

## Society as a Complex Adaptive System

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WE HAVE ARGUED at some length in another place<sup>1</sup> that the mechanical equilibrium model and the organismic homeostasis models of society that have underlain most modern sociological theory have outlived their usefulness. A more viable model, one much more faithful to the *kind* of system that society is more and more recognized to be, is in process of developing out of, or is in keeping with, the modern systems perspective (which we use loosely here to refer to general systems research, cybernetics, information and communication theory, and related fields). Society, or the sociocultural system, is not, then, principally an equilibrium system or a homeostatic system, but what we shall simply refer to as a complex adaptive system.

To summarize the argument in overly simplified form: Equilibrium systems are relatively *closed* and *entropic*. In going to equilibrium they typically *lose structure* and have a *minimum of free energy*; they are affected only by external "disturbances" and have *no internal or endogenous sources of change*; their component elements are *relatively simple* and *linked directly via energy exchange* (rather than information interchange); and since they are relatively closed they have no feedback or other systematic self-regulating or adaptive capabilities. The homeostatic system (for example, the organism, apart from higher cortical functioning) is open and negentropic, maintaining a moderate energy level within controlled limits. But for our purposes here, the system's main character-

istic is its functioning to *maintain the given structure of the system* within pre-established limits. It involves feedback loops with its environment, and possibly information as well as pure energy interchanges, but these are geared principally to *self-regulation* (structure maintenance) rather than adaptation (*change* of system structure). The complex adaptive systems (species, psychological and sociocultural systems) are also open and negentropic. But they are *open "internally" as well as externally* in that the interchanges among their components may result in *significant changes in the nature of the components themselves* with important consequences for the system as a whole. And the energy level that may be mobilized by the system is subject to relatively wide fluctuation. Internal as well as external interchanges are mediated characteristically by *information flows* (via chemical, cortical, or cultural encoding and decoding), although pure energy interchange occurs also. True feedback control loops make possible not only self-regulation, but self-direction or at least adaptation to a changing environment, such that the system may *change or elaborate its structure* as a condition of survival or viability.

We argue, then, that the sociocultural system is fundamentally of the latter type, and requires for analysis a theoretical model or perspective built on the kinds of characteristics mentioned. In what follows we draw on many of the concepts and principles presented throughout this source-book to sketch out aspects of a complex adaptive system model or analytical framework for the sociocultural system. It is further argued that a number of recent sociological and social psychological theories and theoretical orientations articulate well with this modern systems perspective.

<sup>1</sup> Many of the ideas expressed here appear in more extended form in the author's *Sociology and Modern Systems Theory* (Englewood Cliffs, N.J.: Prentice-Hall, 1967).

and we outline some of these to suggest in addition that modern systems research is not as remote from the social scientists' interests and endeavors as many appear to believe.

### *Complex Adaptive Systems: A Paradigm*

A feature of current general systems research is the gradual development of a general paradigm of the basic mechanisms underlying the evolution of complex adaptive systems. The terminology of this paradigm derives particularly from information theory and cybernetics. We shall review these concepts briefly. The *environment*, however else it may be characterized, can be seen at bottom as a set or ensemble of more or less distinguishable elements, states, or events, whether the discriminations are made in terms of spatial or temporal relations, or properties. Such distinguishable differences in an ensemble may be most generally referred to as "*variety*." The relatively stable "causal," spatial and/or temporal relations between these distinguishable elements or events may be generally referred to as "*constraint*." If the elements are so "loosely" related that there is equal probability of any element or state being associated with any other, we speak of "chaos" or complete randomness, and hence, lack of "constraint." But our more typical natural environment is characterized by a relatively high degree of constraint, without which the development and elaboration of adaptive systems (as well as "science") would not have been possible. When the internal organization of an adaptive system acquires features that permit it to discriminate, act upon, and respond to aspects of the environmental variety and its constraints, we might generally say that the system has "*mapped*" parts of the environmental variety and constraints into its organization as structure and/or "*information*." Thus, a subset of the ensemble of constrained variety in the environment is coded and transmitted in some way via various channels to result in a change in the structure of the receiving system which is isomorphic in certain respects to the original variety. The system thus becomes selectively matched to its environment both physiologically and psychologically. It should be added that two or more adaptive systems, as well as an adaptive system and its natural environment, may be said to be selectively interrelated by a mapping process in the same terms. This becomes especially important for the evolution of social systems.

In these terms, then, the paradigm underlying the evolution of more and more complex adaptive systems begins with the fact of a potentially changing environment characterized by variety with constraints, and an existing adaptive system or organization whose persistence and elaboration to higher levels depends upon a successful mapping of some of the environmental variety and constraints into its own organization on at least a semi-permanent basis. This means that our adaptive system—whether on the biological, psychological, or sociocultural level—must manifest (1) some degree of "*plasticity*" and "*irritability*" vis-à-vis its environment such that it carries on a constant interchange with environmental events, acting on and reacting to it; (2) some source or mechanism for *variety*, to act as a potential pool of adaptive variability to meet the problem of mapping new or more detailed variety and constraints in a changeable environment; (3) a set of *selective* criteria or mechanisms against which the "variety pool" may be sifted into those variations in the organization or system that more closely map the environment and those that do not; and (4) an arrangement for *preserving and/or propagating* these "successful" mappings.<sup>2</sup>

It should be noted, as suggested above, that this is a *relational* perspective, and the question of "substance" is quite secondary here. (We might also note that it is this kind of thinking that gives such great significance to the rapidly developing relational logic that is becoming more and more important as a technical tool of analysis.) Also, as suggested, this formulation corresponds closely with the current conception of "*information*" viewed as the process of selection—from an ensemble of variety—of a subset which, to have "*meaning*," must match another subset taken from a similar ensemble.<sup>3</sup> Communication is the process by which this constrained variety is transmitted in one form or another between such ensembles, and involves coding and decoding such that the original variety and its constraints remains relatively invariant at the receiving end. If the source of the "*communication*" is the causally constrained variety of the natural environment, and the destination is the biological adaptive system, we refer to the Darwinian process of natural selection whereby the information encoded in the chromosomal material (for example the DNA) reflects or is a mapping of the environmental variety, and makes possible a continuous and more or less successful adaptation of the former system to the latter. If the adaptive system in question is a (relatively high-level) psychological

or cortical system, we refer to "learning," whereby the significant environmental variety is transmitted via sensory and perceptual channels and decodings to the cortical centers where, by selective criteria (for example, "reward" and "punishment") related to physiological and/or other "needs" or "drives," relevant parts of it are encoded and preserved as "experience" for varying periods of time and may promote adaptation. Or, on the level of the symbol-based sociocultural adaptive system, where the more or less patterned actions of persons and groups are as crucial a part of the environment of other persons and groups as the non-social environment, the gestural variety and its more or less normatively defined constraints is encoded, transmitted, and decoded at the receiving end by way of the various familiar channels with varying degrees of fidelity. Over time, and again by a selective process—now much more complex, tentative, and less easily specified—there is a selective elaboration and more or less temporary preservation of some of this complex social as well as non-social constrained variety in the form of "culture," "social organization," and "personality structure."

On the basis of such a continuum of evolving, elaborating levels of adaptive system (and we have only pointed to three points along this continuum), we could add to and refine our typology of systems. Thus, we note that as adaptive systems develop from the lower biological levels through the higher psychological and sociocultural levels we can distinguish: (1) the *varying time span* required for exemplars of the adaptive system to map or encode within themselves changes in the variety and constraints of the environment; phylogenetic time scales for organic systems and for tropistic or instinctual neural systems; ontogenetic time scales for higher psychological or cortical systems; and, in the sociocultural case, the time span may be very short—days—or very long, but complicated by the fact that the relevant environment includes both intra- and inter-societal variety and constraints as well as natural environment variety (the latter becoming progressively less determinant); (2) the greatly *varying degrees of fidelity of mapping* of the environment into the adaptive system, from the lower unicellular organisms with a very simple repertoire of actions on and reactions to the environment, through the complex of instinctual and learned repertoire, to the ever-proliferating more refined and veridical accumulations of a sociocultural system; (3) the progressively greater separation and independence of the more refined "stored information" from purely

biological processes as genetic information is gradually augmented by cortically imprinted information, and finally by entirely extrasomatic cultural depositories. The implications of these shifts, and others that could be included, are obviously far-reaching.

One point that will require more discussion may be briefly mentioned here. This is the *relative discontinuity* we note in the transition from the non-human adaptive system to the sociocultural system. (The insect society and the rudimentary higher animal society make for much less than a complete discontinuity). As we progress from lower to higher biological adaptive systems we note, as a general rule, the gradually increasing role of other biological units of the same as well as different species making up part of the significant environment. The variety and constraints represented by the behavior of these units must be mapped along with that of the physical environment. With the transition represented by the higher primate social organization through to full-blown human, symbolically mediated, sociocultural adaptive systems, the mapping of the variety and constraints characterizing the subtle behaviors, gestures and intentions of the individuals and groups making up the effective social organization become increasingly central, and eventually equal if not overshadow the requirements for mapping the physical environment.<sup>4</sup>

It was these newly demanding requirements of coordination, anticipation, expectation and the like within a more and more complex *social* environment of interacting and interdependent others—where genetic mappings were absent or inadequate—that prompted the fairly rapid elaboration of relatively new system features. These included, of course: the ever-greater conventionalizing of gestures into true symbols; the resulting development of a "self," self-awareness, or self-consciousness out of the symbolically mediated, continuous mirroring and mapping of each unit's behaviors and gesturings in those of ever-present others (a process well described by Dewey, Mead, Cooley, and others); and the resulting ability to deal in the present with future as well as past mappings and hence to manifest goal-seeking, evaluating, self-other relating, norm-referring behavior. In cybernetic terminology, this higher level sociocultural system became possible through the development of higher order feedbacks such that the component individual subsystems became able to map, store, and selectively act toward, not only the external variety and constraints of the social and non-social environment, but also their

own internal states. To speak of self-consciousness, internalization, expectations, choice, certainty and uncertainty, and the like, is to elaborate this basic point. This transition, then, gave rise to the newest adaptive system level we refer to as sociocultural. As we argued earlier, this higher level adaptive organization thus manifests features that warrant its scientific study in terms as distinct from a purely biological system as the analytical terms of the latter are from physical systems.

