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ABSTRACT

Three potentially useful perspectives for the scientific development of human communication theory are the law model, the systems approach, and the rules paradigm. It is the purpose of this paper to indicate the utility of the systems approach. The first section of this paper provides a brief account of the systems view of the world. Outlined in the second section are the logical and empirical requirements of systems theory in four variations: open systems, closed systems, cybernetics, and structural-functionalism. A brief example of how to conceptualize a communication system from a cybernetic perspective is presented in section three. In section four, the relationship among the forms of knowledge offered by the behavioral, actional, and systems frameworks are examined. The paper concludes with a discussion of the epistemic framework to which the systems theory leads. (RB)

Alternative Theoretical Bases for the Study of Human Communication: The Systems Perspective

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> . . . a comprehensive account of human behavior must be rich enough and complex enough to accommodate half a dozen contrasting and complimentary modes of explanation (Toulmin, 1969, p. 101).

The quest for apodictic knowledge regarding the processes of human communiction is a pursuit that involves many and sometimes difficult choices among competing theoretical, epistemological, and methodological perspectives. The necessity to make these choices is, of course, incumbent upon each of us who wishes to share in that quest. Yet as an intellectual community, the result of these choices on the part of individual scientists generates a collective position that incorporates "half a dozen contrasting and complimentary modes of explanation." Often those views conflict, compete, and vie for our allegiance. Yet above the level of opposing views lies a superordinate goal: can a position be found which is "rich enough and complex enough to accommodate" the alternatives?

To address that question and to make intelligent choices among the alternative positions it is critical to know what kind of knowledge is generated by each alternative as well as the limitations inherent in each. Again, it is important to ascertain what each theory assumes about "human nature" and therefore about the nature of human communication. Finally, it is vital to understand the implications of each perspective for the conduct of inquiry. These issues set the theme for this essay. In a very real sense, all of our scientific endeavor depends upon them for in the end the choices we make among the alternatives we perceive will determine the questions we raise, the analytic procedures we employ, and thereby, the answers we obtain and, ultimately, the knowledge we hold--both individually and collectively.

It would, of course, be presumptuous to think that issues as significant as these can be solved in a single essay or convention program. Nevertheless, the very fact that the issues are being raised in respect to three alternatives--the covering law model, systems theory, and the rules paradigm--is in itself significant, for it may well indicate, to use Kuhn's (1970) schema, that the conduct of "normal science" in communication, while not yet shifted to a new "paradigm" may be approaching a critical stage of self-examination that precedes such a shift.

In order to address the issues just identified, it will be necessary for me to undertake five separate tasks. First, I will attempt to provide a brief account of the systems view of the world. Second, I will outline the logical and empirical requirements of systems theory in four variations: open systems, closed systems, cybernetics, and structural-functionalism. Third, since the discussion of systems logics and empirics is greatly condensed, a brief example of how to conceptualize a communication system from a cybernetic perspective will be presented. Next, the relationship among the forms of knowledge and explanation offered by the behavioral, actional, and systems frameworks will be examined. Finally, the essay will conclude with a discussion of the epistemic framework to which systems theory leads.

The World View of Systems Theory

Every scientific theory is based upon an underlying world view. The world view offered by systems consists of interlinked sets of components hierarchically organized into structural wholes which interact through time and space, are self-regulating, yet capable of structural change. While it shares important aspects with other world views, the fundamental aspect of the systems view from which all else follows is its emphasis upon the concept of organization. As Laszlo

(1972) says:

> Whereas traditional reductionism sought to find the commonality underly diversity in reference to a shared substance, such as material atoms, contemporary general systems theory seeks to find common features in terms of shared aspects of organization (p. 20).

The notion of organization is ". . . not what a thing is per se, nor how one thing produces an effect on one other thing, but how sets of events are structured and how they function in relation to their 'environment'--other sets of things, likewise structured in space and time (p. 20)." Again, as Khailov (1968) states:

> In any field of knowledge, the study of interaction leads logically to the concept of system organization. . . . The essence of all these definitions (of system) is the coupling among the components and the system organization resulting from such coupling (p. 47).

Laszlo argues that humans and the social and communication systems in which they participate are part of the large classification of phenomena called natural systems which may be distinguished with respect to four organizational properties.

