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An Epistemological Foundation for Communication

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Contrasting the ontological view of scientific inquiry with an epistemological view drawn from cybernetics yields a dynamic conception of communication that joins observers with what they observe.

Since its inception in the 1940s, cybernetics held the promise of providing a general theory of communication. Norbert Wiener defined cybernetics as the "science of communication and control" and, to emphasize the irrelevance of the nature (or of the materiality) of the communicators involved, he added to the commonly social definition "in the animal and machine." Even so, early successes of cybernetics were clearly technical-for example, the design of automatic controllers, computers, telecommunication systems, and information networks; theoretical developments went far beyond this initial focus. Examples with far-reaching implications are theories of information flows in complex systems, theories of self-organization, N-person game theories, theories of a system's equilibria and homeostasis, theories of positive and negative feedback, and theories of morphogenesis, all of which formalized entirely general ideas. Consequently, Warren McCulloch, Margaret Mead, Stafford Beer, Karl Deutsch, Gregory Bateson, G. Spencer Brown, and Francisco Varela, among many others, derived profound insights from cybernetics, applying them to neurophysiology, cognition, anthropology, religion, industrial organization, government, psychology, logic, and biology. W. Ross Ashby captured the power of cybernetics to organize knowledge in these diverse fields with an analogy asserting that cybernetics is to real systems as geometry is to the earth's surface.

In retrospect--and it is always easier to evaluate intellectual contributions retrospectively--cybernetics has been concerned with three basic forms of construction: circularity, process, and variety, to which recently has been added observation. The last will be my primary concern.

Circularity is the essence of the early notion of feedback (circular causality). The notion of circularity is found in recursive computation (the use of DO loops, for example), in Ashby's suggestion that cybernetics be concerned with informationally closed systems, and in the paradox of self-organization that has developed into a concern with self-reference (18), with autonomy (19), and with autopoiesis (15, 16).

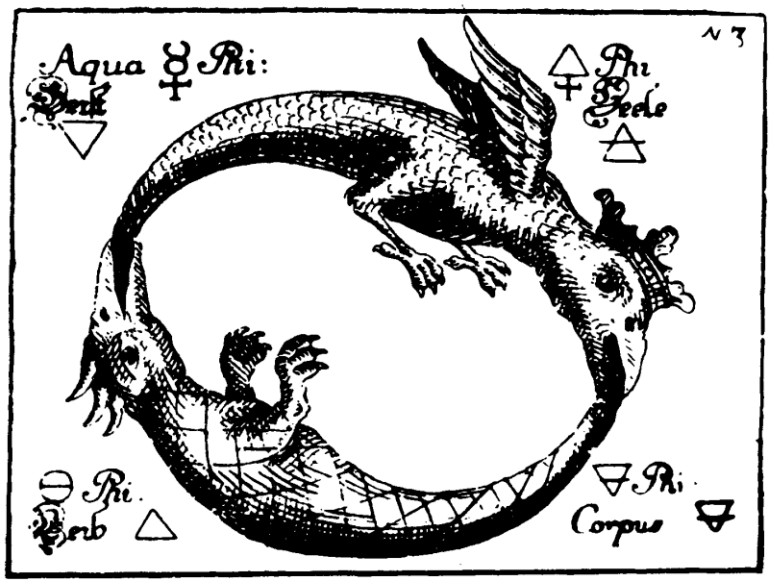
Process is evident in efforts to explain change in terms of a system's transformations (rather than in terms of its producers or products), for example, by involving time in its communication constructs (quite unlike linguists and semanticians do), and more generally by emphasizing a system's dynamics, development, epigenesis, and evolution in preference to determining what something or who someone is. A crucial aspect of cybernetics is that it links and thereby explains the behavior of a system in terms of the organization of its parts, not in terms of what these parts are.

Variety, the recognition of multitudes, lies at the root of the notion of information, with associated concepts of constraint, uncertainty, and chance. Variety is built into the understanding of a system as composed of many (interacting) parts or as describable in terms of variables and has found its material realizations in computer architecture, programming, and use. Cybernetics has developed several laws, like Ashby's law of requisite variety, which links variety to control, adaptation, intelligence, and evolution.

Observation, as a process of interpreting information emitted by an object, underlies all scientific inquiries. But the application of such notions of circularity, process, and variety to the very activity in which cyberneticians are engaged yields a notion of observation that involves circular forms of communication, assigns participants (objects and observers alike) the dual roles of senders *and* receivers, and recognizes their capacity for cognition (including creativity and intelligence).

