

CONCERNING THE NATURE OF COMMUNICATION*

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I. CYBERNETICS AND PSYCHIATRY

The physical and engineering aspects of control devices, calculators and communication systems¹ are now related to a body of precise theory.² This science, which has been called cybernetics³ is gradually expanding into territory which is familiar from another point of view to psychologists, psychiatrists, and psychoanalysts. Cybernetics leads from consideration of physical devices like telegraph cables to attempts at precise mathematical analysis of such formulations as for example, the following: "numerous observations—comparison—thinking—scientific laws—practical application of these laws—new apparatus or machines built."⁴

The inspection of such a sequence makes it clear that students of mental science have a pertinent interest in these developments. Communication theory has a great deal to say about the mechanics of certain operations at which living organisms are peculiarly adept, especially in connection with the ability to respond selectively to signals received.^{5, 6} Cybernetics has hitherto received relatively little attention in the psychiatric literature, although a good deal of discussion by clinicians is mentioned or found in sources not ordinarily consulted by clinicians.^{3a, 7} Some physiologists have actually constructed cybernetic mechanisms as representatives of brain function.^{8, 9, 10} Shannon⁵ proposes a chess-playing machine. Meanwhile, the psychological aspects of communication have aroused considerable interest.^{11**} But the number of fortunate people who have had both intensive training in the theory and practice of communication engineering and extensive experience in dynamic psychotherapy appears to be stringently limited. The specialist in either field hesitates to venture as a layman into the other because of the pitfalls which tempt the uninitiated in such complex matters. Nevertheless it seems worth while to run some risks for the sake of scientific empiricism.

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**Dr. W. R. Ashby of Gloucester, England, conducted the meeting on cybernetics at the International Congress of Psychiatry in Paris in 1950. At this meeting, which was attended by a group with quite heterogeneous viewpoints, little inclination was shown to discuss the subject from the psychological point of view.

Some "cyberneticists" mention or even emphasize the analogies between their machines and the brain, or even the mind: "The realization that the brain and the computing machine have much in common may suggest new and valid approaches to psychopathology, and even to psychiatrics."^{3b} Others stress the essential differences: "Active thinking has been done by the designers of the machine and is done by the staff of scientists using the machine. Creative thinking is not to be found in the machinery itself."⁴

Cyberneticists, coming in one direction from theoretical physics and practical experience with communication systems and calculating machines, are able to state: "The information carried by a precise message in the absence of a noise is infinite. In the presence of a noise, however, this amount of information is finite, and it approaches 0 [zero] very rapidly as the noise increases in intensity."^{5c} "No communication mechanism, whether electrical or not, can call on the future to influence the past, and any contrivance which requires that, at some stage, we should controvert this rule, is simply unconstructible . . . once a message has been formed, a subsequent operation on it may deprive it of some of its information, but can never augment it."¹²

What has the psychotherapist, coming in the other direction from his clinical work, to say about these statements? He can make certain comments and discuss them on the basis of his own experience: First, that the notion of "a precise message" or "a message which has been formed" is psychologically inconceivable in interpersonal communication. Second, that in contrast to mathematical "information," the amount of psychological information increases rather than decreases with increasingly intense (intrinsic) "noise." Third, that human beings, in their interpersonal communications, do seem to call successfully on the future to influence the past.

The mathematician is able to discuss "noise" and "information" from a formal, syntactic point of view in terms of entropy,^{2,3,4} relating them as quantities to formulations of the second law of thermodynamics. The psychologist regards noise and information semeiotically from the pragmatic aspect. According to the common notion, as expressed in dictionaries, *noise* means "a disturbing or discordant sound." It is an emotional word. To say, "I hear a noise!" still means to most people, "I am disturbed." To say, "I have information!" means, "I know something." The common no-

tion of noise usually connotes "what I don't want to hear," and of information "what I do want to hear." The mathematician, in speaking, for example, of "combating noise" and "undesirable uncertainty," seems to accept these axiological connotations,^{2a} which the psychiatrist expresses as the anxiety aroused by noise and the feeling of security which comes from knowing something, respectively.

Since the psychiatrist is generally not equipped to deal rigorously with the mathematical concepts of "noise" and "information," it is fortunate that the mathematician sometimes indicates, implicitly and explicitly, that his discussions of these two quantities are influenced by the concepts of "desirability" and "intention." This provides a common area where the two disciplines overlap in their study of communication. If the psychiatrist defines information from the communicant's point of view as what he advertently desires and intends to communicate, and noise as what he inadvertently communicates without desiring or intending, an interesting situation arises. If we term the communicant for the moment a "machine," this may be stated as follows: Noise is the only factor which communicates operationally anything about the variable state of the machine itself. Information can communicate nothing about this except as a proposition whose verification depends upon scanning the noise. A machine which worked without noise would communicate nothing about the variations in its own state. When a message is desired about those variations, it must be derived from noise.