The first property is that natural systems are wholes with irreducible characteristics. Almost all complex entities are constituted of numerous parts. If the nature of the entity, like a warehouse inventory or a pile of sand is simply the sum of its parts, then the entity may be described as an aggregate or heap. In contrast, consider

> an entity having some formal structure built on the basis of an interdependence among its parts. The most basic unit consists of two parts in communication, where the outcome is something more than the simple properties of each. Friendship and love are of this kind. Friends and lovers do not individually have all of the properties of their relationship . . . (Laszlo, p. 28).

An excellent illustration of this point from communication research comes from the recent article on relational analysis by Rogers and Farace (1975).

> Relational communication analysis requires a perspective that differs from the monadic or individual difference orientation that dominates existing analytic techniques. Relational analysis focuses on communication properties that exist only at the dyadic system level; relational variables do not lie within individual interactors, but rather exist between them. The measurements derived from this analysis refer to emergent properties of joint communicative behaviors and have no counterpart in the properties of individuals or single messages. With the present scheme, the transaction--the exchange of paired sequential messages over time--becomes the basic unit of analysis (p. 222-223).

The second property is that natural systems maintain themselves in a changing environment. This property technically implies a "steady state" condition, i.e., that natural systems have "desirable" or "optimal" states of organization and that they commit sizable portions of their own energy (i.e., energy which is imported from the environment) to preventing the rearrangement or collapse of that organizational configuration. Various aspects of communication can be conceptualized as self-regulating, homeostatic, or cybernetic systems. The cognitive structure of man as reflected in balance theories (Newcomb, 1953; Osgood and Tannenbaum, 1955; Festinger, 1957; Heider, 1958), various theories of communication interaction (e.g., Watzlawick, et. al., 1967), Allport's (1968) open system theory of personality, and Katz and Kahn's (1966) theory of organizations, all emphasize this aspect of systems.

The third property of natural systems states that they "create themselves in response to the challenge of the environment." This property describes the evolutionary dimension of natural systems, their propensity to grow, change and differentiate. That systems change, can hardly be disputed; as the old maxim goes, "the only permanence is change." Yet the majority of system theories in social science and communication are solely based on the preceding property of self-maintenance. All balance theories share the same characteristic of maintaining some system property within a necessary range or alternative, the balancing of opposing forces. To accomplish this, the theory must specify the mechanisms which stabilize, maintain, and preserve the structure of the social, psychological, or communication entity being described. Thus, the emphasis in these systems is on structural permanence.

But communication and social systems, unlike organic systems, don't have a fixed, required structure. Rather, they have fluid, changing structures; they are, as Buckley (1967) says, ". . . characterized primarily by their propensity to change their structure during their culturally continuous 'life-time'." (p. 31) Thus, any description of a communication system which accounts only for structural preservation is insufficient. An adequate theory must also specify those processes which cause the system to change. This emphasis on change is important because it permits the study of communication as a complex adaptive system rather than a static, enduring structure. Living systems, communication included, grow and develop, decay and disintegrate, and a full understanding of the communication process requires knowledge of how the system will change over time.

Buckley (1967) adopts the terms morphostasis and morphogenesis and says:

> The former refers to those processes in complex system environment exchanges that tend to preserve or maintain a system's growth form, organization, or state. Morphogenesis will refer to those processes which tend to elaborate or change a system's given form, structure, or state. Homeostatic processes in organisms, and ritual in sociocultural systems are examples of "morphostasis;" biological evolution, learning, and societal development are examples of "morphogenesis." (p. 58-59)

(For further discussion of this topic, see Cappella and Monge, 1975.)

The final property of organized natural systems identified by Laszlo is that they are "coordinating interfaces in nature's hierarchy." (p. 27) Hierarchies, the ordered arrangement of systems in terms of increasing levels of complexity, are systems linked together.

> Individual subsystems within a complex system fill the role of coordinating interfaces. They assume the liaison between those (lower-level) components of the system which they control, and those (higher-level) ones which exercise control over them. Their function is to pull together the behavior of their own parts, and to integrate this joint effort with the behavior of other components in the system. (Laszlo, p. 68)

We will return to this issue of hierarchy and "levels" of systems in a later section of the paper.

These four properties--wholeness, self-regulation, adaptation and hierarchical imbeddedness--represent the distinctive features of the world view provided by systems. When applied to the study of human communication it suggests that we examine the hierarchical organization of coupled interacting components which are self-regulating over time, yet morphogenetic wholes.

