to send the same message on several channels simultaneously. In speaking, for example, we convey much of our meaning by tone of voice, facial expression, gestures, perhaps body posture, and physical distance from the listener. We might sketch our ideas on a piece of paper while we talk, using visual and oral channels simultaneously. Gestures can communicate a great deal. Think, for example, of how effectively a good mime can convey a story, using no spoken words at all. An effective teacher or other public speaker often uses all these channels simultaneously in getting a message across to his or her audience.

5. **Feedback:** An especially important mechanism for error-reduction involves the receiver sending messages indicating understanding or nonunderstanding back to the sender. In conversation, we nod and smile to indicate that we are getting the message, or raise our eyebrows and look puzzled to indicate otherwise. Good speakers pause often for questions and responses. Important letters may ask the receiver to acknowledge receipt. Radio users have several phrases —"roger," "over," and so on—to indicate that a message is complete, and to check whether the receiver actually received it.

It should be noted that these error-correcting strategies have a cost. Assuming that the sender has chosen the best available channel (Strategy 1) and has improved the SNR as far as is practicable (Strategy 2), either form of redundancy (Strategies 3 and 4) or feedback (Strategy 5) requires more message-sending than would a single message sent once. These strategies use up communication resources—they tie up the sender and receiver and the channel(s) in use. Further, they may introduce additional confusion. Imagine a teacher introducing a course with a statement that it will be interesting and exciting, but speaking in a flat, bored tone of voice. Which message is the class to believe? Probably, we will respond (consciously or not) more to the nonverbal signals than to the spoken message. In such cases, we are getting conflicting messages, and must do some work to decide which one is the real one.

Multiple Messages and Defensive Communication

So far we have been discussing communication in terms of transferring a message—a little bundle of meaning—from one person to another. Everyday communication is, of course, much richer than this. Part of what makes communication so wonderfully complex is that, within a single episode, we are often sending and receiving a variety of messages simultaneously. Listen, for example, to two students, a man and a woman, talking as they leave a class. The words they are using seem to be about the quiz they just had. But if you pay attention, you may see other things going on at the same time: a little flirtation; some boasting about how easy one of them found the quiz; a lead-up to asking to borrow notes from an earlier missed class; perhaps a gentle dig at the other for working too hard; or perhaps an indirect check to see if the other views the professor the same way. The whole conversation may not last a minute but it could still leave the careful analyst with plenty to think about. As we commented earlier, humans are extremely skilled communicators!

At least three levels of communication can be found in most real communications. First, there is the *overt content*, the topic of the conversation, the subject of the essay, or whatever. A second level is what we might call the *self-presentation* of the people involved, the signals by which I try to convey to you what kind of person I want you to think I am. Subtly, and generally unconsciously, we present ourselves as intelligent, witty, lively, conventional or otherwise, spontaneous or reflective, emotional or cool, and a score of other characteristics—all within the confines of a brief chat about the weather or some similar mundane topic! It is often unclear just how, or just how well, we manage this presentation of ourselves, but it is clear that we all do it much of the time, and that we pick up an impression of others just as swiftly.

A third level of communication is what might be called the *tactical* level, the tricks by which we try to influence the other person to do something we want, to impress them, or to establish our status relative to theirs. This overlaps partially with self-presentation, of course. You present yourself to your professor as a serious hardworking student to back up your tactical interest in getting a grade changed. You present yourself to your boss as an energetic go-getter to back up your tactical interest in getting a pay raise. Again, a good deal of this may be done unconsciously, but it is still a familiar and important part of normal communication.

An important implication of this multiple-level aspect of communication is that the three levels often interfere with one another, both in the sender and the receiver. The professor may have trouble hearing why you deserve a better grade because he is involved in presenting himself as a friendly and reasonable, but firm, teacher. He may also be trying to keep from being outmaneuvered by you into doing the extra work the grade change requires. There is so much going on at the self-presentation and tactical levels that another person literally may not hear much of the overt content of what you have to say.