The application of cybernetics onto itself* is *producing a shift in the paradigm of scientific inquiry from ontology to epistemology and is likely to reorient our thinking aboutcommunication in fundamental ways.

Let me clarify the terms characterizing this shift. Ontology is the branch of philosophy that is concerned with the nature of reality or what exists independent of its observation. In a philosophy of science, ontological assumptions imply a one-way process of communication from an unvarying and disinterested object to an intelligent and interested observer; patterns in nature are taken to be involuntary, given and waiting to be discovered. By insisting on objectivity, established scientific methods are designed to prevent the properties of observers from entering their domain of observation. By insisting on replicability, such methods are limited to detecting stable phenomena only. The ontological commitments that observers may make in their work detach them from and make them intellectually superior to the object they describe.



Medieval sign for holism-a unity of two dragons, distinct yet related by a perfectly symmetrical and circular dependency that requires no reference to anything outside it: mutual self-reference, (two-way) communication, observational closure. The corners bear the signs of the four elements of which the universe was then constructed.

In contrast to ontology, epistemology is the branch of philosophy that is concerned with knowledge, not with what exists. From my acquaintance with epistemology generally, cybernetic epistemology has become more specific, emphasizing "processes by which we come to know," perhaps at the expense of its products or what it is that becomes known thereby. Probably the

most important consequence of regarding communication between the observers and the observed to flow both ways is that the properties of observers enter their domain of observation and render the established standards of objectivity and replicability unachievable. A cybernetic epistemology that permits this does not thereby open the door to speculation and fuzzy thinking. Rather, this epistemology represents a radical application of what we know about communication generally to processes of scientific observation in particular and yields what I believe to be a powerful paradigm within which certain phenomena can be constructed in ways that the established paradigm does not permit. The choice of one paradigm over another is not subject to empirical proof, for each carries its own criteria of acceptability. Although ethical and perhaps aesthetic criteria might be applicable, I cannot deal with these here and will instead outline what I consider to be the basic epistemological unity for inquiries into communication.

All observation entails a unity of two processes-"the drawing of distinctions" and "the formulation of relations."

Distinctions are drawn by an observer in observing his or her environment. Whether distinctions are purposeful and reflected or involuntary and determined by convention, they divide a space into parts and thus exert some force upon the observer's domain of observation. Distinctions may be drawn along the skin of an organism, separating the inside from the outside. Distinctions may be drawn between the parts of a motorcycle, locating them in mutually exclusive spaces. Distinctions may be drawn within a sample of data, assigning the results to different classes. Distinctions also may be drawn by making a line on a piece of paper so that the points on one side cannot be on the other. The drawing of distinctions is arbitrary in principle, although there may be reasons that some are better than others. In Spencer Brown's words, "distinction is perfect continence" (18, p. 1).

Distinctions are the source of variety in the observer's environment. Without the act of drawing distinctions everything would appear to be an undifferentiated mass without a handle to hold on to. Only after some distinctions are drawn are observers capable of obtaining information and saying something about their world. Through making these distinctions an observer creates a capacity for understanding. As Spencer Brown put it:

> *A universe comes into being when a space is severed or taken apart. . . . The act is itself already remembered, even if unconsciously, as our first attempt to distinguish different things in a world where, in the first place, the boundaries can be drawn anywhere we please. At this stage the universe cannot be distinguished from how we act upon it, and the world may seem like shifting sand beneath our feet* (18, p. xxix).

Relations are formulated to reconstruct that (holistic) property in the environment that making the distinctions seem to violate. To formulate a relation means putting it into some form, whether it be that of a process in the nervous system, of a computer algorithm, or of a linguistic proposition. This form must be capable of operationally describing, reproducing, or modeling how one part created by a distinction differs from, is linked to, correlates with, conditions, causes, follows, contradicts, etc., the other part created by that distinction. Like drawing a distinction, formulating a relation is the creative act of an observer. Although there is no reason to suppose that the relations chosen by an observer exist in reality, the resulting formulation is

not entirely synthetic. It is an observer's response to the environment's response to that observer's original distinction. This environment might assert itself in defense against the distinction (as in response to racial discrimination). This environment might simply render a distinction disadvantageous to the observer (as when a surgeon mistakenly cuts into an organ with a unity of its own). This environment also might not respond at all, rendering a distinction arbitrary (as in the established philosophy of science that does not provide for feedback with an object of analysis after data have been collected). Relations are formulated to reckon with the empirical consequences of drawing distinctions.

