HEILBRONER'S HISTORICISM VERSUS EVOLUTIONARY POSSIBILITIES

by Edgar S. Dunn, Jr.

Participation in the Institute on Religion in an Age of Science symposium on the human prospect left me with an unresolved restlessness evoking the following commentary. I was surprised to discover that the issues raised by Robert L. Heilbroner in *An Inquiry into the Human Prospect*[1] were treated differently from my expectations. This was more surprising because I correctly anticipated that modern evolutionary theory would be the dominant metaphor guiding the discussion. Since, in my view, Heilbroner's thesis is at variance with this weltanschauung in several important respects, I expected a more critical reception. Countervailing implications of the evolutionary paradigm were largely overlooked, save for the symposium commentary by Victor Ferkiss suggesting that the buffers intrinsic to a system as complex and metastable as genus *Homo* would tend to prevent a precipitous decline.[2]

Heilbroner's book seems a good example of the "poverty of historicism" called to our attention by Karl R. Popper.[3] Heilbroner exhibits the pretension of "prediction as prophecy" that Popper demonstrates to be inconsistent with the evolutionary process. This is the tendency to see the events of future history as uniquely determined by our current historical situation and the process that brought us here. Historicism identifies the "fate" of mankind in the emerging era. In this case, a scenario is sketched identifying historical challenges alleged to yield behavioral regressions of a specified kind.

Current intellectual discourse on these matters seems to have polarized. It is dominated by the doomsters with their historicist scenarios and the technological optimists with their faith in our capacity to engineer the future we want. I would interpret what we know of

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evolutionary processes to suggest that neither polar position is likely to be verified by history.

In due time, the scale and complexity of natural and social processes will frustrate the regulatory pretensions of the social engineers. But the historicist pretension of prediction as prophecy contains a hidden danger. Man's social evolution is based upon conscious, cognitive, group-level information processes that are quite distinct from the mechanism of population genetics that informs the biological evolution of life systems. If any of the eschatological scenarios of doom get to be believed by a sufficient number in the human population, it could be transformed into a self-fulfilling prophecy by foreclosing mankind's ability to recognize, and will to explore, other options. Further, the eschatological strain in human thinking (e.g., found in traditional theology and the classical Greek tragedy evoked in the symposium) may make us vulnerable to such foreboding. Once a theory of history identifies our fate, social policy is reduced to identifying preadaptations that may improve the efficiency with which the presupposed historical determinism works its will. Personal policy is reduced to maximizing the self-advantage (or minimizing the disadvantages) implicit in fate. Mankind may come to assume that his adaptive capacity is more limited than it is.

Heilbroner builds his prophetic scenario on the basis of the identification of a set of historical challenges and the specification of alleged adaptive incapacities that spell this fate. His argument may be summarized as follows: (1) Major environmental challenges (2) result in the necessity to dismantle the industrial process. (3) Both capitalism and socialism are inadequate to accomplish this because (4) both are based upon a growth dynamic resulting in (5) a return to authoritarian traditionalism (i.e., a historical form of social organization previously employed to manage a "steady state"). This is required not only (6) because of the adaptive limitations of industrial capitalism and socialism but also (7) because people have a Freudian psychological need to identify with a traditional political authority. (8) They also lack the capacity for a psychological bond with the future. The classical Greek tragedy is resurrected as the prophetic historicist paradigm for our emergent future.

Consider the challenges—the food-population problem, the threat of redistributive atomic war between the "haves" and "have-nots," and the global-thermal pollution problem. Heilbroner's thesis suggests that this combination of threats confronts mankind with an imminent instability. I would emphasize that the world-system projections that underlie this scenario are poorly developed by Heilbroner and that they are highly conditioned by serious limitations of the data

and model forms employed to generate them. We are seeing such predictions revised and made less immediately threatening as attention turns more and more to these matters.[4]

This may sound like quibbling. Certainly, the specter of inadvertent nuclear suicide is real. No one denies the validity of Hudson Hoagland's calculation (offered at the symposium)—that is, that the compounding of a 2 percent growth rate in population would soon cover the earth with layers of people. No intelligent person can deny that adjustments will have to be made in rates of growth or that at some future point man must achieve a steady state in that portion of the earth's material and energy throughput diverted to human maintenance and survival. I make this point, however, because the less severe and more protracted the adaptive crisis that confronts us, the more likely it is that society can manage developmental rather than regressive or defensive adaptations.

No one doubts that some maniac may push the red button and destroy us. One cannot be sure that we may not at any time cross some dangerous, unperceived threshold of ecological stability that will spell our doom. But, as Ferkiss wisely pointed out in the symposium, we cannot do anything about that anyway. Apart from an unwitting historical accident, what we know about the evolutionary historical process does not make a precipitous change seem likely. It may be as likely that we will encounter an accumulating sequence of localized thresholds (both functionally and geographically). But the chance that some of our adaptive crises may emerge piecemeal enhances substantially, it seems to me, the possibility for more creative social adaptations.