Jack Gibb (1961) coined the phrase "defensive communication" for this interference between the various communication levels, and the distortions and breakdowns in communication to which they can lead. He lists six types of behaviors that tend to set up defensive, distorting climates, and suggests for each the sort of behaviors that lead to supportive, open climates:

1. **Evaluative versus descriptive:** "Your report is late" is descriptive; "You are irresponsible" is evaluative, and makes the hearer defensive.

2. **Controlling versus problem-oriented:** If the speaker seems to be trying to control our reactions or behavior, we resist (defensive). Focusing on our joint problem allows both of us to contribute to solving it.

3. **Strategic versus spontaneous:** We react defensively to someone we see as trying to manipulate us, or as having a hidden agenda. Straightforward, honest reaction to the shared situation is more supportive.

4. **Neutral versus empathetic:** "Mr. Cool," the calm, unemotional, unflustered individual, makes most of us defensive, since the speaker seems detached from us as real people. We respond more positively to someone who conveys warmth and concern for us as individuals.

5. **Superior versus equal:** If the other person comes across as feeling smarter, more attractive, more powerful, or whatever, we tend to defend ourselves by trying to get back at him or her. We are less threatened when we are treated as individuals just as worthy as the speaker.

6. **Certain versus provisional:** We are put off by people who seem to know all the answers. They make us feel as though we must pretend to know them, too, which gets in the way of exploring the difficulties we actually see. Sharing one's own doubts makes it easier for others to do the same.

Most of these characteristics are reasonably obvious. If you think about someone you find "easy to talk to," you will probably find that they have many of these supportive characteristics. Conversely, people we find difficult to talk to tend to have more of the characteristics that arouse our defensiveness. However, just knowing these characteristics does not make it easy to change our behavior. The ways we communicate are often deeply rooted—in habit and in our personalities—and it takes a lot of effort and practice to change them. Even if we are not about to change ourselves or others, it is worth bearing in mind that we send and receive messages at these three levels—overt, self-presentation, and tactical—every time we communicate, and that the different levels may interfere with one another. If we experience difficulty at the overt content level, it may be worth asking ourselves whether something is going on at the other levels to arouse our (or our listener's) defensiveness. In communication, there is an entire symphony going on, and it is easy to lose the melody line altogether.

So far, we have been looking at communication in its normal, everyday sense. We now turn to communication processes in a particular context: the organization.

THE ORGANIZATIONAL CONTEXT

More May Not Be Better

Communication is so interwoven with almost every organizational process that it is difficult to discuss it separately from the other processes. When we discuss power and influence (Chapter 6), we will see that control of communication channels is a crucial element in exercising power (as every competent revolutionary knows: TV stations and newspapers are always among the first things seized in a revolution). When we talk about conflict (Chapter 8), we will emphasize the danger of

escalation distorting or severing communication between the conflict-ing parties. When we look at group processes (Chapter 9), we will focus on the patterns of communication between the group members. In short, whatever we look at in organizations, we seem to end up looking at communication processes as well.

This leads a lot of people who should know better to see "communi-cations problems" as the underlying cause of almost everything that goes wrong in an organization. If a fire destroys half the plant, some-one is sure to diagnose a "communications problem" between, say, the security staff and the supervisor of the department where the fire started. If a new product fails to sell, someone will see "communica-tions problems" between, say, market research and product develop-ment. Even interpersonal difficulties, disagreements and arguments get glibly diagnosed as "communications problems." We should be suspicious of any insight that yields the same diagnosis for a wide range of diseases.

Clearly, communications are woven into so many aspects of organi-zational life that anything that happens is likely to have a communica-tions aspect. The trap is that once we have diagnosed a problem as being centrally due to communications failures, we tend to try to cure it by improving communication, and that will generally be taken to mean increasing communication. After the fire, we set up elaborate new information channels and joint planning committees between security and plant supervisors, when installing an effective sprinkler system *might be more useful. Market research and product development* work on refining their communications with one another, drawing attention away from the need for good new product ideas and good research on them. The two argument-prone individuals spend months refining the open communication between them, and discover that they do, in fact, dislike one another and might do well to keep apart as much as possible!