### *The Sociocultural Adaptive System*

From the perspective sketched above, the following principles underlying the sociocultural adaptive system can be derived:

1) The principle of the "irritability of protoplasm" carries through to all the higher level adaptive systems. "Tension" in the broad sense—in which stress and strain are manifestations under conditions of felt blockage—is ever-present in one form or another throughout the sociocultural system—now as diffuse, socially unstructured strivings, frustrations, enthusiasms, aggressions, neurotic or psychotic or normative deviation; sometimes as clustered and minimally structured crowd or quasi-group processes, normatively supportive as well as destructive; and now as socioculturally structured creativity and production, conflict and competition, or upheaval and destruction. As Thelen and colleagues put it:

1. Man is always trying to live beyond his means. Life is a sequence of reactions to stress: Man is continually meeting situations with which he cannot quite cope.
2. In stress situations, energy is mobilized and a state of tension is produced.
3. The state of tensions tends to be disturbing, and Man seeks to reduce the tension.
4. He has direct impulses to take action. . . .<sup>5</sup>

2) Only closed systems running down to their most probable states, that is, losing organization and available energy, can be profitably treated in equilibrium terms. Outside this context the concept of equilibrium would seem quite inappropriate and only deceptively helpful. On the other side, only open, tensionful, adaptive systems can elaborate and proliferate organization. Cannon coined the term "homeostasis" for biological systems to avoid the connotations of equilibrium, and to bring out the dynamic, processual, potential-maintaining properties of *basically unstable* physiological systems.<sup>6</sup> In dealing with the sociocultural system, however, we need yet a new concept to

express not only the *structure-maintaining* feature, but also the *structure-elaborating and changing* feature of the inherently unstable system. The notion of "steady state," now often used, approaches the meaning we seek if it is understood that the "state" that tends to remain "steady" is *not to be identified with the particular structure* of the system. That is, as we shall argue in a moment, in order to maintain a steady state the system may change its particular structure. For this reason, the term "morphogenesis" is more descriptive.<sup>7</sup> C. A. Mace recognizes this distinction in arguing for an extension of the concept of homeostasis:

The first extension would cover the case in which what is maintained or restored is not so much an internal state of the organism as some relation of the organism to its environment. This would take care of the facts of adaptation and adjustment, including adjustment to the social environment . . . the second extension would cover the case in which the goal and/or norm is some state or relation which has never previously been experienced. There is clearly no reason to suppose that every process of the homeostatic type consists in the maintenance or restoration of a norm.<sup>8</sup>

3) We define a system in general as a complex of elements or components directly or indirectly related in a causal network, such that at least some of the components are related to some others in a more or less stable way *at any one time*. The interrelations may be mutual or unidirectional, linear, non-linear or intermittent, and varying in degrees of causal efficacy or priority. The particular kinds of more or less stable interrelationships of components that become established at any time constitute the particular *structure* of the system at that time.

Thus, the complex, adaptive system as a continuing entity is not to be confused with the structure which that system may manifest at any time. Making this distinction allows us to state a fundamental principle of open, adaptive systems: *Persistence or continuity of an adaptive system may require, as a necessary condition, change in its structure*, the degree of change being a complex function of the internal state of the system, the state of its relevant environment, and the nature of the interchange between the two. Thus, animal species develop and persist or are continuously transformed (or become extinct) in terms of a change (or failure of change) of structure—sometimes extremely slow, sometimes very rapid. The higher individual organism capable of learning by experience maintains itself as a viable system vis-à-vis its environment by a change of structure—in

this case the neural structure of the cortex. It is through this principle that we can say that the "higher" organism represents a "higher" level of adaptive system capable, ontogenetically, of *mapping the environment more rapidly and extensively* and with *greater refinement and fidelity*, as compared to the tropistic or instinct-based adaptive system which can change its structure only phylogenetically. The highest level adaptive system—the sociocultural—is capable of an even more rapid and refined mapping of the environment (including the social and non-social environment, as well as at least some aspects of its own internal state) since sociocultural structures are partially independent of both ontogenetic and phylogenetic structures, and the mappings of many individuals are selectively pooled and stored extrasomatically and made available to the system units as they enter and develop within the system.

Such a perspective suggests that, instead of saying, as some do, that a prime requisite for persistence of a social system is "pattern maintenance," we can say, after Sommerhof and Ashby,<sup>9</sup> that persistence of an adaptive system requires as a necessary condition the maintenance of the system's "essential variables" within certain limits. Such essential variables and their limits may perhaps be specified in terms of what some have referred to as the "functional prerequisites" of any social system (for example, a minimal level of organismal sustenance, of reproduction, of patterned interactive relations, etc.). But the maintenance of the system's essential variables, we are emphasizing, may hinge on (as history and ethnography clearly show) *pattern reorganization or change*. It is true, but hardly helpful, to say that *some* minimal patterning or stability of relations, or integration of components, is necessary—by the very definition of "system" or adaptive organization. Nor can we be satisfied with the statement that persistence, continuity, or social "order" is promoted by the "institutionalization" of interactive relations via norms and values, simply because we can say with equal validity that discontinuity or social "disorder" is *also* promoted by certain kinds of "institutionalization."

To avoid the many difficulties of a one-sided perspective it would seem essential to keep before us as a basic principle that the persistence and/or development of the complex sociocultural system depends upon structuring, destructuring, and restructuring—processes occurring at widely varying rates and degrees as a function of the external social and non-social environment. Jules Henry, among others, has made this point:

... the lack of specificity of man's genetic mechanisms has placed him in the situation of constantly having to revise his social structures because of their frequent failure to guide inter-personal relations without tensions felt as burdensome even in the society in which they originate... thus man has been presented with a unique evolutionary task: because his mechanisms for determining inter-personal relations lack specificity, he must attempt to maximize social adaptation through constant conscious and unconscious revision and experimentation, searching constantly for social structures, patterns of inter-personal relations, that will be more adaptive, as he feels them. Man's evolutionary path is thus set for him by his constant tendency to alter his modes of social adaptation.<sup>10</sup>

More generally, we recall from Chapter 46 that Karl W. Deutsch has seen restructuring as a basic feature distinguishing society from an organism or machine. Speaking of "the critical property which makes a given learning net into a *society*," he says:

A learning net functions as a society, in this view, *to the extent* that its constituent physical parts are capable of regrouping themselves into new patterns of activity in response to changes in the net's surroundings, or in response to the internally accumulating results of their own or the net's past.

The twin tests by which we can tell a society from an organism or a machine, on this showing, would be the freedom of its parts to regroup themselves; and the nature of the regroupings which must imply new coherent patterns of activity—in contrast to the mere wearing out of a machine or the aging of an organism, which are marked by relatively few degrees of freedom and by the gradual disappearance of coherent patterns of activity....

This in turn may rest on specific properties of their members: *their capacity for readjustment to new configurations, with renewed complementarity and sustained or renewed communication.*<sup>11</sup>

4) The cybernetic perspective of control or self-regulation of adaptive systems emphasizes the crucial role of "deviation," seen in both negative and positive aspects. On the negative side, certain kinds of deviations of aspects of the system from its given structural state may be seen as "mismatch" or "negative feedback" signals *interpreted by certain organizing centers* as a failure of the system's operating processes or structures relative to a goal state sought, permitting—under certain conditions of adaptive structuring—a change of those operating processes or structures toward goal-optimization. (Thus, one facet of the "political" process of sociocultural systems may be interpreted in this light, with the more "democratic" type of social organization providing the more extended and accurate assessment of the mismatch between goal-attainment

on the one hand, and current policy and existing social structuring on the other.)

On the positive side, the cybernetic perspective brings out the absolute necessity of deviation—or, more generally, “variety”—in providing a pool of potential new transformations of process or structure that the adaptive systems might adopt in responding to goal-mismatch. On the lower, biological levels we recognize here the principle of genetic variety and the role of gene pools in the process of adaptive response to organismic mismatch with a changed environment. (And in regard to the other major facet of the “political” process, the more democratic type of social organization makes available a broader range of variety, or “deviation,” from which to select new orientations.) Ashby, in developing his very general theory of the adaptive or self-regulating system, suggests (Chapter 15) the “law of requisite variety,” which states that the variety within a system must be at least as great as the environmental variety against which it is attempting to regulate itself. Put more succinctly, only variety can regulate variety. Although such a general principle is a long way from informing more concrete analysis of particular cases, it should help provide a needed corrective to balance (not replace) the current emphasis in social science on conformity, the “control” (as against the cultivation) of “deviants,” and “re-equilibration” of a given structure. (Recall also Roger Nett’s argument in Chapter 48).

Thus, the concept of requisite deviation needs to be proffered as a high-level principle that can lead us to theorize: A requisite of sociocultural systems is the development and maintenance of a significant level of non-pathological deviance manifest as a pool of alternate ideas and behaviors with respect to the traditional, institutionalized ideologies and role behaviors. Rigidification of any given institutional structure must eventually lead to disruption or dissolution of the society by way of internal upheaval or ineffectiveness against external challenge. The student of society must thus pose the question—What “mechanisms” of non-pathological deviance production and maintenance can be found in any society, and what “mechanisms” of conformity operate to counteract these and possibly lessen the viability of the system?

Attempts to analyze a society from such a perspective make possible a more balanced analysis of such processes as socialization, education, mass communication, and economic and political conflict and debate. We are then encouraged to build squarely into our theory and

research designs the full sociological significance of such informally well-recognized conceptions as socialization for “self-reliance” and relative “autonomy,” education for “creativity,” ideational flexibility and the “open mind,” communications presenting the “full spectrum” of viewpoints, etc., instead of smuggling them in unsystematically as if they were only residual considerations or ill-concealed value judgments.

5) Given the necessary presence of variety or deviance in an adaptive system, the general systems model then poses the problem of the *selection* and more or less permanent *preservation* or systemic structuring of some of this variety. On the biological level, we have the process of “natural selection” of some of the genetic variety existing within the interfertile species and subspecies gene pool, and the preservation for various lengths of time of this variety through the reproductive process. On the level of higher order psychological adaptive systems, we have trial-and-error selection, by way of the so-called “law of effect,” from the variety of environmental events and the potential behavioral repertoire to form learned and remembered experience and motor skills more or less permanently preserved by way of cortical structuring.<sup>12</sup> As symbolic mapping or decoding and encoding of the environment and one’s self becomes possible,<sup>13</sup> the selection criteria lean less heavily on direct and simple physiological reward and more heavily on “meanings” or “significance” as manifested in existing self-group structural relations. In the process, selection from the full range of available variety becomes more and more refined and often more restricted, and emerges as one or another kind of “personality” system or “group character” structure. On the sociocultural level, social selection and relative stabilization or institutionalization of normatively interpreted role relations and value patterns occurs through the variety of processes usually studied under the headings of conflict, competition, accommodation, and such; power, authority and compliance; and “collective behavior,” from mob behavior through opinion formation processes and social movements to organized war. More strictly “rational” processes are of course involved, but often seem to play a relatively minor role as far as larger total outcomes are concerned.

It is clearly in the area of “social selection” that we meet the knottiest problems. For the sociocultural system, as for the biological adaptive system, analysis must focus on both the potentialities of the system’s structure at a given time,

and the environmental changes that might occur and put particular demands on whatever structure has evolved. In both areas the complexities are compounded for the sociocultural system. In developing a typology of systems and their internal linkages we have noted that, as we proceed from the mechanical or physical through the biological, psychic and sociocultural, the system becomes "looser," the interrelations among parts more tenuous, less rigid, and especially less directly tied to physical events as energy relations and transformations are overshadowed by symbolic relations and information transfers. Feedback loops between operating sociocultural structures and the surrounding reality are often long and tortuous, so much so that knowledge of results or goal-mismatch, when forthcoming at all, may easily be interpreted in non-veridical ways (as the history of magic, superstition, and ideologies from primitive to present amply indicate). The higher adaptive systems have not been attained without paying their price, as the widespread existence of illusion and delusions on the personality and cultural levels attest. On the biological level, the component parts have relatively few degrees of freedom, and changes in the environment are relatively directly and inexorably reacted to by selective structural changes in the species.