In interpersonal communication, such a message may be desired by the receiver. From the receiver's point of view, information can be defined as what he advertently desires and intends to receive, and noise as what he inadvertently receives without desiring or intending to receive. The reception of noise by the receiver interferes with his reception of information so that his reception is equivocal. If the receiver (in interpersonal communication) is interested in an apparently precise, formed message which the communicant desires and intends to transmit, then their definitions of noise and information coincide. But if the receiver is interested in the state of the communicant, then what is noise to the communicant becomes information to the receiver, and what is information to the communicant becomes noise to the receiver, since it interferes with his clear reception of the message he desires to receive.

so that his reception is equivocal. Thus in the psychological situation, what is information at one moment can become noise at the next moment, and vice versa, by a mere change of attitude on the part of the receiver. Furthermore, since the receiver can re-evaluate what has already happened, what was noise in the past can become information in the future, and vice versa. The situation is somewhat analogous in the case of machines, insofar as they are objects of human observation. Although these statements are based on a shift in defining "noise" and "information" from the syntactic to the pragmatic point of view, they nevertheless present aspects to be considered in any mathematical theory of communication which takes psychological factors into account.

This position can be generalized psychologically in the following proposition: In the case of any machine which is a "black box" (the communicant), the amount of information which can be derived concerning the state of the machine itself is a direct function of the (intrinsic) noise. If the machine functions perfectly, this type of information is limited to the information that it is functioning perfectly. Specifically, a theoretically perfect diplomat reveals nothing of his inner life. The only information he communicates about himself to others is that he has perfect manners. On the other hand, the ambivalence of an ardent lover or a deadly enemy is communicated only by the noise, if any, which contaminates the precisely formed message he intends to convey. It might be possible to increase the area of mutual understanding between cybernetics and psychology by analyzing this proposition in terms of entropy in such a fashion as to make the analysis psychologically cogent. P. W. Bridgman¹³ pointed out the difficulty in dealing in terms of entropy with any system containing living organisms. This difficulty may arise *a fortiori* in the case of psychological systems; nevertheless, some psychologists have been sufficiently intrigued by the possibility to write about it.¹⁴

It might appear that the problem is no more complex than dealing by communication theory with a talking movie of a person who is not acting, so that, for example, the sound track and the pictures may be regarded as noise and information respectively, or vice versa. But it is not that simple. In interpersonal communication, the message is not manifest immediately to the receiver any more than it is to the communicant; and both parties may be exerting strenuous efforts to confuse noise with information, and vice

versa. Common clinical examples of these deceptive maneuvers are as follows: 1. "I'm talking a lot, therefore I'm telling you a lot." 2. "My slip of the tongue was accidental, therefore you must not judge me by it." 3. "He says he loves me, therefore he does." 4. "She forgot my birthday because she is absent-minded." Whether it is possible to relate these complications to matters which the mathematician is already capable of dealing with, such as memory and coding, remains to be seen.

II. THE LATENT COMMUNICATION

The position taken here that is to be justified heuristically in regard to interpersonal communication, especially in the clinical situation, is as follows: That the notion of "a precise message" is psychologically inconceivable; that the amount of potential psychological information increases rather than decreases with increasingly intense (intrinsic) noise; that the future can be successfully called upon to influence the past.

The crux of the matter from the psychological viewpoint is the differentiation between "manifest communications" and "latent communications." To illustrate this, it is convenient to consider first a communication which is indirect in time, place, and person, such as a message from antiquity.

An interesting and cogent example is the Rhind Papyrus.¹⁵ Thirty-six hundred years ago, an Egyptian scribe named Ahmose was attempting to communicate to some countrymen a clever method of dealing with problems in arithmetic. Reading the English translation today, one cannot help being interested in the manifest communication, which describes a fascinating but highly inefficient method of solving such problems. This method is what Ahmose desired and intended to communicate. But to the modern reader, even more interesting is what he did not advertently intend to communicate, the communication latent in his papyrus, which concerns, among other things, a certain amount of carelessness, a lack of intellectual integrity, a preponderant interest in food and how to preserve it from the ravages of mice, and an undemocratic attitude.