The Logics and Empirics of Systems Theory

The logics of systems theory

Systems theory is not a monolithic, logical framework. Careful analysis reveals at least three and perhaps four alternative logical paradigms: (1) General systems theory (GST), which may be divided into (a) the theory of open systems and (b) the theory of closed systems; (2) Cybernetics, and (3) Structural-functionalism. In this section I will briefly detail the logic of each paradigm.

General Systems Theory: Open Systems. In order to conceptualize any communication phenomenon as an open system, the following logical conditions must be met:

(1) identification of the components of the system. These are the parts, which together with interactions, constitute the system. Parts may themselves be systems; if so, they are subsystems of

the major system.

(2) specification of relations in the system. These are the laws of interaction among the components which form the structure of the system.

(3) determination of system behavior. This implies the identification of the processes which the system engages in over time, as well as the properties which these processes imply.

(4) stipulation of the environment. In open systems this is crucial because the system's exchange with the environment, i.e., its inputs and outputs, must be explained.

(5) determination of the system's evolution. Both history and future are included here.

Item (3) indicates that the properties of the system should be identified. If the system is conceived of as open, then the relevant properties are:

(1) exchange occurs between system and environment, usually across the system boundaries. This exchange is identified as input to and output from the system.

(2) under certain conditions the system attains a steady state at some distance from true equilibrium.

(3) this steady state may be reached independently of the initial conditions and is dependent only upon the system parameters; this feature is known as equifinality.

(4) entropy may decrease (Bertalanffy, 1968, pp. 141-145).

General Systems Theory: Closed Systems. For conceptualizing communication as a closed system, the following logical requirements should be met:

(1) a set of components, which

(2) assume a set of states (the configuration of the values of

the components at a particular point in time), which

(3) change as a function of transformation(s) defined on the states such that states at a given point in time imply states at some future point in time."

The properties of a closed system are:

(1) isolation from the environment; nothing in the environment is seen as affecting the system,

(2) if stable, the system attains true equilibrium rather than a steady state,

(3) the system is completely determined by initial conditions, and

(4) entropy must increase.

Cybernetic Systems. When communication is studied as a cybernetic system, it must be so conceived that it possesses the following logical conditions common to all cybernetic systems:

(1) goal parameters (reference signals) set in a control center,

(2) influence exerted by the control center, i.e., an attempt to achieve the goal parameters in the part of the system being controlled,

(3) feedback provided to the control center, i.e., information regarding the effects of the output on the part of the system being controlled,

(4) comparator test conducted by the control center, yielding an error signal, and

(5) corrective action taken by the control center, if necessary (cf., Buckley, 1967, p. 172-174).

Structural-Functional Systems. To conceptualize communication as a structural-functional system means that the following necessary and sufficient logical conditions have been met (cf., Nagel, 1956; Merton, 1957):

(1) identification of the system, i.e., a set of interrelated parts are identified which may be viewed as a whole. It is not necessary that all the parts be specified so long as (a) the system as a whole is identified, and (b) those parts which are necessary for the analysis are identified.

(2) specification of the environment in which the system operates. This generally means the specification of all those factors that are not a part of the system but which may affect the particular behavior of the system being studied.

(3) determination of some trait, attribute, or property of a system which is considered essential for the continuation of the system.

(4) specification of the range, i.e., the different values, which the trait may assume as well as the range within which it must stay if the system is to remain in operation. (Every trait is assumed to be variable, even if only dichotomized into present-not present.)

(5) a detailed account of how the parts (items, mechanisms, structures, etc.) collectively operate to keep the values of the trait within the limits required for the existence of the system despite other changes in the system or impinging influences from the environment.

The Empirics of System Theory

Logics refers to the way we conceptualize or think about phenomena; empirics refers to the way we study and examine that entity or process in the real world. In the former we manipulate symbols, words, ideas, about the object, in the latter we manipulate and/or measure the real thing and/or other things related to it. The distinction is equivalent to the difference between a constitutive and operational definition, except that it is applied to a theory rather than a concept, i.e., to terms and their relations rather than to concepts alone.

To be tested scientifically a theory must be operationalized in accordance with its empirical criteria. Furthermore, these criteria must be isomorphic with the logical criteria. Thus, a set of empirical criteria must be articulated for each system paradigm, i.e., for each set of logical criteria specified above.

General Systems Theory. For examining open communication systems that are conceptualized to be isomorphic with the logic of GST, the following empirical requirements must be met:

(1) measurement of all relevant variables at a given point in time, including inputs and outputs, thus measuring structure, and
(2) measurement of the change in each variable as a function of all the others, thus measuring process.