Sociocultural systems are capable of persisting within a wide range of degrees of freedom of the components, and are often able to "muddle through" environmental changes that are not too demanding. But of course this is part of the genius of this level of adaptive system; it is capable of temporary shifts in structure to meet exigencies. The matter is greatly complicated for the social scientist, however, by this system's outstanding ability to act on and partially control the environment of which a major determining part is made up of other equally loose-knit, more or less flexible, illusion-ridden, sociocultural adaptive systems. Thus, although the minimal integration required for a viable system does set limits on the kinds of structures that can persist, these limits seem relatively broad compared to a biological system.<sup>14</sup> And given the relatively greater degrees of freedom of internal structuring (structural alternatives, as some call them) and the *potentially* great speed with which restructuring may occur under certain conditions, it becomes difficult to predict the reactions of such a system to environmental changes or internal elaboration. Considering the full complexities of the problem we must wonder at the facility with which the functionalist sociologist has pronounced upon the ultimate

functions of social structures, especially when—as seems so often the case—very little consideration is given either to the often feedback-starved social selective processes that have led to the given structures, or to the environmental conditions under which they may be presumed to be functional.

Although the problem is difficult, something can be said about more ultimate adaptive criteria against which sociocultural structures can be assessed. Consideration of the grand trends of evolution provides clues to very general criteria. These trends point in the direction of: (1) greater and greater flexibility of structure, as error-controlled mechanisms (cybernetic processes of control) replace more rigid, traditionalistic means of meeting problems and seeking goals; (2) ever more refined, accurate, and systematic mapping, decoding and encoding of the external environment and the system's own internal milieu (via science), along with greater independence from the physical environment; (3) and thereby a greater elaboration of self-regulating substructures in order—not merely to restore a given equilibrium or homeostatic level—but to purposefully restructure the system without tearing up the lawn in the process.<sup>15</sup>

With these and perhaps other general criteria, we might then drop to lower levels of generality by asking what restrictions these place on a sociocultural adaptive system if it is to remain optimally viable in these terms. It is possible that this might provide a value-free basis for discussing the important roles, for example, of a vigorous and independent science in all fields; the broad and deep dissemination of its codified findings; the absence of significant or long-lasting subcultural cleavages, power centers and vested interests, whether on a class or ethnic basis, to break or hinder the flow of information or feedback concerning the internal states of the system; and the promotion of a large "variety pool" by maintaining a certain number of degrees of freedom in the relations of the component parts—for example, providing a number of real choices of behaviors and goals. Thus we can at least entertain the feasibility of developing an objective rationale for the sociocultural "democracy" we shy from discussing in value terms.

6) Further discussion of the intricacies of the problem of *sociocultural selection processes* leading to more or less stable system *structures* may best be incorporated into the frame of discussion of the problem of "*structure versus process*." This is another of those perennial issues of the social

(and other) sciences, which the modern systems perspective may illuminate.

Our argument may be outlined as follows:

—Much of modern sociology has analyzed society in terms of largely structural concepts: institutions, culture, norms, roles, groups, etc. These are often reified, and make for a rather static, overly deterministic, and elliptical view of societal workings.

—But for the sociocultural system, “structure” is only a relative stability of underlying, ongoing micro-processes. Only when we focus on these can we begin to get at the selection process whereby certain interactive relationships become relatively and temporarily stabilized into social and cultural structures.

—The unit of dynamic analysis thus becomes the systemic *matrix* of interacting, goal-seeking, deciding individuals and subgroups—whether this matrix is part of a formal organization or only a loose collectivity. Seen in this light, society becomes a continuous morphogenic process, through which we may come to understand in a unified conceptual manner the development of structures, their maintenance, and their change. And it is important to recognize that out of this matrix is generated, not only *social* structure, but also *personality* structure, and *meaning* structure. All, of course, are intimately interrelated in the morphogenic process, and are only analytically separable.

### *Structure, Process, and Decision Theory*

Though the problem calls for a lengthy methodological discussion, we shall here simply recall the viewpoint that sees the sociocultural system in comparative perspective against lower-level mechanical, organic and other types of systems. As we proceed upward along such a typology we noted that the ties linking components become less and less rigid and concrete, less direct, simple and stable within themselves. Translation of energy along unchanging and physically continuous links gives way in importance to transmission of information via internally varying, discontinuous components with many more degrees of freedom. Thus for mechanical systems, and parts of organic systems, the “structure” has a representation that is concrete and directly observable—such that when the system ceases to operate much of the structure remains directly observable for a time. For the sociocultural system, “structure” becomes a theoretical con-

struct whose referent is only indirectly observable (or only inferable) by way of series of events along a time dimension; when the system ceases to operate, the links maintaining the sociocultural structure are no longer observable.<sup>16</sup> “Process,” then, points to the actions and interactions of the components of an ongoing system, in which varying degrees of structuring arise, persist, dissolve, or change. (Thus “process” should not be made synonymous simply with “change,” as it tended to be for many earlier sociologists.)

More than a half century ago, Albion W. Small argued that, “The central line in the path of methodological progress in sociology is marked by the gradual shifting of effort from analogical representation of social structures to real analysis of social processes.”<sup>17</sup> This was an important viewpoint for many social thinkers earlier in this century, possibly as part of the trend in physical science and philosophy toward a process view of reality developing from the work of such people as Whitehead, Einstein, Dewey and Bentley. Such views have apparently had little impact on those of recent decades who had developed the more dominant structure-oriented models of current sociology, but it seems clear that—with or without the aid of the essentially process-conscious general systems approach—a more even balance of process with structure in the analysis of sociocultural systems is gradually regaining lost ground.

C. H. Cooley, in his *Social Process*, focused on the “tentative process,” involving inherent energy and growth as the dynamic agents, with ongoing “selective development” set in motion by the interaction of “active tendencies” and surrounding “conditions.” He argued that for the social process, “that grows which works” is a better phrase than “natural selection” or “survival of the fittest,” since “it is not so likely to let us rest in mechanical or biological conceptions.”<sup>18</sup> R. E. Park, with his recognition of the central importance of communication, kept the notion of process in the foreground whether developing the forms of interaction or the foundations of social ecology. We should also recall the leaders of the so-called “formal” school: Whereas Simmel focused on “forms of interaction,” the emphasis was always on the “interaction” as process rather than simply on the “forms”; and though the Wiese-Becker systematics developed in great detail a classification of action *patterns*, it gave equal attention to *action* patterns. For W. I. Thomas, all social becoming is viewed as a product of continual interaction of individual consciousness



and objective social reality. (F. Znaniecki more recently reinforced this point of view'.<sup>19</sup>) And at least one unbroken thread in this vein continuing from the early part of the century is the Dewey-Mead perspective referred to as social interactionism, (which, we have noted, has established a strong base especially congenial to the modern cybernetic approach).<sup>20</sup> A reviewer of a recent collection of social interactionist essays was "reminded throughout of the continuous character of socialization, of the complexity and fluidity of interaction when it is viewed as a process rather than as the mere enactment of social forms. . . ."<sup>21</sup>

We can take only brief note of a few of the more recent arguments for the process viewpoint. The anthropologists, for example, have become acutely concerned in the last few years with this issue. G. P. Murdock seems to be echoing Small when he says, "All in all, the static view of social structure which seeks explanations exclusively within the existing framework of a social system on the highly dubious assumption of cultural stability and nearly perfect functional integration seems clearly to be giving way, in this country at least, to a dynamic orientation which focuses attention on the processes by which such systems come into being and succeed one another over time."<sup>22</sup> At about the same time, Raymond Firth was stating: "The air of enchantment which for the last two decades has surrounded the 'structuralist' point of view has now begun to be dispelled. Now that this is so, the basic value of the concept of social structure as an heuristic tool rather than a substantial social entity has come to be more clearly recognized."<sup>23</sup>

Soon after appeared the late S. F. Nadel's penetrating work, *The Theory of Social Structure*, which was preceded by his article on "Social Control and Self Regulation" (reprinted here as Chapter 47). This perspective is used effectively in *The Theory of Social Structures* as a basis for a critique of the current rather one-sided equilibrium model emphasizing the "complementarity of expectations" to the relative neglect of the several other crucial types of associative and dissociative social interrelationships considered equally important in earlier sociology.

Parsons' model has to do with "the conditions of relatively stable interaction in social systems," implying defined value "standards" and "institutionalized role expectations": any willful disagreement with them simply falls outside the stipulated stability and the model based on it.

I would argue that this is not necessarily so and that our model must allow for such disagreements. Even "relatively stable" social systems do not exclude

them, or include them only in the form of purely fortuitous contingencies. Far from being fortuitous or idiosyncratic, the rejection of the sanctioning potentialities of other roles may itself be anchored in the existing institutions, reflecting the presence of diverse but equally legitimate "value patterns," ideologies or schools of thought, that is, that plurality of norms we spoke of before.<sup>24</sup>

Nadel's book as a whole explores the thesis that structural analysis is not, and should not be treated as, static analysis: "Social structure as Fortes once put it, must be 'visualized' as 'a sum of processes in time.' As I would phrase it, social structure is implicitly an event-structure. . . ."<sup>25</sup> And in concluding he reiterates his argument that

. . . it seems impossible to speak of social structure in the singular. Analysis in terms of structure is incapable of presenting whole societies; nor, which means the same, can any society be said to exhibit an embracing, coherent structure as we understand the term. There are always cleavages, dissociations, enclaves, so that any description alleged to present a single structure will in fact present only a fragmentary or one-sided picture.<sup>26</sup>

As a final example in anthropology, we should mention the cogent argument of Evon Z. Vogt that the two concepts of structure and process must be integrated into a general theoretical model. As with Nadel, structure is seen as falsely conceived as static, with change pathological. Rather, Vogt feels, must we pose the primacy of change, considering structure the way in which moving reality is translated, for the observer, into an instantaneous and artificial observation: social and cultural structures are only the intersections in time and space of process in course of change and development.<sup>27</sup>

Among sociologists, a perennial critic of the overly-structural conception of the group is Herbert Blumer. Blumer has argued that it is from the process of ongoing interaction itself that group life gets its main features, which cannot be adequately analyzed in terms of fixed attitudes, "culture," or social structure—nor can it be conceptualized in terms of mechanical structure, the functioning of an organism, or a system seeking equilibrium, ". . . in view of the formative and explorative character of interaction as the participants *judge* each other and *guide* their own acts by that judgment."

The human being is not swept along as a neutral and indifferent unit by the operation of a system. As an organism capable of self-interaction he forges his actions out of a process of definition involving *choice*, *appraisal*, and *decision*. . . . Cultural norms, status

positions and role relationships are only *frameworks* inside of which that process [of formative transaction] goes on.<sup>28</sup>

Highly structured human association is relatively infrequent and cannot be taken as a prototype of a human group life. In sum, institutionalized patterns constitute only one conceptual aspect of society, and they point to only a part of the ongoing process (and, we might add, they must be seen to include deviant and dysfunctional patterns: for conceptual clarity and empirical relevance, "institutionalization" cannot be taken to imply only "legitimacy," "consent," and ultimately adaptive values).