My thesis is that knowledge arises in the alternating sequence of distinction and relation.

The two operations embodied in observers and their environment go hand in hand and form what I would call the basic *epistemological unity* of observation. I must add here that I have been using observers as materially distinct from their environment merely as a prop for developing the idea of observation as a process involving both. Once this is understood, the observer/environment distinction can be abandoned in favor of the unity that should by now be clear. Before suggesting some general propositions about this unity, let me give a few examples of how knowledge arises.

Consider the sequence of numbers:

… 64128256512102420484096 **…**

One manifestation of knowledge or understanding is the ability to predict. This ability involves generating a sequence from the observation of its parts and extending the process beyond its known boundaries (into the past and/or into the future) for example by an iterative algorithm that relates each part of the sequence to its successor. To create such an algorithm presupposes a partition of the whole sequence into component parts. Naturally, such a partition is arbitrary, except for its usefulness in the reconstructability of the sequence. Taking each individual numeral of the above sequence as a separate part appears to yield no pattern. Taking pairs or triples is equally unsuccessful, but, after partitioning the sequence as follows--

64/1281256/512/1024/2048/4096

-it is apparent that each successor is twice the previous number, $p' = 2p$, and the sequence might have come from and continue as

12481632... ...819216384...

Note that there is no rule for grouping these numerals without the algorithm relating the distinguished parts. Neither the distinction alone nor the function alone can yield understanding, but the unity of the two clearly does.

Consider reconstructability analysis (2, 11), which is a generalization of several statistical techniques, including chi-square methods, to many variables. It starts with an original distribution of data points in a multivariate space. The analyst draws distinctions among groups

of variables and thereby separates what could be represented by the parts of a model. The analyst then assembles a model from these parts, noting how they connect, which generates a new distribution in the original space. If the two distributions match, the analyst's model does no (descriptive) harm to the environment from which the data originated, and further and finer distinctions may be made. If the model-generated distribution no longer matches the data, the analyst must stop, reconsider how the distinction violates the structure manifest in the data, and go back, perhaps exploring other paths. The method stipulates relations among the parts of the model, quantifies their significance, and thus reveals a structure that is simple enough for the analyst while retaining the holistic quality of the object of analysis. Here "understanding" results from the give and take of drawing distinctions and observing how the environment, as manifested in data, responds.

Consider the biology of cognition. The mammalian retina consists of numerous light-sensitive cones, each of which distinguishes magnitudes but no pattern. Information about these magnitudes is not transmitted directly to the brain because, immediately behind the retina, a network of neurons computes relations in the form of differences between the impulses originating in neighboring cones. Following the first layer of neurons is another one, which now computes differences of differences, which are again transmitted to another layer of neurons, etc. Thus, higher-order patterns are created and information about them ultimately reaches the brain, where it leads to further computations of relations and ultimately of actions that effect a change in the very image that gave rise to the original sensation. Cognition-the sequence of drawing distinctions and computing relations-is in fact circular, involving the observer's nervous system as well as the causal network of the environment. In not insignificant ways, cognition is a function of the biological organization of the observer (15).

Consider a national economy, with its innumerably many activities and forms of exchange. Economists, serving particular interests, have experimented with different distinctions (sectors, regions, industries, etc.), employed statistical regularities in search of meaningful units, and tried out a variety of quantitative measurements (of cash flows, demand supply characteristics, interest rates, investments, gross national products, etc.), all of which are initially arbitrary and uninformative. But they start to make sense when they can be shown to correlate and lead to mathematical models that account for the relationships among the variables as measured, ideally reconstructing and simulating the economy in terms of the distinctions made. Although economists have not been as successful in this endeavor as they would like, and alternative economic theories and models of the same phenomena are usually available, the unity of drawing distinctions and formulating relations is evident not only in the process of economic modeling but also in the circularity of its policy implications: changing economic realities, calling for new models, etc.

Note that it is rarely clear which of the two operations comes first. Sometimes an observer will formulate a relationship to recapture what would be lost if a distinction were demanded. Sometimes the observer will draw distinctions to reify a desired relation. This arbitrariness is a mark of the circularity of our epistemological unity.