The assumption that *better* communication is the same as *more* com-munication underlies the failures of many of the first generations of computer-based management information systems (MISs). Designers of the early MISs assumed, reasonably enough, that managers would manage better if they were better informed. With the advent of power-ful computers (and fast printers!) in the early 1960s, this assumption was quickly translated into what seemed to be an effort to bury every manager in printouts. Daily, literally hundreds of pages of fan-fold started to appear on managers' desks. The printouts were, of course, largely ignored; most managers are much too busy to read hundred-page reports on a daily basis. Learning from these lessons, current information-system designers pay much more attention to tailoring the information supply to the manager's real needs, not to providing the largest printout possible.

To guard against the "more is better" trap, it is worth keeping in mind that organizations are, to an important degree, devices for *mini-mizing*, not for maximizing, communication between individuals. Consider the number of two-person communication links possible at a party of 100 people: 4950 [= 100 × 99/2], with each person participating in 99 conversations. It would take over eight hours to have a five-minute conversation with everyone at the party. In contrast, an organization of about the same size might be arranged by assigning one person as boss, ten as supervisors, each supervisor having ten subordinates (111 people in all). There are now only 110 two-person communication links, a mere 2.2 percent of the 4950 links at the party. One important function of organization structure, then, is to *eliminate* a vast number of the possible communication links among its members. (We will discuss this notion further in Chapter 10.)

Content and Direction of Communications

Managers spend most of their time communicating, perhaps as much as 75 percent, according to studies by Mintzberg (1973). By far the largest proportion of this communication is verbal, either face-to-face or by telephone. What do they talk about? The content varies with organizational direction, with whether they are talking to their subordinates, their peers, or their superiors. Katz and Kahn (1978) suggest the following major categories for the primary content of communication in each of these directions:

1. **Downward communication** is likely to involve instruction, both on the subordinate's specific job and on the practices and procedures to be followed in doing it. Second, bosses give their subordinates feedback on how they are doing. Finally, though this aspect is often neglected, they provide the subordinate with a rationale for the job, why it is important, how it fits into the larger picture of the organization's activities and what these larger purposes are.

2. **Upward communication** is largely the mirror image of these content categories. Subordinates report on what they are doing and what problems they are encountering, how existing policies and procedures are working, and their ideas as to what needs to be done and how it should be done. They may also pass on similar information about the activities of their peers, though this is inhibited by the informal taboo on "ratting to the boss."

3. **Lateral communication**—communication between two people at the same organizational level—includes both information concerned with coordinating their interlocked work activities and information communication for social and emotional support. People at the same

organizational level may share many interests other than work coordination: they are often of similar ages and backgrounds, or are at similar stages of their careers. They may also share an interest in diluting the boss's power over them by comparing notes, sharing secrets, and pooling their information.

These categories may be reasonably obvious to anyone who knows how organizations operate. It is worth noting, however, not only the wide variety of things that are communicated, but also the potential for them to conflict with one another. As was discussed earlier, we are more likely to tune out or distort messages from senders we see as evaluative, controlling, or superior—precisely the characteristics we would expect of a boss trying to tell us how to do our jobs. Of course, we make allowances for our superiors acting in a superior manner. Nonetheless, the basic point remains that communication channels in organizations are used for many different sorts of messages. A channel that works for one sort of message (e.g., giving orders) is not likely to be as effective for another (e.g., giving personal advice or getting accurate feedback). This conflict between different types of messages is a primary cause for communication distortion, the topic to which we now turn our attention.

Distortion of Communications

Communication distortion is the "slippage" between what a sender thinks (s)he has sent and the message as interpreted by the receiver. For example, a study by Burns (1954) traced what happened to 237 messages sent by a group of managers. The managers reported 165 (about 70 percent) as being instructions or decisions for their subordinates—a surprisingly high proportion. Of the same 165, the subordinates classified only 84 (a little over half) as instructions or decisions. We can speculate as to how this difference in perceptions arose. Perhaps the managers tried to reduce their subordinates' resistance to being ordered to do something by carefully phrasing the instructions: "Perhaps you could . . ." or, "I'd like to suggest that you . . . " However it happened, the subordinates tended to report many of the "orders" as information or advice, not as instructions. There was significant slippage between what the sender thought (s)he was sending and what the receiver thought (s)he was receiving. In half these messages, the two parties did not agree on what the message was. Distortion had crept in.