For closed systems, the requirements are similar:

(1) measurement of the state of the system, and
(2) measurement of the state of the system after one (or a specified number of applications of the transformation.

Cybernetic Systems. To operationalize a communication system in accordance with the logic of cybernetics, the following empirical conditions must be met:

(1) measurement of the error signal, i.e., the amount of discrepancy between reference signal and feedback signal, or, stated alternatively, the discrepancy between goal parameters and the state of the part of the system being controlled.

(2) measurement of the amount of corrective action taken on the part of the control center.

(3) measurement of the response of the part of the system being controlled, i.e., the new state of this part of the system.

Structural-Functional Systems. The empirical requirements for structural-functional systems are as follows:

(1) Some indication must be made of system operation. This implies (a) a set of criteria for deciding when the system ceases to exist or operate *qua* system, as well as (b) measurement that can reveal the current state of the system.

(2) The range which the system trait covers must be measured. Linkage must be demonstrated between the required range (a subset of the possible trait range) and the continued operation of the system.

(3) The several mechanisms identified in the logical analysis must be measured and their relationship with the trait must be indicated. The mechanisms are considered conceptually independent but may be empirically interdependent.

(4) If any environmental factor affects the system trait it must also be measured and its relationship with the trait and system mechanisms (if there is a relationship) indicated.

A more extensive explication of these criteria together with examples and illustrations are available in Monge (1972).

Studying a Communication System: An Example

The level of abstraction and condensation of the previous section makes it seem desirable to sketch at least one example of how to apply the logical and empirical criteria to the study of communication. Cappella and Monge (1975) have applied the cybernetic systems paradigm to the well-known coorientation model originally developed by Newcomb (1953) and modified by Chaffee and McLeod (1968). Accordingly, the basic stratagem was to conceptualize a communication variable as a comparator variable and embed it as the control center in an ongoing system of communication relations.

To treat a variable as a cybernetic comparator it is necessary to establish some goal or "desired value" for it. In the application to coorientation variables, e.g., accuracy (which is defined as one person's estimate of the second person's orientation to X compared with the second person's actual, i.e., measured orientation to X), a comparator variable called "cybernetic accuracy" is created which consists of the discrepancy between actual and desired levels of accuracy. When set in relation to other variables, specifically, the amount of communication by each person in the dyad and the degree of coordination necessary to accomplish some task, the comparator variables activates the control mechanism of communication which serves to control the amount of coordination relevant to the task (Actually, "higher level" comparator variables are formed, but since they are formed according to the same logic just outlined the refinements need not be explored.). Naturally, communication from the other person provides the "referent signal," feedback information to the comparator variable. Thus, as the discrepancy between actual and desired accuracy increases (as indicated by communication from the "other"), the first person in the dyad engages in increased amounts of communication to reduce the discrepancy; the same process also operates in an identical manner from the viewpoint of the second person in the dyad. It is, of course, then possible to study the dynamic behavior of this system of communicators and to examine the conditions necessary for stability and growth. The general method for constructing cybernetic models of communication is provided by Cappella and Monge (in press).

Systems Theory, Behavior, and Action

In his important book entitled, Explanation and Understanding, Von Wright (1971) traces the history of two traditions of scientific inquiry: the galilean (which is traceable to Plato and the pre-Socratic Greeks) and the aristotelian. The galilean tradition may be associated with a causalist view of scientific knowledge represented most vigorously in modern philosophy by positivism and in social science by behaviorism.

Von Wright identifies the major tenets of the galilean tradition.

> One of the tenets of positivism is methodological monism, or the idea of the unity of scientific method amidst the diversity of subject matter of scientific investigation. A second tenet is the view that the exact natural sciences, in particular mathematical physics, set a methodological ideal or standard which measures the degree of development of all the other sciences, including the humanities. A third tenet, finally, is a characteristic view of scientific explanation. Such explanation is, in a broad sense, "causal." It consists, more specifically in the subsumption of individual cases under hypothetically assumed general laws of nature, including "human nature." (p. 4)

Because of its exclusive reliance upon the covering law or hypothetico-deductive model of explanation, accounts of phenomena in the galilean tradition are usually called "law-governed." For ease in reference, and for reasons I hope will soon become apparent, I shall refer to this position as representing the "behavioral" view of human communication.