While ontological commitments assign scientific observers the role of discoverers of facts that are unalterably outside themselves, the emerging epistemology for communication assigns such observers the role of co-creators of facts.

Accordingly, from the point of view of our epistemological unity, observation is not a one-way process but more like a dialogue between the parts of a system that may alternate in assuming the roles of observer and observed and that may become engaged in a conceivably unending sequence of drawing distinctions and formulating relations. From the general theory of a system's equilibria, we know that such circular processes are likely to converge toward a state in which changes become negligible or absent. At that point observers are in harmony with what they believe they observe-which may be nothing but themselves. The state toward which the process of observation converges (i.e., the eigenvalue of the epistemological unity) could be called *understanding,* but nothing is inherently special about it. A cybernetic thesis ("thesis" in the sense that we have experienced little to the contrary) suggests that the nervous system is organized or organizes itself such that it computes a stable reality" (8**,** p. 53). This "reality" is located neither inside nor outside the observing organism but resides in the ongoing process of drawing distinctions and formulating relations. In this process "facts" may come into being.

In studies of communication in observed systems, a detached scientific observer can make one of two kinds of philosophical commitments, one to an ontology, the other to an epistemology.

Observed systems are approached by observers who see themselves essentially outside that system. Even though observers may be aware that their efforts to bring about a situation favorable to observation do affect the situation being observed (see Heisenberg's [9] uncertainty principle), they remain uninvolved and detached. Consequently, observers try to avoid experimenter influences and measurement effects and, when these effects arise, they are considered undesirable noise in a one-way channel of communication and a threat to established scientific standards (of reliability, validity, and statistical significance).

In most of the familiar definitions of communication (including the theories from which they derive and the methods used to gather data in their support), ontological commitments predominate. By relating communication to changes in psychological states, attitudes, or individual reactions, behavioral theories of communication stress not only the involuntary nature of individual responses to stimuli but also, by extension, the involuntary nature of the data analyzed by behavioral scientists. This confirms what I have said above: ontological commitments imply that the aim of observation is to *discover* the rules or laws governing human behavior outside and independent of the observer.

Ontological commitments of this kind are not abandoned when symbols, messages, or linguistic expressions take the place of physical stimuli in behavioral experiments or when they are considered to assume a mediating position between *two* or more communicators. This substitution only gives communication researchers the added authority to set the criteria for deciding what is symbolic and what is not or what constitutes an inquiry into communication and what does not. The nature of the communication theory resulting from such substitutions and the research methods used to gather evidence on their behalf does not alter the fact that symbolic behavior is being observed in a reality considered independent of the observer.

Although both symbolic-interactional and transactional theories of communication differ from behavioral ones by stressing the voluntary nature of communication, they too do not offer an alternative philosophical commitment. Symbolic-interactionalists emphasize feedback, mutuality, and complementarity in human communication and allow individuals to reach agreement on the meaning of symbols. Transactional theorists emphasize individual interpretation and action in particular social contexts. Whatever the difference, both locate the phenomena they aim to objectively describe in a reality that exists independent of their own interpretations and values. (The current controversy over value-free science has this ontological commitment at its root.)

In the spirit of a cybernetic epistemology, communication researchers who try to understand processes of communication outside themselves must realize that they will have to receive information about this phenomenon and are thus subject to the same constraints. Even in the restricted role of outside observers, researchers will have to build into their notion of (one-way) communication (from the environment) a test for whether communication "occurred" within the system believed to be observed. Formal tests of this kind are available (12) and are probably more widely practiced than is immediately apparent. They presuppose, first, that observers draw several distinctions within the observed system, at least among what they may consider to be communicators, their variability and time. The three distinctions are of course arbitrary. Second, observers require some data on how the whole system as well as its component parts behave, i.e., how the entities that have been distinguished are related. Obviously, a process of Communication is neither a part of the observed system (it occupies no physical space) nor does it emit information about its existence (in the way a sender might). But it certainly renders observers unable to explain the nature or behavior of one communicator without reference to another. It would follow that *communication is that observer-created relational construction which explains what makes a system defy its decomposition* (without loss of understanding) into independent parts. A test for communication does not answer the question of "what does in fact exist" but establishes the necessity for creating such a relational construction.