Finally, it should be noted that Gordon Allport, viewing personality as an open-system, stresses a very similar point concerning the organization of personality:

... the best hope for discovering coherence would seem to lie in approaching personality as a total functioning structure, i.e., as a *system*. To be sure, it is an incomplete system, manifesting varying degrees of order and disorder. It has structure but also un-structure, function but also malfunction. As Murphy says, "all normal people have many loose ends." And yet personality is well enough knit to qualify as a system—which is defined merely as a *complex of elements in mutual interaction*.<sup>29</sup>

In the light of such views, we need only recall the many critiques pointing to the incapacity or awkwardness of the conventional type of framework before the facts of process, "becoming," and the great range of "collective behavior."<sup>30</sup>

Statements such as Blumer's, a continuation of the perspective of many neglected earlier sociologists and social psychologists, would seem to constitute a perspective that is now pursued by many under new rubrics such as "decision theory." For earlier antecedents it should be enough to mention W. I. Thomas's "definition of the situation," Znaniecki's "humanistic coefficient," Weber's "verstehen," Becker's "interpretation," and MacIver's "dynamic assessment."<sup>31</sup> Much of current structural, consensus theory represents a break from this focus. As Philip Selznick has argued,

A true theory of social action would say something about goal-oriented or problem-solving behavior, isolating some of its distinctive attributes, stating the likely outcomes of determinate transformations. . . . In Parsons' writing there is no true embrace of the idea that structure is being continuously opened up and reconstructed by the problem-solving behavior of individuals responding to concrete situations. This is a point of view we associate with John Dewey and

G. H. Mead, for whom, indeed, it had significant intellectual consequences. For them and for their intellectual heirs, social structure is something to be taken account of in action; cognition is not merely an empty category but a natural process involving dynamic assessments of the self and the other.<sup>32</sup>

It can be argued, then, that a refocusing is occurring via "decision theory," whether elaborated in terms of "role-strain" theory; theories of cognitive dissonance, congruence, balance, or concept formation; exchange, bargaining, or conflict theories, or the mathematical theory of games. The basic problem is the same: How do interacting personalities and groups define, assess, interpret, "verstehen," and act on the situation? Or, from the broader perspective of our earlier discussion, how do the processes of "social selection" operate in the "struggle" for socio-cultural structure? Instead of asking how structure affects, determines, channels actions and interactions, we ask how structure is created, maintained and recreated.

Thus we move down from structure to social interrelations and from social relations to social actions and interaction processes—to a matrix of "dynamic assessments" and intercommunication of meanings, to evaluating, emoting, deciding and choosing. To avoid anthropomorphism and gain the advantages of a broader and more rigorously specified conceptual system, we arrive at the language of modern systems theory.

Basic ingredients of the decision-making focus include, then: (1) a *process* approach; (2) a conception of *tension* as inherent in the process; and (3) a renewed concern with the role and workings of man's enlarged cortex seen as a complex adaptive subsystem operating within an *interaction matrix* characterized by *uncertainty*, *conflict*, and other dissociative (as well as associative) processes *underlying the structuring and restructuring of the larger psycho-social system*.

#### PROCESS FOCUS

The process focus points to information-processing individuals and groups linked by different types of communication nets to form varying types of interaction matrices that may be characterized by "competition," "cooperation," "conflict," and the like. Newer analytical tools being explored to handle such processes include treatment of the interaction matrix over time as a succession of states described in terms of transition probabilities, Markoff chains, or stochastic processes in general. The Dewey-Mead

"transactions" are now discussed in terms of information and codings and decodings, with the essential "reflexivity" of behavior now treated in terms of negative and positive feedback loops linking via the communication process the intra-personal, interpersonal and intergroup subsystems and making possible varying degrees of matching and mismatching of Mead's "self and others," the elaboration of Boulding's "Image,"<sup>33</sup> and the execution of Miller's "Plans" (Chapter 45). And herein we find the great significance for sociology of many of the conceptual tools (though not, at least as yet, the mathematics) of information and communication theory, cybernetics, or general systems research, along with the rapidly developing techniques of *relational* mathematics such as the several branches of set theory—topology, group theory, graphy theory, symbolic logic, etc.

#### CONCEPTION OF TENSION

Tension is seen as an inherent and essential feature of complex adaptive systems; it provides the "go" of the system, the "force" behind the elaboration and maintenance of structure. There is no "law of social inertia" operating here, nor can we count on "automatic" reequilibrating forces counteracting system "disturbances" or "deviance," for, whereas we do find deviance-reducing negative feedback loops in operation we also find deviance-maintaining and deviance-amplifying *positive* feedback processes often referred to as the vicious circle or spiral, or "escalation."<sup>34</sup> It is not at all certain whether the resultant will maintain, change, or destroy the given system or its particular structure. The concepts of "stress" or "strain" we take to refer only to the greater mobilization of normal tension under conditions of more than usual blockage. And instead of a system's seeking to manage *tension*, it would seem more apt to speak of a system's seeking to manage *situations* interpreted as responsible for the production of greater than normal tension.

The "role strain" theory of William J. Goode is an illustrative attack on assumptions of the widely current structural approach, using a process and tension emphasis and contributing to the decision-theory approach. Goode analyzes social structure or institutions into role relations, and role relations into role transactions. "Role relations are seen as a sequence of 'role bargains' and as a continuing process of selection among alternative role behaviors, in which each individual seeks to reduce his role strain."<sup>35</sup> Contrary to the

current stability view, which sees social system continuity as based primarily on normative consensus and normative integration, Goode thus sees "dissensus, nonconformity, and conflicts among norms and roles as the usual state of affairs. . . . The individual cannot satisfy fully all demands, and must move through a continuous sequence of role decision and bargains . . . in which he seeks to reduce his role strain, his felt difficulty in carrying out his obligations."<sup>36</sup> Goode also recognizes that there is no "law of social inertia" automatically maintaining a given structure.

Like any structure or organized pattern, the role pattern is held in place by both internal and external forces—in this case, the role pressures from other individuals. Therefore, not only is role strain a normal experience for the individual, but since the individual processes of reducing role strain determine the total allocation of role performances to the social institutions, the total balances and imbalances of role strains create whatever stability the social structure possesses.<sup>37</sup>

It should be noted, however, that Goode accepts unnecessarily a vestige of the equilibrium or stability model when he states, "The total role structure functions so as to reduce role strain."<sup>38</sup> He is thus led to reiterate a proposition that—when matched against our knowledge of the empirical world—is patently false. Or, more precisely, not false, but a half-truth: it recognizes deviance-reducing negative feedback processes, but not deviance-amplifying positive feedback processes. Such a proposition appears reasonable only if we "hold everything else constant," that is, take it as a closed system. However, the proposition is unnecessary to his argument and, in fact, clashes with the rest of his formulation: ". . . though the sum of role performances ordinarily maintains a society it may also change the society or fail to keep it going. There is no necessary harmony among all role performances. . . . But whether the resulting societal pattern is 'harmonious' or integrated or whether it is even effective in maintaining that society, are separate empirical questions."<sup>39</sup>

#### STUDY OF COGNITIVE PROCESSES

A more concerted study of cognitive processes, especially under conditions of *uncertainty* and *conflict*, goes hand in hand, of course, with a focus on decision-making and role transactions. Despite the evolutionary implications of man's enlarged cortex, much social (and psychological)

theory seems predicated on the assumption that men are decorticated. Cognitive processes, as they are coming to be viewed today, are not to be simply equated with the traditional, ill-defined, concept of the "rational." That the data-processing system—whether socio-psychological or electro-mechanical—is seen as inherently "rational" tells us little about its outputs in concrete cases. Depending on the adequacy and accuracy of the effectively available information, the total internal organization or "Image," the character of the "Plans" or program, and the nature of the significant environment, the output of either "machine" may be sense or nonsense, symbolic logic or psychologic, goal-attainment or oscillation.

Beyond giving us a deeper perspective on the concept of the "rational," current theories of cognitive processes give promise of transcending the hoary trichotomy of the cognitive, the conative, and the moral as analytical tools. Whether this amounts to a rejection of the distinction, or simply an insistence that what was analytically rent asunder must now be reunified, the ferment appears significant. We refer here, not only to the many neurological and schematic studies of the brain, or the processes by which it solves problems and attains concepts, but especially to the several theories of cognitive "dissonance" or "congruence" or "balance" represented in the works of Heider, Cartwright and Harary, Osgood and Tannenbaum, Festinger, and others, as well as the symbol-processing and interpersonal communication perspectives represented by the "psycholinguistics" of Osgood, the "communicative acts" of Newcomb, and the "two factor" theory of Mowrer.

The intricate meeting of the cognitive, the affective and evaluative (or attitudinal), and the semantic or symbolic in such theories is well illustrated in Osgood's treatment of "cognitive dynamics." Equating "cognitive elements" with the *meanings* of signs, Osgood proposes that "congruity exists when the evaluative meanings of interacting signs are equally polarized or intense—either in the same or opposite evaluative directions. . . ."40 In contrast to the theories of Heider and Festinger, this theory "assigns affective or attitudinal values to the cognitive elements themselves, and not to their relations. . . ."41 And in discussing the "process of inference through psycho-logic," Osgood says:

Much of what is communicated attitudinally by messages and by behavior is based on such inferences; . . . The syntax of language and of behavior provides a structural framework within which meaningful contents

are put; the structure indicates what is related to what, and how, but only when the meaningful values are added does the combination of structure and content determine psycho-logical congruence or incongruence.<sup>42</sup>

Despite the incorporation of aspects of these several elements into their theories, however, the psychologically oriented theorist usually leaves the sociologist something to be desired, namely, something that transcends "the individual" and "his" attempts to minimize inconsistency or dissonance and maintain stability, and which views the group situation as inadequately characterized in terms of "myriad decisions in individual nervous systems." Thus Osgood hypothesizes that

laws governing the thinking and behaving of individuals also govern the "thinking" and "behaving" of groups . . . with nothing but communication to bind us together, it is clear that "decisions" and "behaviors" of nations must come down to myriad decisions in individual nervous systems and myriad behaviors of individual human organisms.<sup>43</sup>

We are reminded here of Robert R. Sears' complaint that "psychologists think monadically. That is, they choose the behavior of one person as their scientific subject matter. For them, the universe is composed of individuals . . . the universal laws sought by the psychologist almost always relate to a single body."<sup>44</sup> Arguing for the desirability of combining individual and social behavior into a common framework, Sears noted that, "Whether the group's behavior is dealt with as antecedent and the individual's as consequent, or vice versa, the two kinds of event are so commonly mixed in causal relationships that it is impractical to conceptualize them separately."<sup>45</sup>

Fortunately, however, there are recent statements that rally to the side of the sociological interactionist theorists, whose perspective continues to be ignored or little understood by so many personality theorists who are nevertheless gradually rediscovering and duplicating its basic principles. A good beginning to a truly interpersonal approach to personality theory and the problem of stability and change in behavior is the statement of Paul F. Secord and Carl W. Backman, which remarkably parallels Goode's theory of stability and change in social systems discussed earlier. Pointing to the assumptions of several personality theorists that when stability of behavior occurs it is solely a function of stability in personality structure, and that this latter structure has, inherently, a strong resistance to change except when special change-inducing

forces occur, Secord and Backman see as consequences the same kinds of theoretical inadequacies we found for the stability view of social systems:

The first is that continuity in individual behavior is not a problem to be solved; it is simply a natural outcome of the formation of stable structure. The second is that either behavioral change is not given systematic attention, or change is explained independently of stability. Whereas behavioral stability is explained by constancy of structure, change tends to be explained by environmental forces and fortuitous circumstances.<sup>46</sup>

Their own theoretical view abandons these assumptions and "places the locus of stability and change in the interaction process rather than in intrapersonal structures." Recognizing the traditional two classes of behavioral determinants, the cultural-normative and the intrapersonal, their conceptualization

attempts to identify a third class of determinants, which have their locus neither in the individual nor the culture, but in the interaction process itself. In a general sense this third class may be characterized as the tendencies of the individual and the persons with whom he interacts to shape the interaction process according to certain requirements, i.e., they strive to produce certain patterned relations. As will be seen, the principles governing this activity are truly interpersonal; they require as much attention to the behavior of the other as they do to the behavior of the individual, and it cannot be said that one or the other is the sole locus of cause.<sup>47</sup>

They go on to analyze the "interpersonal matrix" into three components: an aspect of the self-concept of a person, his interpretation of those elements of his behavior related to that aspect, and his perception of related aspects of the other with whom he is interacting. "An interpersonal matrix is a recurring functional relation between these three components."