By contrast, the aristotelian tradition may be associated with a "teleological" or finalist view of scientific knowledge. This "anti-Positivist" position is represented in modern philosophy by "idealism," which tends to " . . . reject the methodological monism of positivism and refuse(s) to view the pattern set by the exact natural sciences as the sole and supreme ideal for a rational understanding of reality." (Von Wright, 1971, p. 5) It further emphasizes a form of knowledge which is called understanding or "rational explanation," which amounts to showing " . . . that an action was the appropriate or rationalthing to do on the occasion under consideration." (p. 25) Finally, the aristotelian tradition adopts the position that was formalized by Kant: "The natural units of human behavior are not law-governed phenonema: they are those constellations of language-regulated rule-conforming ("rational") actions that contribute, conjointly, to the development both of our concepts and of our practical conduct." (Toulmin, 1969, p. 103) I shall call this "rule-governed" position the "actional" view of human communication.

For our purposes, the point over which the two seem most deeply divided is the issue of causalist versus teleological accounts of human endeavor. The implications for our conceptualization of human communication are significant. Specifically, it raises the question of whether humans have rationality, choice-making ability, and creativity and are purposive and goal-oriented. Under the traditional behavioral view human communication would be explained solely by antecedent conditions; human purposiveness, rationality, and choice-making ability are considred as unnecessrry illusions without explanatory utility. Under the actional view, these concepts would be accepted as legitimate and important tools for "rationally explaining" or "understanding" the communication process.

At this point it would be instructive to review various theories of communication with respect to the distinctions just made; that task must await the drafting of another paper. But if I might be permitted as an aside the liberty to presage the outcome of such an endeavor, I would predict the following:

(1) that almost all communication theorists claim that their theories are behavioral (i.e., in the galilean, causalist tradition).

(2). that most theorists make extensive assumptions or claims about human nature and human communication that are teleological and inconsistent with the traditional behavioral position, claims that communication is purposive, proactive, and choice-oriented, which make the theories more compatable and consistent with the actional than the behavioral positions.

Should such be the case, it would not, of course indicate the superiority of one position over the other. It would simply demonstrate that one ideal of science is held inconsistently with the claims made about the nature of the phenomenon.

If my characterization of the behavioral and the actional positions is, though greatly abbreviated, fair, the question may now be appropriately raised as to the relationship between systems theory and the other two. In the remainder of this section I will attempt to show how systems theory can incorporate aspects of both positions and thereby provide a synthesis of the alternatives.

The argument goes like this. Von Wright (1971) indicates that

> One could divide the domain traditionally claimed for teleology into two subprovinces. One is the domain of the notions of functions, purpose (fullness) and "organic wholes" ("systems"). The other is aiming and intentionality (p. 16).

Many social scientists in fact contend that human communication must be viewed from the perspective of the first category, i.e., that it is purposeful and functional. For example, Ackoff (1968) argues that

> Communication is an activity in which only purposeful entities can engage. Purposefulness exists only if choice is available to the entity involved and if that entity is capable of choice (p. 210).

This stance, however, appears to place the study of human communication squarely in the province of teleological or actional explanation. The contribution which systems theory offers to the behaviorial position in the form of the cybernetics paradigm is to demonstrate that the "purposive form" of teleology (see the Von Wright, p. 16, quote above) is compatable with the causalist form of explanation. As Rosenblueth, Wiener, and Bigelow (1968) state

> Teleology has been interpreted in the past to imply purpose and the vague concept of a "final cause" has often been added. This concept of final causes has led to the opposition of teleology to determinism [causalism], (p. 225)

Rather, they argue, the definition of teleology should be restricted to

> . . . purposeful reactions which are controlled by the error of the reaction -- i.e., by the difference between the state of the behaving object at any time and the final state interpreted as the purpose. Teleological behavior thus becomes synonymous with behavior controlled by negative feedback . . . . (p. 225)

The conclusions they draw from this line of argument are that the purposive form of " . . . teleology is not opposed to determinism [i.e., causalism] but to non-teleology." (p. 225) and that "both teleological and non-teleological systems are deterministic when the behavior considered belongs to the realm where determinism applies." (p. 225) Thus, cybernetic systems theory has provided a clearer distinction between types of teleology and a mechanism for a causalist explanation of the purposive type.