Organizational Context and Distortion

Going back to our sketch of the communication process (Figure 5.1), we can add several other sources of possible distortion specifically resulting from the process occurring in an organization. For example:

1. **Sender motivation:** My boss is not just the person I "report to." (S)he is also the person who evaluates my performance and decides my pay raises. I am thus likely to underreport job difficulties and overreport job successes, to overstress positive evaluations of the boss's ideas and underemphasize negative ones. Read (1962) found these biases to be common, particularly for ambitious, upwardly mobile managers, who seem to be more sensitive to their bosses' influence over their future career prospects.

2. **Receiver characteristics:** Organizational messages arrive with the sender clearly labeled. Military officers' uniforms clearly indicate their rank, so that receivers know how to treat orders. Written communications are signed by the sender (generally with name *and title*), memoranda come "from the desk of" the sender, and so on. Labeling sets up expectations in receivers as to what sorts of messages they will receive. As we saw earlier, expectations are often useful, but in some situations they can obscure message content. As a teacher, I assume that a student who comes to see me during my office hours wants to talk about course content. It often takes me a while to realize that a particular student wants to talk about a personal problem.

3. **Channel characteristics:** In organizations, communication channels are not just connections between people. They are also labeled with organizational meanings such as status or in-group/out-group identity. We tend to pay closer attention to messages from people who have power in our lives, or who are organizationally close to us (e.g., our immediate work group) than to messages from people less significant to us. Gross (1968), for example, suggests that the United States military's failure to anticipate the Pearl Harbor attack was the result of ignoring information provided by low-ranking officers at a unit with a bad reputation. This channel, in other words, had been labeled as having low value, so the information it provided was heavily discounted—with disastrous results, in this case.

4. **Message characteristics:** We have already discussed the multilevel nature of many organizational messages, and the possibilities of interference among the various levels. It is worth reemphasizing that such between-level interference happens everywhere, but it may be particularly severe in organizations, where single channels serve for such a range of important message content.

Organizational Geometry and Distortion

One part of communication distortion, then, arises because the communication channel is placed in an organizational context. A second

group of distortion factors flows from what we might call the "geometry" of the organization. Two specific aspects of this "geometry" concern us here: (1) serial repetition and (2) convergence/divergence.

Serial repetition. There is an old party game called "Whispers" (in England; "Gossip" in the United States), in which a message is whispered to one person, who then whispers it to another, and so on until the last person announces what (s)he has heard and the message is compared to the original. The results are often hilarious. A message that started out as "There's something wrong with my car" might come out as "It's time to head for the bar."

What makes the game interesting is not simply that messages are distorted when they are repeated inaccurately. If the message gets 50 percent garbled at each repetition, we would expect to retrieve only 1/64, or about 1.6 percent, of the original context after six repetitions. What is interesting is that what comes out generally makes some sense —not the original sense, but not just random words or noises, either. As we saw with perception, humans tend to "make sense" of what they see or hear. If the message is unclear, we reconstruct it into something meaningful. In serial repetition, it is not just repeated garbling, but repeated sense-making, that shapes the final version.

The same processes can occur in organizations. A statement is issued from the top of the company: "We need to improve our product reliability." The director of manufacturing passes this on to his subordinates, embellishing and clarifying its implications for the division: "We need tighter quality control." The production manager calls in the production supervisors and lectures them on sloppy quality control, adding a few warnings about the need for keeping to official inspection procedures generally. The quality control supervisor, feeling defensive, starts a program of 100-percent inspection, instead of the old sampling method, and production comes to a virtual standstill while every prescribed test is done on every item produced. It makes no difference that the reliability problem (if one existed) might have been traceable to a single underdesigned component. The net result of apparently minor rephrasings and embellishments at each stage of the communication process is that a very different message was received at the end from that intended at the beginning. Serial repetition can lead to large communication distortions.