Note that the epistemological assumptions underlying such a test emphasize the observers' contributions in bringing about what is essentially a holistic phenomenon (relating parts to form wholes). It is the observers who draw a distinction, wait to see what happens (how the environment, the data, respond), and finally decide whether there is a compelling reason to formulate a dynamic relationship (that is called communication) to account for the difference between the behavior of the whole and of the aggregate of its parts.

Note also that this notion of communication is linked to that of *process.* If the behavior of one individual cannot be fully understood without reference to the behavior of another, then describing them separately will reduce an understanding of both individuals together. What is omitted from this reductionism is the dynamics of interaction and dependency that we call communication. Conversely, if someone stares at a television screen or reads a newspaper, this does not constitute evidence for communication, as it is possible for that person to give the impression of exposure to a medium while thinking of or doing something entirely different. If there is no demonstrable need for a dynamic dependency between the behavior of a communicator (including the presence or absence of a medium) and the behavior of a supposed

receiver, communication is dispensable as an explanatory device. Both can then be described separately and without loss. Communication is not dispensable, however, when there is a difference between a collection of individuals, each involved in his or her own activity, and that collection of individuals doing something in concert. The noise they make in each other's presence is insufficient evidence that communication processes are taking place. In this sense, the construct of communication may be said to heal the wounds inflicted by observers who regard people as individuals when their behaviors are demonstrably dependent on each other.

Communication concepts of this kind are neither entirely new nor inconsistent with some of the familiar ones.

Shannon's (17) mathematical theory, for example, formalizes the idea by defining the amount of information transmitted as the difference between two entropies: the entropy in all components measured separately and the joint entropy. Expressed in terms of a sender and a receiver:

$$I = H(\text{sender}) + H(\text{receiver}) - H(\text{sender \& receiver})$$

The classical phrase that communication is "the process by which one mind affects another" states virtually the same as the above, except that cybernetics provides a formal test for the indispensability of constructing such a process. So does Lasswell's (14) dictum "who says what by which channel to whom and with what effect," except that questions regarding the "who," the "what," the "whom," etc., cannot be answered separately, as Lasswell proposed. Rather, one must observe whether there is any correlation between the answers, for if there is none, the answers characterize something other than communication. With ontological assumptions in mind, studies that define communication as if it were a kind of stimulus, as if it were contained in a specialized medium, or as if it were the acts by members of a privileged species cannot address the issues of communication as a process that makes a whole behave differently from the sum of its parts.

As a construct to cope with a dynamic environment that observers cannot decompose without loss, communication has, I believe, no intrinsic value or purpose. In fact, it complicates the work of observers. Systems whose parts can be observed separately without or with only negligible loss can be dealt with more easily. The ability to draw distinctions that isolate problems, to design autonomous devices, like the ability to make secure steps into the unknown, is as much an art as the ability to solve a problem, to recognize dynamic dependencies, and to cope with the environmental responses to observers' actions. The debilitating and dogmatic claim that "everything is related to everything else" should be put to a test, for it is indeed possible that apparent relationships between phenomena are the sole product of observers' imaginations or wishes. Experiments in perception have revealed many examples in which observers feel the need to and indeed see relationships that are in fact entirely spurious. The test establishes the necessity of communication as a relational construct. I might add that advantages usually arise not from the need for but from the absence of the need for such a construct.

Communication in systems that involve their observers as integral parts escapes research with ontological commitments in mind. The crucial difference between studying a system from the outside or from within lies in the properties of the observers. In systems involving their

observers, the *properties of its observers enter the system under consideration,* often as constitutive components, and a theory of communication in such systems must account for this. In contrast, the properties of detached observers either do not enter the system being observed, or, if they do, their detached position renders such properties undesirable disturbances. Ontological commitments simply rule that the observers' properties may not enter their domain of observation and, to retain this commitment, efforts must be directed to minimize their effects. Ontological commitments therefore become untenable in the study of communication in systems involving their observers.

Systems that include their own observers are essentially social systems. A society, a social organization, or a human group consists of individuals who observe each other and communicate with each other about their observations. This applies to scientific observers and human subjects alike. People do not merely respond to communications as do mechanical devices to physical events. They have minds, interpretative abilities, and interests and act accordingly. When a theory of society is proposed within that society, individuals take positions, especially since such a theory must refer to them as its object. Members of this society may behave either to confirm or to contradict this theory and thereby change the very object the theory claims to represent. Systems involving their observers are by their very nature self-referential; communication within such systems is circular and has a paradoxical quality absent from systems that are observed from the outside.