In these terms, Secord and Backman attempt to specify the conditions and forces leading to or threatening congruency or incongruency, and hence stability or change, in the matrix. Thus, four types of incongruency, and two general classes of resolution of incongruency, are discussed. One of these latter classes

results in restoration of the original matrix, leaving self and behavior unchanged (although cognitive distortions may occur), and the other leads to a new matrix in which self or behavior are changed.<sup>48</sup>

In sum, contrary to previous approaches, theirs emphasizes that "the individual strives to maintain interpersonal relations characterized by

congruent matrices, rather than to maintain a self, habits, or traits."

Maintenance of intrapersonal structure occurs only when such maintenance is consistent with an ongoing interaction process which is in a state of congruency. That most individuals do maintain intrapersonal structure is a function of the fact that the behavior of others toward the individuals in question is normally overwhelmingly consistent with such maintenance.<sup>49</sup>

And this conception also, as most approaches do not (or do inadequately), predicts or accounts for the fact that, should the interpersonal environment cease to be stable and familiar, undergoing great change such that others behave uniformly toward the individual in new ways, the individual "would rapidly modify his own behavior and internal structure to produce a new set of congruent matrices. As a result, he would be a radically changed person."<sup>50</sup>

As we have said, the Secord and Backman theory and Goode's role-strain theory may be seen as closely complementary views. The former argues that *personality* structure is generated in, and continues to have its seat in, the social interactive matrix; the latter argues that *social* structure is generated in, and continues to have its seat in, the social interactive matrix. Since it is the latter that we are focusing on here, we shall conclude with additional examples of current theory and research that explore further the mechanisms underlying the genesis or elaboration of social structure out of the dynamics, especially the role dynamics, of the symbolic interaction process.

### Further Examples

Ralph Turner has addressed himself to the elaboration of this perspective in that conceptual area fundamental to the analysis of institutions—roles and role-taking.<sup>51</sup> The many valid criticisms of the more static and overdetermining conception of roles is due, he believes, to the dominance of the Linton view of role and the use of an oversimplified model of role functioning. Viewing role-playing and role-taking, however, as a process (as implied in Meadian theory), Turner shows that there is more to it than just "an extension of normative or cultural deterministic theory" and that a process view of role adds novel elements to the notion of social interaction.

The morphogenic nature of role behavior is emphasized at the start in the concept of "role-making." Instead of postulating the initial existence

of distinct, identifiable roles, Turner posits "a tendency to create and modify conceptions of self- and other-roles" as the interactive orienting process. Since actors behave *as if* there were roles, although the latter actually exist only in varying degrees of definitiveness and consistency, the actors attempt to define them and make them explicit—thereby in effect creating and modifying them as they proceed. The key to role-taking, then, is the morphogenic propensity "to shape the phenomenal world into roles"; formal organizational regulation restricting this process is not to be taken as the prototype, but rather as a "distorted instance" of the wider class of role-taking phenomena. To the extent that the bureaucratic setting blocks the role-making process, organization is maximal, "variety" or alternatives of action minimal, actors are cogs in a rigid machine, and the morphogenic process underlying the viability of complex adaptive systems is frustrated.

Role interaction is a tentative process of reciprocal responding of self and other, challenging or reinforcing one's conception of the role of the other, and consequently stabilizing or modifying one's own role as a product of this essentially feedback-testing transaction. The conventional view of role emphasizing a prescribed complementarity of expectations thus gives way to a view of role-taking as a process of "devising a performance on the basis of an imputed other-role," with an important part being played by cognitive processes of inference testing. In a manner consistent with models of the basic interaction process suggested by Goode and by Secord and Backman, Turner views as a central feature of role-taking "the process of discovering and creating 'consistent' wholes out of behavior," of "devising a pattern" that will both cope effectively with various types of relevant others and meet some recognizable criteria of consistency. Such a conception generates empirically testable hypotheses of relevance to our concern here with institutional morphogenesis, such as: "Whenever the social structure is such that many individuals characteristically act from the perspective of two given roles simultaneously, there tends to emerge a single role which encompasses the action."<sup>52</sup>

Turning directly to the implications for formal, institutional role-playing, Turner argues that the formal role is primarily a "skeleton" of rules which evoke and set into motion the fuller roles built-up and more or less consensually validated in the above ways. Role behavior becomes rela-

tively fixed only while it provides a perceived consistency and stable framework for interaction, but it undergoes cumulative revision in the role-taking process of accommodation and compromise with the simple conformity demanded by formal prescriptions.

The purposes and sentiments of actors constitute a unifying element in role genesis and maintenance, and hence role-taking must be seen to involve a great deal of selective perception of other-behavior and relative emphasis in the elaboration of the role pattern. This selection process operates on the great variety of elements in the situation of relevant objects and other-behaviors which could become recognized components in a consistent role pattern. Not all combinations of behavior and object relations can be classed into a single role; there must be criteria by which actors come to "verify" or "validate" the construction of a number of elements into a consistent role. This verification stems from two sources: "internal validation" of the interaction itself, and "external validation" deriving from "the generalized other" of Mead. The former hinges on successful prediction or anticipation of relevant other-behavior in the total role-set, and hence on the existence of role patterns whereby coherent selection of behaviors judged to constitute a consistent role can be made. But the notion of fixed role prescriptions is not thereby implied, since, first, roles—like norms—often or usually provide a *range of alternative* ways of dealing with any other-role, or, as is most common, the small segment of it activated at any one time, and secondly, the coherence and predictability of a role must be assessed and seen as "validated," not in terms of any one other-role, but in terms of the Gestalt of all the accommodative and adjusted requirements set by the number of other-roles in the actor's role-set and generated in the ongoing role-making process.

An example is provided by the study by Gross *et al.* of the school superintendent role. It is found that incumbency in this role (1) actually involved a great deal of choice behavior in selecting among the alternative interpretations and behaviors deemed possible and appropriate, and that (2) consistency and coherence of an incumbent's behavior could be seen only in terms of the total role as an accommodation with correlative other-roles of school board member, teacher, and parent, with which the superintendent was required to interact simultaneously. As Gross puts it, a "system model" as against a "position-centric" model involves an important

addition by including the interrelations among the counter positions. "A position can be completely described only by describing the total system of positions and relationships of which it is a part. In other words, in a system of interdependent parts, a change in any relationship will have an effect on all other relationships, and the positions can be described only by the relationships."<sup>53</sup>

Thus Turner sees the internal criterion of role validation as insuring a constant modification, creation, or rejection of the content of specific roles occurring in the interplay between the always somewhat vague and incomplete ideal role conceptions and the experience of their concrete implications by the interpreting, purposive, selectively evaluating and testing self and others.

The basis of "external validation" of a role is the judgment of the behavior to constitute a role by others felt to have a claim to correctness or legitimacy. Criteria here include: discovery of a name in common use for the role, support of major norms or values, anchorage in the membership of recognized groups, occupancy of formalized positions, and experience of key individuals as role models acting out customary attitudes, goals and specific actions.

Under the "normal loose operation of society" these various internal and external criteria of validation are at best only partially conveyant and consistent in identifying the same units and content as roles. The resulting inevitable discrepancies between formal, institutional rules and roles, and the goals, sentiments and selective interpretations arising from the experience of actually trying to play them out, make role conceptions "creative compromises," and insure "that the framework of roles will operate as a hazily conceived ideal framework for behavior rather than as an unequivocal set of formulas."<sup>54</sup>

In sum, "institutions" may provide a normative framework prescribing roles to be played and thus assuring the required division of labor and minimizing the costs of general exploratory role-setting behavior, but the actual role transactions that occur generate a more or less coherent and stable working compromise between ideal set prescriptions and a flexible role-making process, between the structured demands of others and the requirements of one's own purposes and sentiments. This conception of role relations as "fully interactive," rather than merely conforming, contributes to the recent trends "to subordinate normative to functional processes in accounting for societal integration"<sup>55</sup> by emphasizing the complex adaptive

interdependence of actors and actions in what we see as an essentially morphogenic process—*as against a merely equilibrial or homeostatic process.*

#### ORGANIZATION AS A NEGOTIATED ORDER

Next we shall look at a recently reported empirical study of a formal organization that concretely illustrates many facets of the above conceptualization of Turner and contributes further to our thesis. In their study of the hospital and its interactive order, Anselm Strauss and colleagues develop a model of organizational process that bears directly on the basic sociological problem of "how a measure of order is maintained in the face of inevitable changes (derivable from sources both external and internal to the organization)."<sup>56</sup> Rejecting an overly structural view, it is assumed that social order is not simply normatively specified and automatically maintained but is something that must be "worked at," continually reconstituted. Shared agreements, underlying orderliness, are not binding and shared indefinitely but involve a temporal dimension implying eventual review, and consequent renewal or rejection. On the basis of such considerations, Strauss and colleagues develop their conception of organizational order as a "negotiated order."

The hospital, like any organization, can be visualized as a hierarchy of status and power, of rules, roles and organizational goals. But it is also a locale for an ongoing complex of transactions among differentiated types of actors: professionals such as psychiatrists, residents, nurses and nursing students, psychologists, occupational therapists and social workers; and non-professionals such as various levels of staff, the patients themselves, and their families. The individuals involved are at various stages in their careers, have their own particular goals, sentiments, reference groups, and ideologies, command various degrees of prestige, esteem and power, and invest the hospital situation with differential significance.

The rules supposed to govern the actions of the professionals were found to be far from extensive, clearly stated, or binding; hardly anyone knew all the extant rules or the applicable situations and sanctions. Some rules previously administered would fall into disuse, receive administrative reiteration, or be created anew in a crisis situation. As in any organization, rules were selectively evoked, broken, and/or ignored

to suit the defined needs of personnel. Upper administrative levels especially avoided periodic attempts to have the rules codified and formalized, for fear of restricting the innovation and improvisation believed necessary to the care of patients. Also, the multiplicity of professional ideologies, theories and purposes would never tolerate such rigidification.