Convergence/divergence and overload. A second obvious point about the "geometry" of hierarchical organizations is that channels from below any position in the center converge; managers have many subordinates, but only one boss. If I have a five-minute chat with each of my twelve subordinates every morning, that is only a brief interruption for

them, but the first hour of my work day is gone. If each subordinate summarizes for me what (s)he plans to do today, I receive an enormous amount of information very quickly. If I now repeat the process with my own boss, who is also gathering information from many subordinates, the compression effect is multiplied. Our capacity for absorbing and using information is very limited, and information channels converge from below. What flows up the organization must be highly summarized, and even then much of it will not be effectively processed.

One direct implication of channel convergence is that contact between a subordinate and a superior is likely to be seen very differently by the two participants. For the subordinate, direct conversation with the boss is likely to be relatively rare, and thus highly significant. From the boss's point of view, conversations with subordinates are relatively common, and thus much less significant. Even if the subordinate picks a single issue to discuss with the boss, and it is the only thing they talk about, the issue is only one of many the boss discusses that day.

The significance of this difference in the configuration of channels above and below a position is borne out in various research findings. Webber (1970) found that superiors believe that they communicate with their subordinates more freely than the subordinates see them as doing. Similarly, Lawler, Porter, and Tannenbaum (1968) found that managers felt better about their contacts with their superiors (the unusual events) than they did about contacts with their subordinates (the commonplace events). Part of this can be explained simply by the superior-subordinate relationship, but part of it seems to be due to the relative frequencies of upward and downward communication imposed by the shape of the organization.

A second implication of the upward convergence of communication channels in organizations is simply that a lot of information flows upward into each position, and that overload is a perpetual threat. There is plenty of research evidence to show that managers spend an enormous percentage of their time communicating—not thinking, or planning, or reading, or deciding, but simply processing information (see McCall, Morrison, and Hannan [1978] for a useful review of these studies). What happens when the torrent of information exceeds what the individual is capable of processing?

Miller (1960) suggests seven broad categories of reaction to information overload. Some are clearly dysfunctional for the organization as a whole (though they may save the individual from going crazy); others can go either way, depending on how they are done. Miller's seven categories are:

1. **Omission:** Some or all of the incoming information is simply ignored and not processed. For example, a letter is not answered.

2. **Error:** Some or all of the incoming information is processed wrongly. For example, you dash off a quick answer to a letter, but fail to provide the information requested.

3. **Filtering:** Some information is omitted, but on a systematic basis. For example, calls are screened for importance, and the less important ones are ignored.

4. **Queueing:** Incoming information is processed to the extent possible, with the excess stored to be dealt with later when the pace eases. For example, phone callers are put on hold, memos are kept for later attention.

5. **Approximation:** The details of the incoming messages are ignored, and the content summarized into simpler, broad categories. For example, instead of keeping track of the nature and causes of particular breakdowns, a hard-pressed manager might simply keep count of how many such incidents were reported.

6. **Multichanneling:** If one channel is becoming overloaded, one could switch some messages to another channel. For example, some people seem to be able to do this internally: read their mail, carry on a conversation, and monitor the TV news all at the same time. Alternatively, an overloaded manager might switch one stream of messages to a different organizational channel. When such a switch assigns one area of the manager's activity to a subordinate, decentralization results.

7. **Escape:** The individual who is getting overloaded can simply leave the situation, either by physically leaving or mentally tuning out.