Human Society's Open-ended Possibilities

This is a relatively minor point we should pass over quickly in order to focus attention upon the argument about the lack of individual and social adaptability. At this point the *Human Prospect* scenario comes into its most serious conflict with our emerging knowledge of evolutionary processes and with what we know of the evolutionary history of genus *Homo*. Human beings as individual biological organisms, as well as their societies and organizations, are set apart in evolutionary history by their extraordinary adaptability. Furthermore, on a historical time scale they are distinguished by a special gift for making generalizing adaptations at their sociocultural level.

There are two adaptive modes at work in evolutionary processes.[5] There are *specializing adaptations*, and there are *generalizing adaptations*. In the course of bioevolutionary history, the bulk of species adapta-

tions to environmental challenges have been specializing. They bring about a highly specialized correlation of population behavior with the requirements of a restricted environmental niche. Associated with this is a reduction in variety in the genetic pool that tends to transform these radiating branches into terminating branches whose long-term survival is thereafter dependent upon the stability of the niche. Subsequent radical environmental changes often lead to the extinction of such well-adapted strains. Adaptive generalization, on the other hand, has occurred less often in bioevolution and occurs when the environmental challenge evokes a different kind of response. This adaptive response widens the environmental range of resulting biological populations by widening, rather than narrowly specializing, the range of organism behavior. Generalizing adaptations take the form of improving adaptability rather than adaptation. They tend to increase organizational and functional complexity. The unique thing about genus *Homo* is that, alone of all evolutionary lineages, it is the product of a continuous series of adaptive generalizations improving its behavioral adaptability to the point of acquiring radically extended capacities for conscious, cognitive, symbolic representations of its environment interdependent with its capacity for organized group behavior. These are the highest tools of behavioral adaptability, especially the nongenetic, more rapidly evolving social processes for organizing group behavior. These have reached the point in the current epoch where they are less marked by the environmental shaping of behavior than the behavioral shaping of environments. This, in turn, is at the root of our new environmental disturbances.

It is especially noteworthy that, once social evolution began to move beyond the stage of isolated radiating cultures, the relationship between adaptive specialization and adaptive generalization acquired a character substantially different from that exhibited by bioevolution. When individual men and social organizations began to specialize in function, it was not a consequence of being forced by the effect of environment into progressively more narrowly defined niches restricting behavioral variety. It was the result of a learning process that sought to amplify the productivity of human behavior. But this was possible only because it was carried out as a part of an adaptive generalization that linked these specialized activities into a network of readily modifiable, even reversible patterns of, transactions. The end result broadened the environmental range of the specialist because his greater productivity brings a share in the productivity of other specialists. Through his participation in the transactions process, he gains access to a broader range of products and a broader environ-

mental range. Once this evolving system of relationships reaches a level of affluence sufficient to support extensive travel and a level of technique that makes books, newspapers, radio, television, and cinema a part of the exchange process, the most specialized entities of the social process gain a degree of access to the total environment completely impossible in the absence of social processes.

Thus social evolution has been marked by a remarkable series of adaptive generalizations from the craft guild to the giant corporate conglomerate to complex, contract-related industrial provision systems; from the family and clan to the nation state to embryonic international institutions; from the patriarchical head of clan to the complex organs of legislation and justice. Among the great adaptive generalizations of social evolution have been the development of organized markets, the city, and the development of institutional science and its recent alliance with technology. There has been a remarkable line of increases in the complexity and adaptability of social systems.

Yet, in the face of knowledge of this history and process, Heilbroner advances the core proposition that individual and social adaptability are henceforth inadequate to meet the environmental challenge. A special feature of society's current challenge is certainly the necessity to recognize the limits nature imposes upon man's capacity to regulate nature. But Heilbroner assumes this challenge to lie beyond society's capacity for adaptive generalization by the simple device of denying its existence—and doing so, as I shall demonstrate later, by employing metaphors that are too superficial to embrace the reality of either human nature or the current historical situation.

I am not criticizing Heilbroner from the counterpodal point of view of the technological or humanistic optimists who draw his contempt. I have been at pains elsewhere to point out the potential threat of behavioral regression in the current historical situation.[6] I am saying that the environmental challenges we face present certain opportunities as well as threats. Our responsibility is to identify the elements of the challenge that are unique to the present moment in history so that we may visualize new adaptive generalizations that might constitute a creative response. Even if we can avoid the behavioral regression and behavioral closure Heilbroner fears, there will be pain and misfortune enough to satisfy anyone with a well-developed sense of tragedy. Our concern is to avoid adaptations that reduce adaptability—that foreclose the developmental possibilities of mankind. The evolutionary process as we know it does not foreclose the possibility that something like the Heilbroner scenario may emerge. But neither does it foreclose other options, as the "historicist" thesis presupposes. These need to be examined.