In sum, the area of action covered by clearly defined rules was very small, constituting a few general "house rules" based on long-standing shared understandings. The basis of organizational order was the generalized mandate, the single ambiguous goal, of returning patients to the outside world in better condition. Beyond this, the rules ordering actions to this end were the subject of continual negotiations—being argued, stretched, ignored, or lowered as the occasion seemed to demand. As elsewhere, rules failed to act as universal prescriptions, but required judgment as to their applicability to the specific case.

The ambiguities and disagreements necessitating negotiation are seen by the researchers to be patterned. The various grounds leading to negotiation include: disagreement and tension over the proper ward placement of a patient to maximize his chances of improvement; the mode of treatment selected by the physician, which is closely related to his own psychiatric ideology and training; the multiplicity of purposes and temporal ends of each of the professional groups as they maneuver to elicit the required cooperation of their fellow workers; the element of medical uncertainty involved in treating the patient as a unique, "individual case," and the consequent large area of contingency lying of necessity beyond specific role prescription; and, finally, the inevitable changes forced upon the hospital and its staff by external forces and the unforeseen consequences of internal policies and the round of negotiations themselves. What is concretely observed, then, in researching the organizational order of the hospital, is negotiation between the neurologically trained and the psychotherapeutically oriented physician, between the nurses and the administrative staff, between the nonprofessional floor staff and the physician, between the patient and each of the others.

The negotiation process itself was found to have patterned and temporal features. Thus, different physicians institute their own particular programs of treatment and patient care and in the process develop fairly stable understandings with certain nurses or other institutional gate-

keepers such as to effectuate an efficient order of behaviors with a minimum of communication and special instructions. Such arrangements are not called for by any organizational role prescriptions; nevertheless, they represent a concrete part of the actual organization generated in the morphogenic process of negotiation (or role-making and -taking, in Turner's terms). Thus, agreements do not occur by chance but are patterned in terms of "who contracts with whom, about what, as well as when. . . ." <sup>57</sup> There is an important temporal aspect, also, such as the specification of a termination period often written into an agreement—as when a physician bargains with a head nurse to leave his patient in the specific ward for "two more days" to see if things will work themselves out satisfactorily.

In a final section of their paper, Strauss and his colleagues bring out the full implications of their negotiation model in dealing with genuine organizational change. The model presents a picture of the hospital—and perhaps most other institutionalized spheres of social life—as a transactional milieu where numerous agreements are "continually being established, renewed, reviewed, revoked, revised." But this raises the question of the relation between this process and the more stable structure of norms, statuses, and the like. The authors see a close systemic relation between the two. The daily negotiations periodically call for a reappraisal and reconstitution of the organizational order into a "new order, not the reestablishment of an old, as reinstating of a previous equilibrium." And, we would add, it contributes nothing to refer to this as a "moving equilibrium" in the scientifically established sense of the term. The daily negotiative process not only allows the day-by-day work to get done, but feeds back upon the more formalized, stable structure of rules and policies by way of "a periodic appraisal process" to modify it—sometimes slowly and crecively, sometimes rapidly and convulsively. And, as a reading of history suggests, virtually every formal structure extant can be traced, at least in principle, from its beginnings to its present apparently timeless state through just such a morphogenic process—a process characteristic of what we have called the complex adaptive system.

#### THE SCHOOL SUPERINTENDENT AND HIS ROLE

We turn to the study by Gross and his associates of the role system of the school superintendent and his counter-role partners, the school



board member, the teacher, and the parent. A major burden of this empirical study is to demonstrate the research sterility of the Lintonian conception of role, and structural theories built on it, due principally to the postulate of consensus on role definition. The study showed a majority of significant differences in the definitions of their own roles by a sample of incumbents of the same social position and by incumbents of different but interrelated counter positions. This fact led Gross and his associates to the demonstration of a number of important theoretical consequences derived from rejection of the postulate of role consensus. It is often assumed, for example, that the socialization process by which roles are "acquired" provides for a set of clearly defined and agreed-upon expectations associated with any particular position. But the empirically discovered fact of differential *degrees of consensus* seriously challenged this assumption. From our systems model viewpoint, recognition of degrees of consensus is tantamount to the recognition of a continuous source of "variety" in the role system, as defined earlier, which leads us to seek the various *selective*, choice processes occurring in the role transactions. At least for the occupational positions studied, it was found that the assumption of socialization on the basis of prior consensus on role definitions was untenable, and deserved "to be challenged in most formulations of role acquisition, including even those concerned with the socialization of the child."<sup>58</sup>

Secondly, the research showed that, instead of assuming role consensus and explaining variations of behavior of incumbents of the same position in terms of personality variables, one would better explain them in terms of the varying role expectations and definitions—which may be unrelated to psychological differences.

The implications are also great for a theory of social control. Instead of a model assuming that the application or threat of negative sanctions leads to conformity to agreed-upon norms, the research pointed to the numerous situations in which, due to variant or ambiguous role definitions, the same behavior resulted in negative sanctions by some role partners and positive sanctions by others, or failure to apply sanctions because of perceived ambiguity—or nonconformity to perceived expectations of another despite negative sanctions because other expectations were defined as more legitimate.

Another Lintonian postulate challenged by this research is that though an actor may occupy many positions, even simultaneously, he activates

each role singly with the others remaining "latent." It is found, however, that individuals often perceive and act toward role partners as if simultaneous multiple roles were being activated. For example, one may hold different expectations regarding a teacher who is male, young and unmarried as against one who is female, older and married. In other words, standards and expectations are applied to the whole person as a result, in part, of the complex of positions the person is perceived as occupying at that time. A related consideration involves the time dimension over which two or more individuals interact; other positions they occupy enter progressively into their perception of each other and consequently modify evaluations and expectations. Thus the authors generalize their point to a broader theory of social interaction by suggesting that evaluative standards shift over time from those applied as appropriate to the incumbent of a particular position to those applied to a total person with particular personality features and capacities as the incumbent of multiple positions.

Finally, their rejection of the consensus model led these researchers to find a process of role-strain or role-conflict generation and resolution similar in principle to that conceptualized by others discussed above. Having defined the role set they were studying as a true *complex system* of interrelated components, and having then uncovered and analyzed the *variety* continuously introduced into the system by way of variant, ambiguous or changing role definitions, they then focused on the *selection process* whereby this variety was sifted and sorted in the give and take of role transactions. Thus, given the situation in which a role incumbent was faced with incompatible expectations on the part of two of his counter-role partners, a theory was constructed to answer the question of how the actor may choose from among four alternatives in resolving the role conflict. From our present perspective, the theoretical scheme suggested constitutes another important contribution to the forging of a conceptual link between the dynamics of the role transaction and the more stable surrounding social structure—a link that is too often skipped over by the consensus theorist's identification of social structure and consensual role playing.

This linkage is made in terms of the concepts of perceived *legitimacy* of the conflicting expectations, an assessment of the *sanctions* that might be applied, and predispositions to give primacy to a *moral* orientation, an *expedient* orientation, or a balance of the two. We face once again the

reciprocal question of how role transactions are conditioned by the surrounding social structure and how that structure is generated and regenerated as a product of the complex of role transactions.

The four alternatives that Gross and colleagues see open to an actor to choose in attempting to resolve a role conflict between incompatible expectations A and B are: (1) conformity to expectation A; (2) conformity to expectation B; (3) compromise in an attempt to conform in part to both expectations; or (4) attempt to avoid conforming to either expectation. The first criterion that the theory postulates to underlie the particular alternative chosen is the actor's definition of the legitimacy of the expectations. Thus the prediction of behavior on this criterion is that, when only one expectation is perceived as legitimate the actor will conform to that one; when both are defined as legitimate he will compromise; and when neither is seen as legitimate he will engage in avoidance behavior. The second criterion is the actor's perception of the sanctions that would be applied for nonconformity, which would create pressures to conform if strong negative sanctions are foreseen otherwise. This predicts for three of the four combinations of two sets of expectations, but not for the case of both expectations being perceived as leading to weak or no negative sanctions.

It is assumed that for any role conflict situation an actor would perceive both of these dimensions and make his decision accordingly. Predictions on the basis of the theory so far provide for determinate resolutions of conflict in seven of the sixteen combinations of the four types of legitimacy and the four types of sanctions situations, but the other nine are left indeterminate with only the two criteria. This is because the criteria predispose in different directions, and at least a third criterion is needed to determine the outcome. The authors thus appeal to the actor's predisposition to give primacy to either the legitimacy or to the sanctions dimension, or to balance the two, thus leading to the postulation of three types of predisposing orientations to expectations as listed above—the *moral*, the *expedient*, and the balanced *moral-expedient*. All the combinations of situations now become predictive.

The accuracy of the predictions was tested empirically with the data from the superintendent-role study for four "incompatible expectation situations," and the evidence supported the theory, though with some incorrect predictions.

The implications of this conceptualization and empirical analysis are far-reaching, as already

suggested, for general sociological theory. The study is concerned with what must be considered "institutional" organization and process, and supports a model of that structure and process that is quite different from the more traditional models. As the authors point out, one strong advantage of the theory is its conceptualization of institutional role behavior in terms of "expectations," whether legitimate or illegitimate, rather than in terms of "obligations" (legitimate expectations) as is assumed in consensus theory. The theory thus allows for the possibility that illegitimate expectations constitute a significant part of institutional role behavior, and underlie much of the conflict occurring—as we feel intuitively to be the case—within the institutional process. It follows, further, that deviance—nonconformity to expectations—is a more intimate and normal element in institutional behavior than conformity theory would permit. And it also permits theoretical recognition of the possibility that, as Etzioni has suggested,<sup>59</sup> a great deal of organizational behavior is based, not on internalized norms and values, but on an expedient calculation of self-interests and of possible rewards and punishments. This, in turn, leaves open the theoretical possibility that non-legitimized power, as well as legitimized authority, may often be a controlling factor in institutional behavior.

#### ROLE CONFLICT AND CHANGE AMONG THE KANURI

The final empirical study we shall sketch is explicitly based on an understanding of the modern systems approach, focusing as it does on a theory of "self-generating internal change." Ronald Cohen, an anthropologist, reports a theoretically well-organized analysis of his field study of role conflict and change among the Kanuri of Nigeria.<sup>60</sup> The study focuses on "goal ambiguity" and "conflicting standards" within a facet of the joint native-colonial political administrative hierarchy, particularly on the pivotal position of native "district head" which had come to combine the quite diverse cultural orientations of the colonial British and the Kanuri. This diversity between, as well as within, the two cultures made for inconsistencies, ambiguity, and conflict in political goals and in role standards and performances, which were continuously exacerbated by the variety of pressures put on district heads by the central native administration, the colonial administration, and the colonial technical departments.

The consequences of this situation for the political system are analyzed in terms of A. G. Frank's theory of organizational process and change.<sup>61</sup> Given the conditions of ambiguity and conflict of standards and goals, it is postulated that a process of *selective performance* and *selective enforcement* of standards will occur, with subordinates being forced to decide on which expectations to meet, and superiors required to selectively evaluate performances and hence selectively enforce some standards over others. This postulate leads to a number of predictions that Cohen proceeded to test. In essence, a continuous process is set up that appears, though in more exaggerated form, much like the "role strain," "role-making," "negotiated order" situations we met earlier. Role players fail to meet, or feign meeting some standards, and differentially select those they will meet. As a result, the role system is postulated to exhibit a strain toward substantive rationality (in Weber's sense), shifting standards for members, widespread role innovation or "deviance," ready adaptation to environmental changes, and an active and widespread circulation of information about standards and goals by "intermediary dealers in information" and by members seeking to reduce the ambiguity and conflict concerning these standards and goals.