If we suppose that all the information coming in has some value to start with, we can assess the organizational cost of these various reactions. Omission and error are costly: the information simply is not properly processed. Filtering and queueing are at least selective as to what will and what will not be processed. If effectively done, the information omitted or delayed is less important or urgent than that processed. Similarly, approximation tries to retain the crucial features of the messages while dropping out the details, though it would probably make more sense for the sender to produce the summary than for the receiver to have to do so. Multichanneling, at least in the organizational decentralization sense, is somewhat similar to sender-based approximation, in that the subordinate to whom the responsibility is delegated will presumably now report only the results, not the details, of the information (s)he receives. The manager who escapes the torrent of information is probably saving his or her sanity, but may well be damaging the organization.

The listing serves to reemphasize two earlier comments. First, our ability to process information is severely limited; the ability to process information is one of the crucial limits on how organizations function. Second, it is useful to think of organizations from the communication-limiting, not the communication-enhancing, perspective. Much of what happens is the result of efforts to restrict flow of information, not to increase it. Experienced managers develop strategies for limiting their information intake. They tend to read only "executive summaries" of reports, not the reports themselves (a point worth bearing in mind when writing reports). Winston Churchill, heading the British war effort in the early 1940s, fired off requests for information with the words, "Pray let me have this day, on one side of a sheet of paper, your views on. . . ." He wanted his information fast, and he wanted it boiled down to the basics.

COMMUNICATION IN RESEARCH AND DEVELOPMENT

Many of the processes we have discussed so far can be illustrated in one particularly interesting organizational context, the research and development (R&D) laboratory. Communication is crucial in R&D. Many scientists and engineers spend at least some portion of their professional lives in such settings, so findings from such environments are of direct interest. The central business of the R&D lab is the production of new knowledge and ideas, and communication is central to such work. In this final section of the chapter, we will look briefly at some of the findings from research studies of communication in R&D settings. We will focus on a study by Allen and Cohen (1969), embellishing a few of the points they make.

Allen and Cohen's study examined the communication patterns they found in industrial R&D labs. They traced, for example, the sources of scientific and technical ideas being worked on in the labs. They found that only about 15 percent came directly from the scientific and technical literature. In fact, one of their basic observations was that the bulk of communication was internal. People within the lab talked mainly to one another, not to outsiders. (These were industrial laboratories, and the patterns of communication may be different from academic laboratories. Industrial scientists are more likely to be "locals," in that their primary interests and contacts are within the organizations for which they work. Academic scientists tend to be more "cosmopolitan," less involved with their employing organization, and having broader contacts with people working on related problems in other organizations.)

Communication between lab members and the outside world is commonly a two-step process, passing through a small number of researchers

referred to as "gatekeepers." These individuals tend to maintain a broad network of outside contacts, both with other individuals and with the scientific literature, and serve as middlemen for contact between the other members of the lab and the outside world. This two-step process is intriguingly parallel to one found earlier in mass communication. Researchers in that area (e.g., Katz and Lazersfeld, 1955; Rogers, 1962) found that, for example, people rarely form their political opinions directly from the mass media. Instead, they are more influenced by "opinion leaders," people they already know and respect, who act as a link between the mass media and the individual. Similar two-step processes have been found in such areas as medical doctors learning about new drugs and farmers adopting new types of corn. In each case, communication seems to flow from the literature to the individual through relatively few "gatekeepers" or "opinion leaders." In the R&D lab, such individuals are of great value to the individual researcher, and need to be carefully nurtured by the organization.

Several of our earlier comments on how communication patterns are shaped are well illustrated in Allen and Cohen's work. For example, they found that friendship nets and technical discussion nets tend to overlap one another; a channel that is used for one is more likely to be used for the other. They also found that status had a sharp effect on who talked to whom. Researchers with Ph.D.s, the high-status people in a lab, tended to be cliquey, talking mainly to each other both socially and technically. The lower-status (non-Ph.D.) employees tended to initiate communications with the high-status group more often than with their own peers. Allen and Cohen suggest that the lower-status individuals wanted to share in the reflected glory of the work of the higher-status doctorate holders. Whatever the reason, it is clear that status was a powerful influence on communication processes.