Capitalism versus Socialism: A Superficial Dichotomy

Consider Heilbroner's claims for a lack of social adaptability. He takes as his unit of analysis "the two great socio-economic systems" that influence human behavior in our time: "capitalism and socialism." He develops a line of argument claiming that both capitalism and socialism depend for their survival and successful operation upon maintaining industrial growth. Since the current adaptive challenge is alleged to require a termination of growth and even a dismantling of the industrial machine, it is demonstrated that neither of these social "institutions" will serve to resolve these problems. They cannot survive in the emerging historical process.

These are not useful conceptual units for interpreting the current historical situation. In the course of social evolution, social behavioral adaptations are made by operating organizational entities—by behavioral entities with identifiable purposes and activity processes. Capitalism and socialism as concepts do not constitute a description of identifiable social-behavioral entities. They do not even constitute a description of the existing relational patterns between such entities. These concepts came into being as abstract concepts of ideal relational types and have always been distinguished by the absence of clear empirical referents. Where some have attempted to apply these terms as descriptive names for identifiable empirical patterns of social relationship, a consensual agreement as to their meaning has been difficult to find.

If we are to form a useful judgment about the adaptability of the social process, we need to identify what the current environmental challenges imply for successful social regulation that is different from the developed behavioral capabilities of existing social-behavioral entities. Only then can we acquire a better understanding of the behavioral changes that may be required and form some judgment about whether, and how, they may be successfully educed. Reliance upon capitalism and socialism as conceptual entities forecloses the possibility of any such analysis.

Although it is difficult to lay an adequate conceptual base in a short article, I would like to suggest a more fruitful way of representing the adaptive requirements of our current historical situation. It requires at least a sketchy representation of the primary social-behavioral entities that exist in the current state of social evolution achieved in the industrial West, as well as the cybernetic processes they employ to sustain a regulated productive social process.

The Regulation of "Goods" Provision by Enterprise Systems

Apart from individuals and households as elemental behavioral entities, modern societies are dominated by organized social-behavioral

entities of two types—(1) private and public enterprises and (2) the organizations of general government. These entities are related through a complex network of transactions to form larger social entities (like regional, national, and international economies or transactional fields) that are quasi-ecological in form. The latter are not formal organizations or traditional behavioral systems, but they demonstrate some implicit regulatory properties.

Next we need to recognize that the behavior of these entities is rooted in cybernetic processes. They are governed by information processes. Within individuals as human organisms, as well as within formal social organizations, these processes are built up of generic, elemental information-processing loops. These consist of a set of perceptual processes monitoring an entity's operating environment under the control of a set of purposes embedded in a central processor. The observations made are compared with antecedent observations recorded in memory and thus are tested by standards to identify mismatches between the state of the entity's relation to the present environment and the entity's purposes. The central processor's evaluation then activates behavioral effectors, selected from its developed repertoire, in order to reduce the mismatch between its purpose or goal and the actual situation. Thus a cybernetic information-processing loop governs behavior. These simple loops are employed to fashion complex processes through a hierarchical arrangement of multiple levels of cybernetic systems and subsystems. Subsystems often retain varying degrees of behavioral autonomy, but all are integrated to some degree by shared purposes.

Cybernetically, there is little to differentiate between capitalism and socialism. Their differences have primarily to do with differences in the mixture of private and public enterprises and in the restrictiveness of general government. Their developed cybernetic forms of regulation are essentially similar.

Cybernetically speaking, social organizations are developed to match fields of environmental disturbance with corresponding fields of regulatory control. (Economists like to think of this in terms of "internalizing externalities." Systems and organization theorists talk about the appropriateness of "the span of control.") As long as social organizations do not encounter environmental disturbances that lie outside their established span of control (their already developed or preprogrammed capacities for behavioral adaptation), they operate to maintain organizational purposes. It is when environmental disturbances emerge that lie outside existing spans of control that developmental adaptations take place to reorganize the system's behavioral range or behavioral intentions. Formal behavioral systems

attempt to make their span of control correspond to the field of relationships that constitutes a potential or actual field of disturbance identified by a set of human-social purposes or intentions.

The behavioral entities presently engaged in the regulation of social processes have evolved forms of cybernetic control matched to the problems and purposes most obtrusive in the past evolutionary epochs. Genus *Homo* has invented group processes to amplify individual capacities for performing two quite different generic regulatory functions—the production of "goods" and the avoidance of "bads."