A prehistoric kitchen-midden is an even more striking example of a latent communication, since it was not intended as a communication at all and yet communicates a great deal to future generations, e. g., dates.¹⁶

With this preparation, one can approach the more subtle situation met with in the direct, *vis-à-vis* communications of clinical practice. At a certain stage of his treatment, a patient bought a recording machine. He would dictate his dreams during the night and proudly bring the machine to the psychiatrist's office in the morning and run them off. This was intended to demonstrate his efficiency and co-operation, but instead showed his fear of interpersonal relationships and his hostility to the psychiatrist. He filled the machine with manifest communications which were of far less importance at the time than the latent communication signified by his purchase of the machine for this sole purpose. Furthermore, his eulogies of the machine inadvertently revealed far more about himself than they did about the recorder.

From the consideration of examples such as these, it becomes evident that the value of a communication (to the receiver) cannot be set by the communicant, but only by the receiver. No matter how anxious the communicant is to form a precise message, his communication cannot be limited to what he intends. Furthermore, the unintended communications, which from his point of view are "noise," are of more psychological value than the intended ones. But this depends on what the receiver regards as information; the patient's wife, for example, was unable at the time to see any significance in his purchase of the machine. During her own subsequent treatment, however, it happened that a great many of her husband's actions which she had previously ignored now became very informative, so that what had previously seemed like a lot of noise was transformed into information, particularly when she took the timing and the status of the communicant into account. Similarly in the case of the papyrus, the precise message which Ahmose intended is not so precise after all, and the less precise it is, the more we learn about Ahmose and his people, mainly because our distance in time from their culture enables us to be more objective. The random, disarranged, and once noisome kitchen-midden also becomes very informative after the lapse of many centuries.

In the case of interpersonal relationships, in general, intended, precise, formal, rational, verbal communications are of less value than inadvertent, ambiguous, informal, nonrational, nonverbal communications; for in such cases the receiver is not interested in the information the communicant intends but in the psychological

reality behind it.* "Arithmetical problems about granaries can be solved," means at the most superficial psychological level: "I am interested in granaries"; and "I am co-operative" means "*I feel I should tell you at this time that I am co-operative.*"

These observations make certain defining statements possible from the psychological point of view. Any emission of energy which affects an organism may be called a communication, providing it is understood by the receiver. For example, Mario Pei refers to "the broader definition of language" as "any transfer of meaning."^{18b} Whatever can be understood is a *communication*. Whatever cannot be understood is not a communication. Only a person who understands the actions of bees can receive communications from them.²¹ An image on a television screen is a communication to the public; "snow" on the screen is a communication only insofar as the receiving organism understands how television works.

A communication is *understood* when it changes the distribution of psychic cathexes in the receiving organism. Any change in the psychic cathexes in an organism, such as that brought about by a communication, changes its potentialities for action. Cathexis refers to the charge of "psychic energy" on a psychic image, and the investment of such an image with feeling and significance. Not everything which changes cathectic distribution and, hence, poten-

*These are principles well known explicitly or implicitly to all psychiatrists and psychologists, and for that matter to all physicians. The probability of their validity is increased by the fact that students of other disciplines, viewing other aspects, come to similar conclusions. Among linguists, for example, E. H. Sturtevant (Ref. 17) takes an almost cynical position: "All real intentions and emotions got themselves expressed involuntarily, and as yet nothing but intention and emotion had called for expression. So voluntary communication can scarcely have been called upon except to deceive; language must have been invented for the purpose of lying." Concerning the specificity of nonverbal communications, another linguist, Mario Pei (Ref. 18), says: "It is further estimated that some seven hundred thousand distinct elementary gestures can be produced by facial expressions, postures, movements of the arms, wrists, fingers, etc., and their combinations." Seven hundred thousand is more than the number of words in the English language, including a few hundred thousand archaic and technical terms (Ref. 18a).

Still, as to the relative values of verbal and nonverbal communications, there are contrasting viewpoints. Darwin (Ref. 19) says: "The movements of expression . . . serve as the first means of communication. . . . They reveal the thoughts and intentions of others more truly than do words, which may be falsified." Freud (Ref. 20) remarks on the other hand: "Speech owes its importance to its aptitude for mutual understanding in the herd, and upon it the identification of the individuals with one another largely rests."

tialities for action, is a communication: Metabolic changes, fantasies, and dreams may do the same thing. The *value* of a communication is the extent to which it changes quantitatively the cathectic distributions in the communicant and the receiver and, hence, their potentialities for action. The value is the quantitative aspect of the quality of being understood, and changes on a time scale. It is principally discussed here from the receiver's viewpoint. *Interpersonal* communication generally refers here to *vis-à-vis* communication which influences the development of the relationship between the autonomous portions of the personalities concerned. *Intend* (in this discussion of the latent communication) is used with its common dictionary implication of conscious design, determination, and direction.