Finally, Allen and Cohen found that the information communication patterns were heavily influenced by the formal organizational structure, the hierarchy and the work group. This is somewhat surprising, in light of the strong scientific norms about open exchange of information, but is perhaps explicable if one recalls that these were industrial R&D labs. In one of my own studies (Connolly, 1975), I found that communication nets tended to follow the organizational hierarchy only for researchers dealing with development or project work. For those involved in more basic research, the pattern tended to be both less centralized and less hierarchical, with people sharing ideas and discussion with whomever seemed relevant to their current problems, regardless of rank or department.

In short, Allen and Cohen's study is well worth reading for a glimpse of how the flow of ideas and discussions in an R&D lab is shaped. Individuals take on different roles in these processes, with some deeply

involved, others almost isolated. The nets that emerge are shaped by status, friendship, scientific and technical interests, organizational level, and work group affiliations. It is from such subtle, complex communication processes that one of the organization's truly vital assets, the novel idea, sometimes emerges.

SUMMARY

We have examined the basic elements of the communication process: sender, receiver, channel; message, encoding, decoding. We discussed the requirements for such a process to work effectively, and suggested the various ways in which it could go wrong. The basic requirements include an intact channel, a shared codebook, and an adequate signal-to-noise ratio. Strategies for reducing error include improving signal-to-noise ratios, channel switching, serial or parallel redundancy, and feedback. We also noted that communication channels typically convey multiple messages simultaneously, including overt content, self-presentation, and tactical or manipulative messages. These multiple messages may interfere with one another as in the distortion associated with defensive communication.

Placing these processes in the organizational context, we noted first that communication is interwoven with every other organizational process. This can lead to an overdiagnosis of "communication problems," and to an overprescribing of "improved communication." It is a common error to assume that more communication is always better. In fact, it is useful to think of organizations as communication-minimizing, rather than communication-maximizing, arrangements.

Within organizations, the content of communications is shaped by direction, with different messages going to superiors, subordinates, and peers. Again, conflict among the various messages is possible and can lead to communication distortion. The degree of distortion is influenced by characteristics of the sender and receiver, those of the channel, and those of the message itself. Further, the geometry of the organization's structure contributes to distortion, both by requiring serial repetition of messages and by inducing overload in upward flows. People react in various ways to overload, and some reactions are more harmful to the organization than others. A fundamental problem for organizations, we suggested, is in balancing the huge quantities of information handled with the very limited ability of individuals to process information.

The final section of the chapter illustrated several of the communication processes discussed in the special context of R&D laboratories, where the communication of ideas is crucial.

DISCUSSION QUESTIONS: CHAPTER 5

1. You are employed in the development laboratory of a major aerospace company. You have developed a chemical that, if added to aircraft fuel, promises to reduce significantly the risk of fire if the aircraft crashes. You have completed a detailed technical report on your work.

   Identify at least six other individuals or groups with whom you would have to communicate your discovery in order to get it adopted. Would your technical report be equally suitable for all these audiences? Describe the features that would be especially relevant and especially irrelevant for each audience. Outline a communication plan for reaching these six audiences, including: (a) the order in which you would approach them; (b) the content you would emphasize for each; and (c) the format (e.g., written report, formal presentation, informal discussion) you would choose for each audience.

2. Communication distortion or breakdown can result from noise at the encoding, transmission, or decoding stages. Give an example of each form of breakdown for the following communication processes:

   a. Transmitting a design specification by means of an engineering drawing from the design office to a machine operator on the shop floor

   b. Presenting a new technical idea from a researcher to the New Products Review Committee

   c. Informing a subordinate of yours that his or her work over the past year has been unsatisfactory

   Which of these three processes do you think would be most liable to distortion? Why? What might you do to overcome this distortion?

3. What is meant by "defensive communication"? What can be done to overcome it?

4. Is more communication generally the same as better communication? Why or why not? Give examples.

5. Organizations frequently arrange for employees to go together on retreats at a place remote from the plant or laboratory to discuss important issues. Suggest three reasons why communication might be expected to be better in such a setting than it is in normal day-to-day work.

6. Senior managers often complain that they are the last to know about serious problems within the organization. Why is this so, and what can the organization do about it?