The process is thus a circular, feedback loop whereby superiors continuously modify their standards or expectations as definitions of political objectives change, and subordinates adapt their decisions and performances to these changing expectations and surrounding circumstances, which in turn changes the states of the situation toward which superiors are acting. The role system, then, is seen as continuously receptive and responsive to external and internal pressures which demand some kind of workable "mapping" of the abundantly available situational "variety," which in turn makes possible—though does not guarantee—the evolution of more or less adaptive, institutionalized internal system procedures.

Applying this theory to the Kanuri, Cohen found the predictions to be borne out to a substantial degree. We leave the detailed description of these phenomena to the original study, which drew the general practical conclusion that—in spite of its apparent conservative, anti-progressive traditionalism—the Kanuri political role system showed greater compliance to the varied pressures of superiors and situational exigencies than to the tenets of tradition and thereby proved to be a self-generating system containing mechanisms for its own transformation. The implications of this

for policy relating to "developing countries" are of obvious importance.

On the theoretical side, Cohen clearly recognizes the implications of his mode of analysis for a genetic model of sociocultural evolution.

This model depends basically on two conditions. First, the evolving phenomenon must be shown to be *variable* in terms of its constituent units, and second, there must be analytically distinct *selective factors* which operate on the variation within the phenomenon to produce a constantly adapting and thus an evolving history of development. Although there are more or less stable orientations of tradition present in Bornu, conflicts in the political organization produce a variability of response by the actors upon which selective pressures exerted by superiors in the political hierarchy may operate to bring about innovations and changes that are incremental in their nature, i.e., evolutionary rather than revolutionary.<sup>62</sup>

We opened our discussion of the decision-making, process approach to complex adaptive systems with a turn-of-the-century prognosis of Albion Small. We might remind ourselves further of important ties with the past by closing with the early fundamental insight of Edward Sapir:

While we often speak of society as though it were a static structure defined by tradition, it is, in the more intimate sense, nothing of the kind, but a highly intricate network of partial or complete understandings between the members of organizational units of every degree of size and complexity. . . . It is only apparently a static sum of social institutions; actually it is being reanimated or creatively reaffirmed from day to day by particular acts of a communicative nature which obtain among individuals participating in it.<sup>63</sup>

### Conclusion

We have suggested that much current thinking represents the coming to fruition of earlier conceptions of which Sapir's and Small's statements are harbingers. Although a science should not hesitate to forget its founders, it would do well to remain aware of their basic thought.

We have argued that a promising general framework for organizing these valuable insights of the past and present may be derived from the recent general systems perspective, embracing a holistic conception of complex adaptive systems viewed centrally in terms of information and communication process and the significance of the way these are structured for self-regulation and self-direction. We have clearly arrived at a point in the development of the "behavioral"

sciences at which synthesis or conceptual unification of subdisciplines concerned with social life is challenging simple analysis or categorization. Not only is there growing demand that the "cognitive," "affective" and "evaluative" be conceptually integrated, but that the free-handed parceling out of aspects of the sociocultural adaptive system among the various disciplines (e.g., "culture" to anthropology, the "social system" to sociology, and "personality" to psychology) be reneged, or at least ignored. The potential of the newer system theory is especially strong in this regard.<sup>64</sup> By way of conclusion we recapitulate the main arguments.

1) The advance of science has driven it away from concern with "substance" and toward a focus on *relations* between components of whatever kind. Hence the concern with complex organization or systems, generally defined in terms of the transactions, often mutual and usually intricate, among a number of components such that some kind of more or less stable structure—often tenuous and only statistically delineated—arises (that is, *some* of the relations between components show *some* degree of stability or repetitiveness *some* of the time). Extremely fruitful advances have been taking place, especially since the rapid scientific progress made during World War II, in specifying basic features common to substantively different kinds of complex adaptive systems, as well as delineating their differences. In contrast to some of the general systems theorists themselves as well as their critics, we have argued that this is not simply analogizing, but generalizing or abstracting as well (although the former is important, and scientifically legitimate also, when performed with due caution). To say that physiological, psychological, and sociocultural processes of control all involve the basic cybernetic principles of information flow along feedback loops is no more a mere analogy than to say that the trajectories of a falling apple, an artificial satellite, or a planet all involve the basic principle of gravitational attraction.

2) Complex adaptive systems are open systems in intimate interchange with an environment characterized by a great deal of shifting variety ("booming, buzzing confusion") and its constraints (its structure of causal interrelations). The concept of equilibrium developed for closed physical systems is quite inappropriate and usually inapplicable to such a dynamic situation. Rather, a characteristic resultant is the elaboration of organization in the direction of the less probable and the less inherently stable.

Features common to substantively different complex adaptive systems can be conceptualized in terms of the perspective of information and control theory. "Information" in its most general sense is seen, not as a thing that can be transported, but as a selective interrelation or mapping between two or more subsets of constrained variety selected from larger ensembles. Information is thus transmitted or communicated as invariant constraint or structure in some kind of variety, such that subsystems with the appropriate matched internal ensembles, reacting to and acting upon the information, do so in a situation of decreased uncertainty and potentially more effective adaptation to the variety that is mapped. Unless mapping (encoding, decoding, correlating, understanding, etc.) occurs between two or more ensembles we do not have "information," only raw variety or noise.

In these terms, adaptive systems, by a continuous selective feedback interchange with the variety of the environment, come to make and preserve mappings on various substantive bases, which may be transmitted generationally or contemporaneously to other similar units. By means of such mappings (for example, via genes, instincts, learned events, culture patterns) the adaptive system may, if the mappings are adequate, continue to remain viable before a shifting environment. The transmission and accumulation of such information among contemporaneous adaptive systems (individuals) becomes more and more important at higher levels until it becomes the prime basis of linkage of components for the highest level sociocultural system.

Some of the more important differences between complex adaptive systems include the substantive nature of the components, the types of linkage of the components, the kinds and levels of feedback between system and environment, the degree of internal feedback of a system's own state (for example, "self-awareness"), the methods of transmission of information between subsystems and along generations, the degree of refinement and fidelity of mapping and information transfer, the degree and rapidity with which the system can restructure itself or the environmental variety, etc.

3) Such a perspective provides a general framework which meets the major criticisms leveled against much of current sociological theory: lack of time and process perspective, overemphasis on stability and maintenance of given structure, and on consensus and cooperative relations, to the relative neglect—or unsystematic

treatment—of deviance, conflict and other dissociative relations underlying system destructuring and restructuring.

4) Thus, the concept of the system itself cannot be identified with the more or less stable structure it may take on at any particular time. As a fundamental principle, it can be stated that a condition for maintenance of a viable adaptive system may be a change in its particular structure. Both stability and change are a function of the same set of variables, which must include both the internal state of the system and the state of its significant environment, along with the nature of the interchange between the two.

5) A time perspective is inherent in this kind of analysis—not merely historical but evolutionary. (It can probably be said that the time was ripe by 1959 for a Darwinian centennial ramifying well beyond the purely biological.) This perspective calls for a balance and integration of structural and processual analysis. As others have pointed out, the Linnean system of classification of structures became alive only after Darwin and others discovered the processes of variation, selection and recombination that gave them theoretical significance, though these discoveries leaned heavily in turn on the classification of systematically varying structures.

And among the important processes for the sociocultural system are not only cooperation and conformity to norms, but conflict, competition and deviation which may help create (or destroy) the essential variety pool, and which constitute part of the process of selection from it, such that a more or less viable system structure may be created and maintained (or destroyed).

6) In sociological terms, the “complementarity of expectations” model is an ideal type constituting only one pole of a continuum of equally basic associative and dissociative processes characterizing real societies—although the particular “mix” and intensities of the various types may differ widely with different structural arrangements. Further, the systemic analysis of a sociocultural system is not exhausted by analysis of its institutionalized patterns. By focusing on process, we are more prepared to include all facets of system operation—from the minimally structured end of the collective behavior continuum through the various degrees and kinds of structuring to the institutional pole. The particular characteristics of the process, especially the degrees and kinds of mappings and mismatches of the interacting units, tell us whether we are in fact dealing with certain degrees of structuring and the dynamics

underlying this structuring: de facto patterning may be anchored in coercive, normative, or utilitarian compliance, making for very different kinds of system.

7) “Institutionalized” patterns are not to be construed as thereby “legitimized” or as embracing only “conformity” patterns—at least for the sake of conceptual clarity and empirical adequacy. Processes of all degrees and kinds of structuring may be seen in terms of deviant as well as conformity patterns—relative to the point of reference selected by the observer. One may select certain institutional patterns and values (to be clearly specified) as an arbitrary reference point to match against *other* institutional patterns and values, along with less structured behaviors. The concept of *the* institutionalized common value system smuggles in an empirically dubious, or unverified, proposition—at least for complex modern societies.

8) The complex adaptive system’s organization *is* the “control,” the characteristics of which will change as the organization changes. The problem is complicated by the fact that we are dealing directly with two levels of adaptive system and thus two levels of structure, the higher level (sociocultural) structure being largely a shifting statistical or probability structure (or ensemble of constraints) expressing over time the transactional processes occurring among the lower level (personality) structures. We do not have a sociocultural system *and* personality systems, but only a sociocultural system *of* constrained interactions among personality systems.

We can only speak elliptically of “ideas” or “information” or “meanings” in the head of a particular individual: all we have is an ensemble of constrained variety embodied in a neurological net. “Meaning” or “information” is generated only in the process of interaction with other ensembles of similarly mapped or constrained variety (whether embodied in other neurological nets or as the ensemble of causally constrained variety of the physical environment), whereby ensemble is mapped or matched against ensemble via communication links, and action is carried out, the patterning of which is a resultant of the degree of successful mapping that occurred. (Of course, “meaning” on the symbolic level can be regenerated over a long period by the isolated individual through an internal interchange or “conversation” of the person with his “self,” made possible by previous socially induced mappings of one’s own internal state that we call “self-awareness.” But in some respects, part of the

world literally loses its meaning for such a person.)

If the ensembles of variety of two interacting units, or one unit and its physical environment, have no or little isomorphic structuring, little or no meaning can be generated to channel ongoing mutual activity; or in more common terms, there is no "common ground," no "meeting of minds" and thus no meaning or information exchange—only raw variety, uncertainty, lack of "order" or organization.