By the production of "goods" I mean the traditional production and distribution of material goods and services—the management of the thermodynamic, material-energy throughput essential to the maintenance of genus *Homo*. These process technologies characteristically involve sets of linear activity sequences susceptible in recent millennia to regulation by formal organizations implementing rational plans through the application of prescriptive controls. The developmental problems that have dominated the industrial era have been those associated with the difficulties of economic access to resources and markets and the inefficiencies of traditional modes of goods production. These problems have yielded most readily to the industrial technologies born of rational science.

The regulation of these activities falls naturally to traditional private industrial and commercial enterprises. These entities manage performance processes by devising technological and financial-accounting models of their internalized activities which are used as a template in organizing the activities of components. They constitute a set of purposes and instrumental standards by which internal activities are judged. When mismatches occur, the component performance is brought back in line with the model through the issuance of prescriptive orders. This is an effective cybernetic process because (1) process models can be developed in sufficient detail to guide prescriptive order, and (2) in exchange for the wage bargain, individual human components have been willing to give up sufficient behavioral autonomy for the regulatory process to work.

These entities are forced into developmental (evolutionary, learning) processes when mismatches occur in their relationship to operating environments that cannot be corrected through performance adaptations because the technological and cybernetic performance models (established ways of behaving) are too limited. Then the basic strategy is to expand the span of control of the enterprise and its guidance models. Sometimes this can be accomplished by revising the technological model of the enterprise. But often the disturbances

(including opportunities) are centered in the operating environments of the enterprise. Here expanding the span of control involves internalizing portions of the operating environment. Thus the evolutionary processes of this era involve expanding the scale and complexity of enterprise entities. This led to the development of generalizing adaptations, like the corporation, that became instrumental to the process. The past century has witnessed a steady progression of the vertical integration of heterogeneous entities forming linear sequential segments of provision systems (e.g., the iron and steel industry) and the horizontal integration of homogeneous entities playing similar roles and wishing to act in concert in regulating a common field of relationships (e.g., farmers cooperatives, chain stores, etc.). The expansion of these fields is sometimes fashioned through the extension of formal enterprise management, sometimes through the coordination of entities by employing contract systems, sometimes through trade or association agreements, etc.

Among the developmental problems encountered in this era was the inability of private enterprise to manage the provision of some goods and services in a manner deemed consistent with the public interest. In these cases, public organizations were instituted that became quasi enterprises. (Numerous examples include municipal power systems, the Canadian railway, sewage and garbage disposal systems, fire protection, public roads, etc.) But these problems were solved by instituting public management systems that are technically (cybernetically and organizationally) twins of the private industrial-commercial enterprises of the era.

"Bad" Avoidance versus "Goods" Provision

The avoidance of "bads" called forth a different kind of regulatory organizational response. By the avoidance of "bads" I have something different in mind from the idea of disposing of "negative" goods —that is, those material and energy commodities that exist at a time and place in such abundance that they acquire disutilities. The classical example of a negative good is the effluent waste of the thermodynamic throughput of the social process. As long as ample pollutable reservoirs exist these can be disposed by the same kind of technological and managerial process that characterized traditional goods-producing enterprises. In contradistinction, by "bads" I refer to disturbances that disrupt or destroy the essential stability and synergistic properties of the complex system of social-behavior entities (individuals, households, public and private enterprises).

This field of relationships constitutes a different kind of social entity. It is made up of the network of transactions that bind the social-

behavioral entities into an ecosystemic unity. The resulting "social ecosystem" is different in a number of respects from bioecosystems but similar in the sense that the constituent entities are often favored by participating in the larger process because the relationships tend to be symbiotic and synergistic in nature. It is not a formally organized behavioral system. That is, it is not a rationally planned system organized to fulfill specialized purposes and endowed with a consciously fashioned cybernetic information processor that coordinates all of its constituent activities through point-to-point controls. It is a product of the evolutionary adaptative generalizations that fashioned a simultaneous specialization of production and generalization of consumption through the emergence of a larger system of transactions. Because of the synergistic character of the input-output linkages, some transaction disturbances tend to be deviation counteracting, and the whole of the social ecology is characterized by a measure of dynamic stability.

The "bads" we speak of are disturbances that disrupt the systemic functioning of the social ecosystem. They find their origin in a generic characteristic of adaptive social behavior, though this characteristic becomes manifest in many different ways and at different system levels.