The problem still remains, however, as suggested by the above quotation that some forms of teleology are not reducible to the causalist paradigm (i.e., are not deterministic). As noted at the outset of this section this second class of teleologies is called "intentionality" by Von Wright. It is worth noting, of course, that to call non-reducibility a problem is a bias, for it implicitly accepts the positivist position of methodological monism by implying that it is desirable to reduce all forms of knowledge regarding communication to the causalist form. Churchman and Ackoff (1968) argue

> It is also important to note that the possibility of choice on the part of objects results from the way in which the scientist looks at the world; within the frame of reference of classical mechanics, there is no choice, but in the frame of reference of teleology, there is a choice. . . . Thus "purpose" [like cause] is not found in the world; it is a fruitful scheme for studying the world. . . . we are not forced to abandon mechanics for teleology; both frames of reference are fruitful, and neither is fundamental (p. 245).

We shall return to this point shortly.

Von Wright defines intentionality in the following way:

> Intentional behavior, one could say, resembles the use of language. It is a gesture whereby I mean something. Just as the use and the understanding of language presupposes a language community, the understanding of action presupposes a community of institutions and practices and technological equipment into which one has been introduced by learning and training. One could perhaps call it a life-community. . . . behavior's intentionality is its place in a story about the agent. Behavior gets its intentional character from being seen by the agent himself or by an outside observer in a wider perspective, from being set in a context of aims and cognitions (pp. 114-115).

Thus, the characterization of behavior as intentional is dependent upon the way it is described.

As a logic for understanding intentional action Von Wright applies the practical syllogism, which he describes as follows:

> The starting point or major premise of the syllogism mentions some wanted thing or end of action; the minor premise relates some action to this thing, roughly as a

> means to the end; the conclusion finally, consists in use of this means to secure that end. Thus, as in a theoretical inference the affirmation of the premises leads of necessity to the affirmation of the conclusion, in a practical inference assent to the premises entails action in accordance with them (p. 27).

When this form of reasoning is applied to the subject matter of our discipline, a logic is provided which generates a form of knowledge called understanding which accounts for intentional human communication actions by placing them into a normative context.

How does systems theory accommodate this position? It is important to note, as does Anscombe (1957) that this form of reasoning (the practical syllogism) is " . . . different in kind from the proof syllogism (Von Wright, p. 27);" it does not conform to the logic of the hypothetico-deductive, covering law model. If Von Wright is correct in this assertion, and if the practical syllogism, properly applied, can nevertheless, yield scientifically valid knowledge, then the positivist tenet of methodological monism is called into question. Rather than attempting to reduce all knowledge to one logic, we must admit the possibility of alternative logics. Here it is important to recall that the description of systems theory developed earlier in this essay also revealed several different "logics." For example, it was pointed out that system theorists such as Bertalanffy (1968) have argued that the logic of open systems is fundamentally different from that of closed systems, e. g. in terms of equifinality, homeostasis, etc. This position called "field variant logic" (c.f., McKeon, 19 , and Toulmin, 1969) which states that various classes of phenomena in the world operate by different rather than similar logics, is, I believe, inherent in systems theory, despite the fact that it is traditionally viewed as based on the logic of analogy and similarity.

Yet the fact that systems theory is itself a metatheory, as a theory of logics and includes different logics does not imply that it can or necessarily must account for both behavioral and actional positions. One more argument is required. Elsewhere (Monge, 1973) I have outlined what constitutes the systems form of explanation. In brief,

> A system is said to explain when: (1) the formal calculus entails expectations, (2) the terms of the calculus are loaded with empirical referents (by rules of correspondence), and (3) isomorphism is established between the logical system and empirical reality (p. 10).

The critical point here is that the calculus, the logic for explanation, is flexible, not fixed; it need not conform to the hypothetico-deductive, covering-law mode of logic. Any logic which entails expectations that may be tested against the empirical world and found to be isomorphic with it is acceptable. Thus, if it meets the other requirements for being a system, the analysis of human communication action on the basis of the practical syllogism may be considered a valid form of systems knowledge.

Now we can return to the quotation from Toulmin (1969) with which we began this essay

> . . . a comprehensive account of human behavior must be rich enough and complex enough to accommodate half a dozen contrasting and complimentary modes of explanation (p. 101).

I would submit that of the three alternatives being reviewed today, systems theory can best fulfill that function.

Some, of course, might wish to object to this attempt at synthesis by asserting that we must choose between the behavioral and the actional positions.