Unless "social control" is taken as simply the more or less intentional techniques for maintaining a given institutional structure by groupings with vested interests, it must refer to the above transactional processes as they operate—now to develop new sociocultural structures, now to reinforce existing ones, now to destructure or restructure older ones. Thus, we cannot hope to develop our understanding much further by speaking of one "structure" determining, "affecting," or acting upon another "structure." We shall have to get down to the difficult but essential task of (a) specifying much more adequately the distribution of essential features of the component subsystems' internal mappings, including both self-mappings and their mappings of their effective environment, (b) specifying more extensively the structure of the transactions among these units at a given time, the degree and stability of the given structuring seen as varying with the degree and depth of common meanings that are generated in the transaction process, and (c) assessing, with the help of techniques now developing, the ongoing process of transitions from a given state of the system to the next in terms of the deviation-reducing and deviation-generating feedback loops relating the tensionful, goal-seeking, decision-making subunits via the communication nets partly specified by (b). Some behavior patterns will be found to be anchored in a close matching of component psychic structures (for example, legitimized authority or normative compliance); others, in threats of goal-blockage, where there is minimal matching (for example, power or coercive compliance); still others, anchored in a partial matching, primarily in terms of environmental mappings of autonomous subunits and minimally in terms of collective mappings (for example, opportunism or utilitarian compliance). As the distribution of mappings shifts in the system (which normally occurs for a number of reasons), so will the transaction processes and communication nets, and thus will the sociocultural structure tend to shift as gradients of misunderstanding, goal-blockage, and tensions develop.

9) Finally, we have tried to show how this perspective bears on, and may help to integrate conceptually, the currently developing area of "decision theory" which recognizes individual components as creative nodes in an interactive matrix. In the complex process of transactions occurring within a matrix of information flows, the resulting cognitive mappings and mismappings undergo various stresses and strains as component units assess and reassess with varying degrees of fidelity and refinement their internal states and the shifting and partially uncertain, and often goal-blocking environment. Out of this process, as more or less temporary adjustments, arises the more certain, more expected, more codified sequences of events that we call sociocultural structure. In the words of Norbert Wiener, "By its ability to make decisions" the system "can produce around it a local zone of organization in a world whose general tendency is to run down."<sup>65</sup> Whether that structure proves viable or adaptive for the total system is the kind of question that cannot be reliably answered in the present state of our discipline. It most certainly demands the kind of predictive power that comes with the later rather than the earlier stages of development of a science. And later stages can arrive only at some sacrifice of ideas of earlier stages.

### Notes

1. *Sociology and Modern Systems Theory* (Englewood Cliffs, N.J.: Prentice-Hall, 1967).

2. See Pringle, Chapter 33; and Donald T. Campbell, "Methodological Suggestions from a Comparative Psychology of Knowledge Processes," *Inquiry*, 2 (1959), 152-67.

3. See, for example, Rapoport and MacKay selections, Chapters 16 and 24.

4. For an excellent recent overview of this transition, see A. Irving Hallowell, "Personality, Culture, and Society in Behavioral Evolution," in Sigmund Koch (Ed.), *Psychology: A Study of a Science*, Volume 6: Investigations of Man as Socius (New York: McGraw-Hill, 1963), 429-509.

5. Herbert A. Thelen, "Emotionality and Work in Groups," in Leonard D. White (Ed.), *The State of the Social Sciences* (Chicago: University of Chicago Press, 1956), pp. 184-86.

6. See Cannon selection, Chapter 32.

7. Or perhaps we might take Cadwallader's suggestion (Chapter 52) and use Ashby's term "ultrastability." I dislike, however, the connotative overemphasis on "stability," which is sure to be misunderstood by many.

I prefer the term "morphogenesis" as best expressing the characteristic feature of the adaptive system. (See, for one, Maruyama's usage in Chapter 36.) Thus, we might say that physical systems are typically equilibrium, physiological systems are typically homeostatic,

and psychological, sociocultural, or ecological systems are typically morphogenic. From this view, our paradigm of the mechanisms underlying the complex system becomes a basic paradigm of the morphogenic process, perhaps embracing as special cases even the structuring process below the complex adaptive system level.

8. C. A. Mace, "Homeostasis, Needs and Values," *British Journal of Psychology*, 44 (1953), 204-205. Gordon Allport reinforces this view for personality (but note his terminology): "Some theories correctly emphasize the tendency of human personality to go beyond steady states and to elaborate their internal order, even at the cost of disequilibrium. Theories of changing energies . . . and of functional autonomy . . . do so. These conceptions allow for a continual increase of men's purposes in life and for their morphogenic effect upon the system as a whole. Although homeostasis is a useful conception for short-run 'target orientation,' it is totally inadequate to account for the integrating tonus involved in 'goal orientation.' . . . Although these formulations differ among themselves, they all find the 'go' of personality in some dynamic thrust that exceeds the pale function of homeostatic balance. They recognize increasing order over time, and view change within personality as a recentering, but not as abatement, of tension."—Gordon W. Allport, *Pattern and Growth in Personality* (New York: Holt, Rinehart & Winston, 1961), p. 569.

9. See Chapters 34 and 35.

10. Jules Henry, "Culture, Personality, and Evolution," *American Anthropologist*, 61 (1959) 221-22.

11. Karl W. Deutsch, "Some Notes on Research on The Role of Models in Natural and Social Science," *Synthese*, (1948-49), 532-33.

12. See Campbell, *op. cit.*, and Pringle, Chapter 33.

13. Recall Osgood's interpretation in Chapter 23. Also, see Charles E. Osgood, "Psycholinguistics," in S. Koch (Ed.), *Psychology, loc. cit.*, pp. 244-316; O. Hobart Mowrer, *Learning Theory and the Symbolic Processes* (New York: John Wiley, 1960), esp. Chapter 7: "Learning Theory, Cybernetics, and the Concept of Consciousness." For less behavioristic and more genetic and emergent views see, for example, George H. Mead, *Mind, Self and Society* (Chicago: University of Chicago Press, 1934), and more recently, Heinz Werner and Bernard Kaplan, *Symbol Formation* (New York: John Wiley, 1963).

14. See, for example, Marshall D. Sahlins, "Culture and Environment: The Study of Cultural Ecology," in Sol Tax (Ed.), *Horizons of Anthropology* (Chicago: Aldine, 1964), pp. 132-47.

15. See especially the selections above from Nett (Chapter 48), Deutsch (Chapter 46), Hardin (Chapter 55) and Vickers (Chapter 56).

16. However, we should not deemphasize the important structuring role of concrete artifacts, for example, the structure of physical communication nets, road nets, cities, interior layouts of buildings, etc., as limiting and channeling factors for sociocultural action and interaction.

17. Albion W. Small, *General Sociology* (Chicago: University of Chicago Press, 1905), p. ix.

18. Charles H. Cooley, *Social Process* (New York: Scribner's, 1918).

19. Florian Znaniecki, *Cultural Sciences* (Urbana: University of Illinois Press, 1952).

20. Consider the explicit "feedback" and "self-regulation" conceptions in the following statements of G. H. Mead in *Mind, Self and Society*: ". . . the central nervous system has an almost infinite number of elements in it, and they can be organized not only in spatial connection with each other, but also from a temporal standpoint. In virtue of this last fact, our conduct is made up of a series of steps which follow each other, and the later steps may be already started and influence the earlier ones. The thing we are going to do is playing back on what we are doing now" (p. 71). "As we advance from one set of responses to another we find ourselves picking out the environment which answers to this next set of responses. To finish one response is to put ourselves in a position where we see other things. . . . Our world is definitely mapped out for us by the responses which are going to take place. . . . The structure of the environment is a mapping out of organic responses to nature; any environment, whether social or individual, is a mapping out of the logical structure of the act to which it answers, an act seeking overt expression" (pp. 128-29, and footnote 32, p. 129). "It is through taking this role of the other that [the person] is able to come back on himself and so direct his own process of communication. This taking the role of the other, an expression I have so often used, is not simply of passing importance. It is not something that just happens as an incidental result of the gesture, but it is of importance in the development of cooperative activity. The immediate effect of such role-taking lies in the control which the individual is able to exercise over his own response. . . . From the standpoint of social evolution, it is this bringing of any given social act, or of the total social process in which that act is a constituent, directly and as an organized whole into the experience of each of the individual organisms implicated in that act, with reference to which he may consequently regulate and govern his individual conduct, that constitutes the peculiar value and significance of self-consciousness in those individual organisms" (p. 254, including part of footnote 7).

See also the extended discussion based on Mead's essentially cybernetic perspective in Shibutani, Chapter 39.

21. Melvin Seeman, review of Arnold Rose (Ed.), *Human Behavior and Social Processes*, in *American Sociological Review*, 27 (August 1962), 557.

22. George P. Murdock, "Changing Emphasis in Social Structure," *Southwestern Journal of Anthropology*, 11 (1955), 366.

23. Raymond Firth, "Some Principles of Social Organization," *Journal of the Royal Anthropological Institute*, 85 (1955), 1.

24. S. F. Nadel, *The Theory of Social Structure* (New York: The Free Press of Glencoe, 1957), pp. 54-55.

25. *Ibid.*, p. 128.

26. *Ibid.*, p. 153.

27. Evon Z. Vogt, "On the Concept of Structure and Process in Cultural Anthropology," *American Anthropologist*, 62 (1960), 18-33.

28. Herbert Blumer, "Psychological Import of the Human Group," in Muzafer Sherif and M. O. Wilson (Eds.), *Group Relations at the Crossroads* (New York: Harper, 1953), pp. 199-201. Emphasis added.

29. Gordon W. Allport, *Pattern and Growth in Personality* (New York: Holt, Rinehart, & Winston, 1961), p. 567. Also recall his discussion in Chapter 41.
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34. Recall Maruyama's discussion in Chapter 36.
35. William J. Goode, "A Theory of Role Strain," *American Sociological Review*, 25 (August, 1960), 483.
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54. Turner, *loc. cit.*, p. 32.
55. *Ibid.*, p. 38.
56. Anselm Strauss *et al.*, "The Hospital and Its Negotiated Order," in Eliot Freidson (Ed.), *The Hospital in Modern Society* (New York: The Free Press of Glencoe, 1963), p. 148.
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58. Neal Gross *et al.*, *op. cit.*, p. 321. Also see Robert L. Kahn *et al.*, *Organizational Stress: Studies in Role Conflict and Ambiguity* (New York: John Wiley, 1964).
59. Amitai Etzioni, *A Comparative Analysis of Complex Organizations* (New York: The Free Press of Glencoe, 1961).
60. Ronald Cohen, "Conflict and Change in a Northern Nigerian Emirate," in George K. Zollschan and Walter Hirsch (Ed.), *Explorations in Social Change* (Boston: Houghton Mifflin Co., 1964), Chapter 19.
61. A. G. Frank, "Goal Ambiguity and Conflicting Standards: An Approach to the Study of Organization," *Human Organization*, 17 (1959), 8-13.
62. *Op. cit.*, 519. Emphasis supplied.
63. Edward Sapir, "Social Communication," *Encyclopedia of the Social Sciences* (New York: Macmillan, 1931), Vol. 4, p. 78.
64. This still remains primarily a potential, however; perusal of the general systems literature shows treatment of the sociocultural level systems to be sparse compared to that of biological, psychological and other systems. Part of the reason for this is the failure of sociologists to participate and to make what could be significant contributions to a field rapidly leaving us behind.
65. Norbert Wiener, *The Human Use of Human Beings* (Garden City, N.Y.: Doubleday Anchor, 2d ed., rev., 1954), p. 34.



# Modern Systems Research for the Behavioral Scientist

*A SOURCEBOOK*

*edited by*

WALTER BUCKLEY

UNIVERSITY OF CALIFORNIA, SANTA BARBARA

*foreword by*

ANATOL RAPOPORT

UNIVERSITY OF MICHIGAN



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