I have already mentioned that a general characteristic of social problem solving becomes involved when a behavioral entity attempts to internalize the field of disturbance by bringing it under organized control. This is the locus of the behavioral origin of the "bads." There is always a temptation to internalize the benefits and externalize the costs associated with bringing a disturbance under control. This is manifest in many ways, all the way from using force to compel other behavioral entities to conform to one's will to rigging the terms of an interentity transaction in one's favor. The methods for this can range all the way from theft to misrepresentation. In one manifestation economists have applied the term "beggar-thy-neighbor" policy to this kind of strategy. But such behavioral adaptations yield the consequence that other behavioral entities in the ecological field forming the operating environment of the "beggaring" entity are suffering the bad consequence of being "beggared." The worst part of this is the fact that, if such behavior is permitted to become generalized, the integrity of the network of transactions that forms the social ecosystem becomes undermined. Its stability and synergistic properties are destroyed.

General Government for the Regulation of "Bads"

The organizations and institutions of general government have

evolved to regulate disturbances of this kind and protect the stability of the social ecosystem. But the agencies of general government are organized quite differently from those of the specialized enterprise systems. (Remember, we are excluding here governmental enterprise activities.) General governments are not organized to generate conventional goods and services, so their consciously organized internal activity structures may be relatively simple. They are organized not primarily to act as direct regulators of internalized subentities but to act upon quasi-autonomous entities forming external environmental fields. Since this environmental field is so large and its activity and transaction patterns so complex, there is no chance for governmental agencies to bring this domain under the form of administrative control characteristic of enterprise-provision systems. It is impossible to build transaction models of the ecosystem sufficiently complex and accurate to provide the full prescriptive control of individual behavioral entities. Rather, the ecosystem relies upon restrictive controls. Instead of telling a subentity to "do this," it tells it that it "may do anything it wants but this." Instead of *prescribing* behavior, it *proscribes*. Instead of regulating before the act, it regulates after the act through review and penalty. General government builds fences that limit the behavior of individuals and organizations within boundaries essential to maintain the total ecosystemic stability.

There is another difference between the cybernetic process of general government and those of enterprise systems. While the organizational structures and the performances of industrial-commercial entities have often been developed through the application of a comprehensive rational-planning process, most of the rule structures administered and adjudicated by general government were not. Furthermore, they could not have been generated thus. They are the consequence of generations of evolutionary experimental interventions into the social process through the piecemeal creation of rules (employing legislation and the common law process). They have been molded into a reasonably internally consistent set, further modified in meaning and effect through the constant feedback of judicial interpretations (creating case law) and through the selective administration and enforcement of the law in the light of experience with it. The result is an almost living, pulsating regulatory structure that is constantly developing in response to the changing stability requirements of the social ecosystem. (If social science were to pay more attention to historical processes shaping these regulatory processes and less to the static structures of formal organization, it would understand much more about the processes of social evolution.)

Thus governmental entities came to superimpose upon the social

ecosystem a degree and a form of cybernetic regulation that is unique. It adds to the stability, the entitivity, and the systemic properties of the total social ecology. However, relative to the cybernetics of enterprise control, the resulting regulation is more partial and probabilistic. These forms of governmental regulation would not likely have worked well if it were not for the fact that the social ecology is characterized to a degree by "natural" self-regulatory tendencies.

These are of two sorts. First, to a degree the transactions between individual and organizational entities of the social ecology form a network of input-output relationships that are congruent. Thus disturbances (e.g., in the form of shortages or surpluses, etc.) that are transmitted through these input-output linkages tend to be deviation counteracting. That is, behavioral adjustments that individual entities make in response to their own purpose-oriented cybernetic rules often tend to be in a direction that reduces the disturbances experienced by other entities as well, thus contributing to the order and stability of the total network. Second, all of the quasi-autonomous behavioral entities that make up the social ecology share elements of a common culture. Some of these are religious and ethical rules and mores that foster a sense of ecological interdependence and an adherence to certain behavioral rules like honesty and respect for the restrictive laws of government. Thus the "beggar-thy-neighbor" tendencies of individualistic adaptative behavior are dampened. Conflicting value-motivated strivings are constrained.

The combination of governmental regulation and culture-fostered self-regulatory tendencies justify our recognizing the social ecology as a quasi-behavioral entity with cybernetic properties. But these are cybernetic properties of a unique sort when compared with formally organized systems.

Social Cybernetic Norms

One remaining characteristic of social cybernetic systems needs emphasis. It is important to underscore the primacy of value.

The central processor of every cybernetic loop contains a value base that provides both the motivating force and the guidance principles that activate its processes. This value base performs a threefold function: (1) It forms the substantive purposes and intentions of the process. (2) It designates that part of the external environment forming the operating environment and determines which aspects of the operating field will be subjected to observation and symbolic representation. (3) It evaluates the data of ongoing observations to identify mismatches and activate appropriate adaptative responses from the repertoire of developed activities.

Anything but the simplest behavioral systems are formed by a complex hierarchy of cybernetic loops. This means that the performance of subordinated activity systems is commonly governed by values that are instrumental in the services of the values and purposes of higher order systems. At the lowest level of instrumentality they may be regulated by little more than efficiency standards given by a technical process model selected by higher order purposes.