Theories* of *communication in systems that include their observers must be constructed within the very object they claim to describe, and the act of formulating such theories* is *also an act of changing that object while it* is *described.

Consider family therapy as an example of such a system. The therapist is confronted with a family whose members may have agreed upon why they seek help. However, this consensus has been obtained without the therapist, for whom the explanation of the family's problems may be mere words. To understand what is going on in that family, the therapist will have to observe how alliances are formed, what role each individual plays in them, and how members interact with each other to protect their definitions of themselves, of the family as a whole, and of the alleged problem. The first of these three issues concerns the drawing of suitable distinctions within the family (individuals are convenient and hence often misleading constituents of the family). The second concerns assigning suitable positions to the members within these alliances, and the third concerns creating relations among the parts distinguished so that the whole makes sense. The therapist accomplishes this while working with the family: listening to stories, assigning tasks, rearranging seating, organizing role playing. In the course of such an inquiry, the family may resist the therapist's interpretations and object to actions that appear to disregard existing alliances, problem definitions, etc., all of which may lead the therapist repeatedly to reexamine his or her conception of the family. But the family too may change, accepting the role of the therapist as a moderator, incorporating experiences gained during sessions, revising its own distinctions within the family, and defining itself anew. Not only does the knowledge about the family arise in negotiations concerning distinctions and what they violate and concerning relations and what they entail, but the family itself changes in front of everyone's eyes. The knowledge that results is the unity of the family as reflected in the unity of the two operations,

distinction and relation, repeatedly asserted and enacted within a system containing its own observers.

Even so, psychotherapists ought to be more astute observers than their patients: in communication between two or more observers, understanding is no longer the lone prerogative of the privileged one who considers himself or herself uninvolved, outside and above that part of the system being observed. In the process, communications not only enact the distinctions and relations envisioned by the observers but also refer to them. *Communications that do both (enact and refer to their enactment) constitute the very system in which they are exchanged. "To* constitute" means "to establish" or "to define itself." It is therefore a characteristic of systems involving their observers that they develop *their own definition of the very system* in which the observers participate. Communication within the family defines that family, delineates the conditions for membership, and controls the process of interaction within it, including with the therapist.

One historical example of the failure to recognize this self-referential and constitutive process is provided by Marxism. Although Marx was convinced that philosophy should not merely describe but should also change society, he placed himself in the position of an outside observer, possibly because of his social position in England. Whatever the reason, his belief in his own detachment is evident: in his declaring that he was not a Marxist, in considering himself a member of a class that is neither oppressor nor oppressed (which allowed him to escape the dominant interaction he described), and in characterizing the social dynamics he observed with unusual clarity as deterministic and inevitable, proceeding with at most varying speed toward an inescapable homeostatic state. Originally, Marx's theories of social development had no competitors. They were adopted where a belief in the inevitability of progress was already well accepted and served political ends. But these theories took few roots where there was a widespread belief that people could participate in shaping their own system of production. The Western European and American response to Marx's (in his opponents' conception) bleak future was the evolution, if not the conscious creation, of a system of communication that invalidated what Marx had predicted and what Marxists still believe will inevitably come about. Marx's lack of awareness of the self-reflective nature of all social theory invalidated his predictions for social processes that were essentially participatory, self-governing, and ultimately constitutive of contemporary organizational forms.

Although systems involving their observers generally converge toward or "compute" their own stable reality-note particularly the many examples of self-fulfilling hypotheses and, above all, culture as an autonomous construction-the example of Marxist theory shows that such a reality need not be free of contradictions, conflicts, or disagreements. For example, sociologists (Marxist and non-Marxist alike) constantly struggle over what the relevant social classes are-note the ontological commitment this struggle implies-while the ongoing practice of drawing distinctions and defining relations (whether in words, in practice, or by the use of technology) creates and constitutes social realities that escape both antagonists. Just as one must be suspicious of a world view that stipulates that relations between the parts of social systems are deterministic, inevitable, and thus exclude the observers of such systems from participation, so one must be careful not to fall into the opposite trap by claiming that these relations must be organic, integrated, and harmonious. People communicate more about themselves through the

expression of inequalities, conflicts, clashes, and misunderstandings than through confirmations of what they accept **as** self-evident.