III. CLINICAL APPLICATIONS

In the case of machines, there are at least two kinds of messages received: One is the message which is put into the machine as information; another is the message which the machine sends about its own state as noise. Similarly, there are two kinds of communications between people: One refers to the manifest topic of communication, the other to the state of the communicant. The latter, as psychiatrists know, is generally latent, for if a man is asked: "How are you?" he reveals the true state of affairs, not by the manifest content of his reply, but by his manner, his choice of words, and a multitude of other clues. It has been traditionally agreed for at least five thousand years that in the development of interpersonal relationships, the state of a communicant (with regard to *Maat* or righteousness, for example) is more important than what he or she is saying. In the present terminology, the latent communication is generally of more value in this regard than the manifest communication. Its superior value is well known to the layman who remarks: "It's not what she says, it's the way she says it!"

There must be some way for the receiver to understand the latent communication. With a certain part of his ego, the communicant tries "to form a precise message." But what comes out is a configuration to which many functions make their contributions and through which they potentially reveal themselves. The receiver understands as much of this as he is ready to, but it seems always more than the communicant advertently intended. Just as the

communicant communicates, so the receiver perceives through a configuration of many functions. What is important is that he understands more than he is aware of, just as the communicant reveals more than he is aware of. What he understands but is not aware of is his "latent response" to the communication. He may or may not eventually become fully aware of all that he understands, but his psychic cathexes are redistributed and his potentialities for action changed much more than he is aware of at a given moment. The following case demonstrates the nature of the latent response and that it is on the basis of the latent response that the receiver relies on the future to rearrange the past into new components of noise and information. It also shows how in the mind, information does not "exist"; it "becomes."

A man who was courting a widow tried to curry her favor by lavishing attention on her children and her dog. He frequently stated with apparent sincerity, "I love children and dogs." The widow's manifest response was to think, speak, and act with conscious intent as though she accepted his manifest communication at face value. But along with the latter she received an impression which was not yet a manifest response. She noticed that his voice had a peculiar tone when he made this declaration. This tone was "noise" in many senses of the word. It was not intended, it communicated no information about his love (at the time), it was a vibration of the "machine" which made his words less clear, and it was disturbing. On one occasion, she observed him (without his knowledge) snarling at a child, and on another occasion kicking a dog. On each of these occasions an interesting event took place: A lot of "noises," of whose value and import the widow was not previously aware and which she had never intended to notice, were suddenly integrated so that her attention was adverted to them and they became informative: "He was lying *all along* when he said he loved children and dogs." The wooer's manifest communication had carried with it some latent communications. These activated in the widow a fund of inadvertent latent responses which led to her feeling of uneasiness. When his insincerity became manifest, her stored-up latent responses became manifest to her. While they were still latent, however, they were understood in the sense that they changed her potentialities for action so that, without precisely knowing why or consciously planning to, she maintained a certain reserve and spied upon him a little.

This example attempts to demonstrate why certain responses are called "latent" and why such latent influences are called "responses." The distinction between latent responses and latent content must now be discussed. A young scientist was greatly interested in the very subject discussed here: the relationship between cybernetics and psychology. He maintained that his ideas on the subject were objective, and on the surface they appeared so, but it soon became evident that he had a response of which he was not aware, to the problem. He became very defensive when the inclusion in his discussion of a certain quotation was questioned, a remark of O'Brien's in Orwell's *1984*: "Do you suppose our mathematicians are unequal to that?" It soon appeared that the literature he had read on communication theory had made him uneasy, so that quite unconsciously he had developed a hostile attitude, for he feared that further progress in the subject would reduce the esthetic values in human society. His latent response to the manifest and latent communications of the mathematicians was highly charged with resentment toward them. But the latent content of his hostility referred to something far in the past: his fear that his very conscientious ("mathematical") father would deprive him of the pleasure of having romantic ("esthetic") fantasies about his mother. He had a latent response (which became manifest in analysis) about the mathematicians, based on latent content about himself.