But all social systems, whatever the substance of their target and instrumental values, are organizational artifacts evolved to amplify man's capacity to satisfy his more basic values and motivations. The needs and wants reflected in basic human values exhibit a luxuriant foliage of variety, but for our purposes it is useful to identify three types.

Gordon L. Allport (following Abraham H. Maslow) classifies the value sources of all human-social activities into either "deficit" motives or "growth" motives.[7]

Deficit motives are primarily tension reducing in nature. Growth motives maintain tension in the interest of distant goals often unattainable in one lifetime—indeed at times for the sake of tension itself.

I would further divide the "deficit" motives into two distinct types. One aspect of the deficit motives relates to the elements of human striving that have primarily to do with the material and energy requirements of human biological maintenance—oxygen, food, sex, clothing, shelter, etc. The other aspect relates to the primal and necessary value man places upon environmental order. One element of this is as basic as the biological instinct for survival. In the the social context, this is manifest in man's concern for the survival of the social structures he has come to identify as essential to the satisfaction of his needs and fundamental to his own sense of identity. Another element is the value placed upon environmental order and stability. He wants to live in a milieu with sufficient order to support his developed social performance roles.

Growth motives (I would much prefer that they be called developmental motives because of the scalar connotations of "growth") designate those participatory and creative strivings that seek variety and behavioral novelty, even though fraught with risk and tension. It is the growth motives that underlie the unique adaptability of man and make possible the adaptive generalization of organized social processes. The growth motives underlie the developmental potentialities and learning capabilities of man and his social artifacts.

The burden of following this somewhat complex conceptual construction has been placed upon the reader because it is essential for making explicit the unique and novel elements of our current histori-

cal situation. It is necessary to identify the nature of the adaptive requirements that our current problems seem to pose for the next era of social evolution. As a side benefit, we are armed with a useful base for a final commentary upon Heilbroner's scenario.

Unresolved Problems of Social Regulation

Throughout the industrial era until recently, enterprise agencies and the agencies of general government—each acting to regulate its own natural domain of activity relationships, employing its traditional modes of information processing—succeeded in maintaining order and stability in the social ecosystems sufficiently well to sustain a revolution in the industrial-commercial processes that undergird the social process. But that very success has modified the size and complexity of the ecology of human populations and social systems (as well as their interrelationships with, and impact upon, their host planetary and biological ecosystems) to such a degree that society is experiencing disturbances with which neither the already developed enterprise nor governmental entities have the capacity to cope.

Until comparatively recently, the bulk of organized social activity was engaged in managing the material and energy throughput that sustains and maintains human life. The social business was the production of goods. This was carried on at a scale and with a technology that did not generate many troublesome negative feedbacks emanating from the social system's interface with the host biological and planetary environments. Where, in localized settings, resource exhaustion and despoliation took place, one could characteristically move on to new or alternative supplies—either literally or through the instrumentality of a technological fix. The resilience of host natural environments seemed boundless. Goods production and distribution processes lent themselves well to enterprise management. Disturbances that were manifest at ecosystemic levels were susceptible to traditional general-government regulation because they had primarily to do with violations of the integrity of the transactions network by individual entities that had their primary impact upon other individual entities in their immediate operating environments within the same community of general government.

But now a new set of "bads" is emerging that requires avoidance. They are the evolutionary product of the adaptive successes of the historical era drawing to a close, and they pose the adaptive challenges of an emerging era. They have a family likeness to the "bads" that gave rise to the earlier regulatory interventions of general government, yet they are different in fundamental respects. They, too, arise out of the tendency for social entities to solve situational prob-

lems at the entity level by internalizing the benefits and externalizing the costs of extending their span of control. At their root lies a fundamental "beggar-thy-neighbor" phenomenon. But it is a more generalized phenomenon that becomes manifest at the aggregate level of the social ecology rather than the level of interentity transactions. It might better be rephrased as a "beggar-thy-environment" problem.

The new disturbances do not arise merely out of the ways the behavior of individual social entities "beggar" one another and, hence, undermine the integrity of the systemic transactions network. Increasingly, there are costs externalized by the adaptive responses of social entities that do not impact directly upon other social entities and hence do not form a well-defined adversary problem amenable to the intervention of traditional general government. Instead, they represent an accumulation of side effects of the adaptations and transactions of a population of social entities that combine to disrupt the stability and synergy properties of the entire ecosystem. While these, in turn, may have significant feedback impacts upon the social entities themselves, the source of the "bad" is diffuse, often not identifiable with specific behavioral acts, and much more commonly unintentional and inadvertent. The fault seems to lie in the "system."