Yet as Toulmin says:

> In characterizing human behavior as rule-conforming rather than law-governed, we, too have conceded that physiological, biochemical, and other scientific laws may well apply to the relevant phenomena underlying our behavior as strictly as they do to similar phenomena occurring outside the human body. The order of rule-conforming human behavior is thus not in conflict with the order of law-governed natural phenomena: it is an additional mode of order superimposed on that natural order (p. 103).

As I have tried to show systems theory provides an explanatory framework that is capable of incorporating both behavioral and actional positions.

Finally, some may raise concerns regarding the rejection of methodological monism. Bertalanffy (1968) addresses this issue:

> So far, the unification of science has been seen in the reduction of all sciences to physics, the final resolution of all phenomena into physical events. From our point of view, unity of science gains a more realistic aspect. A unitary conception of the world may be based, not on the possibly futile and certainly farfetched hope finally to reduce all levels of reality to the level of physics, but rather on the isomorphy of laws in different fields. . . . We come, then, to a conception which in contrast to reductionism, we may call perspectivism (p. 48-49).

The Epistemic Framework

The final question which I will address is the kind of epistemological framework, the perspectivism, which systems theory offers. As I argue elsewhere (Monge, 1974) the knowledge structure of the communication discipline tends to be organized around what is commonly called a "levels" approach which divides knowledge into intrapersonal, interpersonal, and socio-cultural levels, or some variation thereof.

This approach is not without problems. First, it is interesting to note that the typical levels approach in communication fails to examine the nature of the interface between adjacent levels and consequently, it does not qualify as a hierarchical schema. Second, just where the organizational framework was derived from is unclear; certainly it was not generated from any theory about the nature of communication nor from a clearly specified set of logical criteria. It appears to be a piecemeal amalgam of odd bedfellows largely reflective of the eclectic interdisciplinary nature of the field and of the social science academy in general. Third, a levels approach of necessity draws upon a diversity of concepts, terminology and theory which vary from level to level; change the levels and the concepts, theories and/or perspectives often change even though the same basic process is being examined. Fourth, knowledge is not integrated or synthesized; what is learned at one level is rarely of use in understanding a similar process at another level. Finally, it seems that a levels approach leads to academic specialization which may not reflect the inherent nature of the communication process, and hence interferes with generating apodictic knowledge.

Systems theory provides a theoretical structure for organizing knowledge about human communication. The knowledge structure it generates would be organized around--at least in part--the following concepts: information, the symbolic patterning of matter and/or energy; networks, the channels through which information flows and the limitations imposed upon message processing by channel characteristics; memory, the storage, manipulation and retrieval of information: boundary processes, the interface between communication systems at the same or different levels and the seeking, avoiding, and filtering of information; control, feedback processes and the use of information to manipulate and influence other systems or subsystems or components within the communication system. Furthermore, each of these elements would be viewed as a part of the communication process whenever it might occur and whatever level it might occur on. For example, knowledge about communication networks would be generated which would be applicable to neural processing, small group processes, organizational networks, and networks which exist in the larger society. Additionally, since the knowledge is to be organized to represent an ongoing dynamic system, the emphasis would be placed upon discovering both morphostatic and morphogenetic characteristics, i.e., its homeostatic and its evolutionary dimensions.

The above is, of course, only a suggestive framework; it is obviously incomplete. It does, however, serve to illustrate what I feel are the major advantages of the systems approach to generating knowledge. First, the framework is derived from systems theory and hence consists of a set of concepts and relationships that are theoretically and logically interrelated. Second, it is a framework which should permit integration of knowledge from a variety of currently disparate academic areas. Third, it is parsimonious in that the number of concepts and theories utilized is far fewer than those generated by alternative approaches. Additionally, where the knowledge can be shown to hold across the usual disciplinary levels described at the outset, these levels can be shown to be inapplicable and if the knowledge does not hold the unique aspects of each level will be demonstrated.

Conclusion

In this essay I have attempted to explicate the logic of systems theory and to show its relation to alternative theoretical bases for the study of human communication. The position I have taken has been a conciliatory one in that the reasons offered for adopting the systems perspective center on its ability to incorporate important aspects of the alternative positions rather than its own unique features. My reasons for doing so are based upon my belief that a discipline as young as ours would make a serious mistake to preclude alternative perspectives too soon in our inquiry. That perspective which incorporates the others is, at least until more information is available, the one best suited to guide us in our quest for knowledge about human communication.

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