A woman reported: "I dreamed about a kitten." Both her latent communication, and the latent response in the analyst's mind were, as they both discovered later, something about a miscarriage, although at the time they talked about cats. The latent content in her mind, which determined her latent communication, was about herself, and the analyst's latent response was also about her and not about himself. In general, latent content refers to the latent perception of what concerns the individual's own psychology; latent response refers to the latent perception through communication of someone else's psychology, or, more broadly, to the latent perception through communication of something about external reality. Doubtful cases are taken care of in a formal way by defining communication as an understood emission of energy which affects the organism. The psychiatrist's latent response in clinical communication is usually a response to: the patient's latent response to a previous communication, plus the patient's latent con-

tent. For example: "This patient doesn't know that he is angry at what I said, which reminds him of earlier experiences; is that why I'm being unusually careful of what I say? And conversely for the patient sometimes, *mutatis mutandis*. For example: "The doctor doesn't know that he is responding to my provocation because of his earlier experiences; is that what I have to settle with him?"*

The concept of the latent response may now be recognized as having some familiar connotations. In clinical practice it refers to the latent communication of the subconscious reactions of the patient to his situation and to the subconscious perception of these reactions by the analyst, ideally without any interference from his own anxieties. In other words, it applies in this situation mainly to the perception of the transference reactions with a minimum of interference from counter-transference or anxiety, excluding what the analyst is able to verbalize to himself immediately. The peculiar skill of the analyst in this respect is to be able to detect more than is ordinarily detected of the latent communication. This skill comes through training in detecting his own latent responses and in purifying them by segregating the latent thoughts caused by counter-transference and anxiety. This is not meant to imply that there is necessarily a one-to-one relationship between a manifest communication and a manifest response, or between a latent communication and a latent response, although there is an empirical relationship.

Another familiar aspect of the latent response is its relationship to the unconscious or preconscious perceptive ego, that is, to intuition. In other words, the latent response to a communication is the intuitive knowledge of the receiver. Intuition may be described as follows:²³ It is one part of a series of processes (a segment of an epistemological spectrum) which work above and below the

*The latent response may be represented by, but is not identical with, a preconscious stream of associations in the mind of the receiver. This stream of thoughts can sometimes be detected by introspection while listening. It may be more or less influenced by the latent content which the communication activates in the receiver and is usually a compromise formation of the two influences: the latent response and the latent content which the manifest and latent communications activate. Patients often seem to respond to this stream of associations, when it occurs, rather than to the manifest communications of the analyst. T. Reik, (Ref. 22a) offers some good examples of this preconscious phenomenon. He also describes excellently some latent responses, though not by that name (Ref. 22b). All this is difficult to state more simply because of the multiplicity of vectors.

level of consciousness in an apparently integrated fashion, with shifting emphasis according to special conditions. Intuition is knowledge based on experience and acquired through sensory contact with the subject by means of pre-verbal unconscious or pre-conscious functions, so that the intuiter at first cannot formulate to himself or others exactly how he came to his conclusions. This means that the individual can know something without knowing how he knows it. He may not even know what it is that he knows, but behaves or reacts in a specific way as if his actions or reactions were based on some special knowledge.* In fact, he may not even know that he knows something, yet behaves as if he did.²⁶

The receiver may not be aware that anything has been communicated besides the manifest content; or, if he is, he may not know how the latent communication is conveyed. Nevertheless, the distribution of his psychic cathexes is changed so that he behaves or reacts as if he had some additional understanding.

It is interesting to note that, in general, women seem to be more aware of, and to place more value consciously on the latent communication than men. For example, they are more apt to be aware of being influenced to a greater degree by a man's mood, zeal, or tone of voice than by what he says. Many men prefer to think that they are primarily influenced by the manifest communication.

SUMMARY

Psychological aspects of the mathematical concepts of "noise" and "information" are discussed. Although these concepts are now mathematically related to the second law of thermodynamics, their evaluation still involves psychological problems. The most important point in this respect is that it is "noise" and not "information" which signals the state of the machine itself. This introduces an apparent paradox in the study of communication when "noise" and "information" are defined from a psychological point of view.

An attempt is made to justify heuristically some important differences in communication theory between the mathematical (syntactic) and the psychological (pragmatic) points of view. The

*This is reminiscent of Schilder's statement regarding dogs: "It is also true that the sound which for the dog has become a promise that feeding will occur is no longer like any other sound. It has gone through many more constructive processes. For the dog the sound has the import of feeding." (Ref. 24.) Schilder epitomizes the situation when he speaks of the prior wordless state that every thought goes through before it is formulated. (Ref. 25.)

psychologist differs from the mathematician in considering: (1) that the notion of "a precise message" is psychologically inconceivable; (2) that the amount of potential psychological information increases rather than decreases with increasingly intense (intrinsic) noise; (3) that the future can be successfully called upon to influence the past.

In interpersonal communications, "noise" is of more value than "information," since in such cases it is of more value to the communicants to know about each other's states than to give "information" to each other. "Noise" carries latent communications from the communicant. Manifest and latent communications arouse latent responses in the receiver which are important to both parties and are of special interest to psychiatrists.

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