These "environmental problems" take different forms and they are manifest at different ecosystemic levels. One consequence of the technological-industrial era of social evolution has been to change the scale of the evolving social ecology and the complexity of its interventions in its host environments—the bio and planetary ecologies. The stability and synergy properties of the world ecosystem or biosphere are being disturbed in many ways that feedback upon the social ecology and its constituent entities as new forms of disturbance (e.g., the creation of hypercoherent bioecosystems and the actual destruction of plant and animal ecosystems as a consequence of the "beggaring" practices of social husbandry and the disposal of social wastes).

In a similar fashion, systemic disturbances emerge within the social ecology itself. The coadaptations that behavioral entities make to each other through the overlapping operating environments formed by their fields of transactions are characterized by leads and lags that are a product of dynamic frictions and incomplete or faulty perceptions. Thus it happens that we can experience inflation or recession or even stagflation—products of the mismatches in the aggregate levels of production, incomes, and expenditures of the social ecology. Similarly, the value-based rules that govern the behavior of social entities (operative both internally and through the interventions of general government) lack coordination at a level that could diminish many

social inequities. There are many innocent "victims of the system"—individuals who are not afforded an equal chance to participate in the social process and its rewards.

The developed ways of regulating social processes provide no sure way to handle these disturbances. We can understand why if we review their salient characteristics.

One cannot follow the traditional processes of general government and proscribe all of the behavioral acts whose side effects aggregate to ecosystemic disturbance because these are not simple, easily identifiable "beggar-thy-neighbor" acts. They are not specifiable violations of the integrity of the transaction system. The adversary processes of conventional law have no objective basis for identifying the adversaries. To do so would require general government to operate from a detailed representational model of the different ecosystemic fields (social, biological, and planetary), including their interrelationships at both the macro and micro levels. Only then could governments specify mismatches at the root of the disturbances sufficiently well to identify successfully the necessary countervailing interventions. But even if general government possessed the guidance of such a model, it lacks appropriate instruments of intervention. Traditional general government most commonly operates through the enactment of general proscriptive laws that apply to whole populations. The ecosystemic disturbances behind the new kinds of "bads" often result from "channelized" mismatches that require a selected set of behavioral entities to be marked for regulatory intervention. Currently, developed legislative and judicial processes cannot do this well. Further, the traditional interventions of general government take the form of proscriptive laws intended to be enforced over a substantial period. General government has not evolved the capacity to modify its rules structure effectively in response to short-run contingencies. Yet it is the nature of environmental problems that (1) the behavioral entities targeted by the model for regulatory control may change substantially within a relatively short period of time, and (2) the nature and pattern of the disturbances calling for interventions may change relatively frequently. Traditional law is undermined by anything seeming of whimsy.

But even if the law could be finely honed to changeable contingencies, it might still fail because, in this application, it would not be supported by evolved cultural mores and ethics in the same way as traditional law. This is because our traditional cultural base emphasizes the obligation of man and behavioral entities to each other. Moral exhortations to honesty and legal obedience presuppose a law that deals with specific transactions. There does not exist in evolved

culture the same sense of obligation to "the system." There is, in fact, a sense that it is appropriate to ignore laws that are selective and discriminatory, as interventions to regulate environmental disturbances must often be. To the extent that a management and social science literature is developing that seeks to model environmental systems, it seems to identify relationships and mismatches in terms of the results of social activities—less frequently in terms of activity patterns themselves. But the most fundamental mismatches that stand in the way of successful environmental regulation are not those that identify, for example, the incompatibility of the heat effluents of society with the stability of the ecosystem in general. They are the mismatches in the values and rule structures that guide the activities of social-behavioral entities generating these mismatches.

In the light of the incapacity of traditional general government to deal with these new-era problems, there is a temptation to call upon the developed methods of regulation that enterprise entities have utilized so successfully. We have spoken of the necessity to model these ecological fields if we are to specify the true nature of the environmental disturbances. This is precisely within the tradition of enterprise management. It is the central characteristic of the cybernetic systems employed by enterprise models that they regulate internal operating environments under the guidance of formal operative models of them.

Prevailing reform notions would have us transform the agencies of general government into a gigantic "enterprise in the sky." Enterprise-type management would thus be given a span of control adequate to internalize all of the ecosystemic fields that breed the "new bads." But evolved enterprise cybernetic systems are no more capable of meeting the challenges of the new era than the instrumentalities of general government.

First, no developed capacity exists for modeling systems as complex as these ecological fields on anything like the level of detail essential to issue sensitive, adaptive, prescriptive orders to behavioral entities. Further, there would seem to be little hope that future developments will solve this problem. Even if we could develop methodologies appropriate to this kind of modeling, it would possibly require even more manpower and resources to construct and maintain the model than to carry out the working transformations and transfers basic to social maintenance.