An important consequence of the sew-referential nature of systems involving their observers is ***that they are or tend to become descriptively closed.***

When observers delineate their domain of observation, the social system of which they are a part, they have to include all relevant parts in their description and ensure that communication is confined within the delineated domain, or else they would not understand it. To establish the reality of a delineated system requires these observers to interact with the other participants. This invariably reveals the observers' own position within their domain of observation and causes adaptive or hostile responses or confirmatory or contradictory communications in return. The absence of such feedback would establish the observers' positions either as outside the observed system or as arbitrary or inconsequential; neither position is characteristic of a system involving observers as constitutive parts. The presence of feedback is evidence of the observers' influence, indistinguishable from what would exist without their interventions, and of their failures to distinguish and include all those affected by and responding to their communications. Thus, it is the very network of communication that sets the boundaries of what its participants may come to know about the system in which they partake as well as about the network of communication through which this knowledge is revealed. Even if observers choose to distinguish within their domain one system of which they are a part and another that they merely observe from the outside, to the extent that the latter interacts or contrasts with the former, they have to include it in the description, for it participates, shapes, or defines by the very interaction or contrast the system in which the observers see themselves as part. Obviously, systems that do not make themselves known to observers, either directly or by affecting the system of interest, can have no reality in their description or must escape their vision. The preference of observers to confirm their descriptions by communicating with other observers about them and through them and the tendency of such systems to develop equilibria has the effect of closing their system descriptively and in fact. Participant observers cannot expand their horizon without at the same time enlarging and getting into conflict with the system they wish to describe. Scientific inquiry into systems involving their observers is invariably political and there is something frighteningly comfortable in confining participation and knowledge about this participation to a system that one wants it to be.

Finally, I wish to contrast the epistemological foundations I have sketched here with the ontology of the established philosophy of scientific inquiry. I agree with Hove and von Foerster **(7,** 10) that the insistence on objectivity-which rules that the properties of observers must not enter the description of their observations-has largely prevented serious inquiry into society. The role of observers as communicators makes social systems inherently circular in organization, and adequate theories of communication in such systems therefore will have to be self-referential. Instead of objectivity, I am suggesting that, in systems involving their observers, *communication theory must be accepted on evidence that it constitutes the system it claims to describe.* Such a theory contains its own domain, is a theory in action, and is not discoverable from the outside.

Circular forms of communication in society and the theories that may constitute them are fundamentally incompatible with ontological commitments. In their foundations of mathematics

and logic, Whitehead and Russell (20) have rigorously exorcised self-reference, and much of contemporary philosophy of science, which is built on these foundations, is consequently incapable of theorizing about this essential fabric of society. The research methodology that arose within this tradition is equally powerless to make self-referential social structures transparent. Cybernetics has-first surreptitiously, now more openly-worked against these philosophical constraints.

In summary, the epistemological unity-the unity of drawing distinctions and creating relations within an observer's domain of experiences- characterizes knowledge as a process, includes a circular (interactive) concept of communication, and is capable of characterizing the self-referential nature of social systems that involve their own observers. It promises a powerful epistemological foundation for studies of human communication and challenges the ontological assumptions underlying established inquiries into society in general and social communication in particular.

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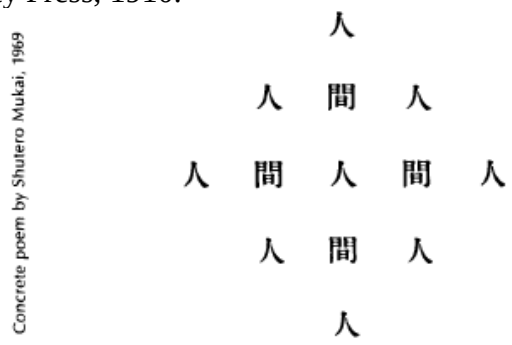

The poet explains that 人間 or NIN-GEN is translated as "human being" and is composed of NIN or 人 denoting "man" and GEN-MA or 間 denoting "space in-between." The latter symbol results from the unity of something man-made ("gate") and something natural ("sun") and has no English equivalent. 人間 embodies the idea that it is the space in between that defines an autonomous human being, by distinguishing him or her from and relating him or her to others. Significantly, a crazy individual (間抜け) or MA-NUKE is someone without that space.