Second, in enterprise management, constituent human and social entities have effectively yielded their behavioral autonomy with respect to their enterprise roles. They are amenable to, and are directly

rewarded for, making appropriate responses to prescriptive orders. The instrumental values in direct control of their behavior are largely congruent. But the new ecosystemic "bads" have their origin, in the first instance, in the incompatibility of the instrumental values of social entities and a debilitating lack of congruence between these instrumental values and the basic values of mankind.

We should understand from experience that our attempts to apply prescriptive enterprise control at the ecosystem level (e.g., the imposition of price controls) in anything more than a short-term emergency situation tend to freeze the system and squeeze out all of the adaptability essential for long-term stability and development.

Some Characteristics of Evolutionary Possibilities

I have already emphasized the point that man organizes society in the service of his basic motives—the deficit motives, the desire for social survival and order, and the growth motives. But the discussion to this point has been concerned with only two of these. The industrial-commercial system characteristic of the present historical era evolved primarily to amplify man's capacity to satisfy his deficit motives. In the Western world it has succeeded beyond the wildest dreams of earlier generations. Changes in the scale and complexity of the social process are now generating side effects. I have just discussed the new kinds of "bads" that have evolved and noted the incapacity of current modes of social regulation to deal with them. Recent social evolution has given more emphasis to a different kind of goods as well. The industrial-commerical era has contributed significantly to the evolution of basic human values.

While growth-developmental human motives have found effect in the lives of many people at many times throughout human history, they rarely find strong expression in any situation where the individual's concerns are largely absorbed with the prior biomaterial requirements of simple human maintenance. The scientific-technological, commercial-industrial revolutions that brought us to the current historical situation, however, have carried truly large numbers of the population to a new threshold of experience that fosters the release and expression of developmental motives. First, truly phenomenal numbers of people have been raised to a level of affluence such that the single-minded pursuit of the deficit motives is no longer dictated by necessity. Second, this same affluence has made possible a much wider horizon of experience through travel and the elaboration and proliferation of traditional goods and services. Third, modern industrial societies increasingly require roles

that encourage human participants to develop their human potentialities. They require more human components who can perform at higher levels of information processing.

Now, if neither the prescriptive cybernetic methods of traditional enterprise management nor the proscriptive cybernetic methods of general government seem capable of regulating the new "bads" I have enumerated, and at the same time human aspirations are seeking attention in a revised form, what are we to make of the situation? The metaphors now established suggest some characteristics of the evolutionary possibilities.

They suggest that we may be ending one significant era in social evolution and entering another. More important, they suggest the kinds of evolutionary developments that may be required by man's effort to cope with the new "bads" and realize the emerging "goods."

They suggest that we must evolve social systems that exhibit cybernetic properties in addition to those that enterprise and governmental systems employ to manage the old "goods" and "bads." They further suggest what some of these emergent properties may be. In contrast to general government, and in common with enterprise management, modeling will undoubtedly play a role. But, even accounting for advances in method and observational technique, the micromodeling typical of enterprise management is not likely to be extended much beyond its traditional roles. Additional forms of modeling will be necessary to generate rougher representations of large system relationships (and the mismatches constituting the systemic "bads") essential to suggest the adaptive requirements of the historical situation and to monitor the effects of evolutionary experimentations it educes from society. It is clear that we will have to pay more attention to the modeling of the value relationships underlying established cybernetic processes and to identifying their mismatches or incongruities.

This interpretation suggests the need for a system of quasi-political, quasi-administrative processes able to organize a highly adaptive set of entity responses to a continuously modifying set of environmental conditions—processes that iteratively respond to the changing requirements of system order and synergy without freezing the system and processes that emphasize the need for the ultrastability of adaptability in contrast to the equilibrating stability of adaptation.

The need to develop synergistic processes for dealing with a new kind of complexity is clear. Traditional management and social sciences visualize greater complexity in terms of larger numbers of closed system relational variables arranged in more extended orders

of nested hierarchies that facilitate centralized regulation of subsystem activities. In dealing with the new "bads," we confront overlapping fields of disturbance that are part of an open, sociodynamic, and thermodynamic evolving ecological system. Regulating these new ecosystemic disturbances requires resolving the dissonance yielded by the disjointed values of quasi-autonomous elements of an ecosystem population.

This, in turn, suggests the need for a substantial increase in the role of dialogical processes relative to dominance-submissive and adversary processes. It seems likely to me that all of the regulatory elements of an evolving cybernetic process capable of dealing with the new complexity will need to become quasi-communal. Whereas the mismatches forming the old "bads" are characteristically defined in terms of the incompatibility of certain activities or their results, the new "bads" manifest disturbances that are better defined by the incompatibility of the instrumental values of the entities involved in the field of disturbance and by the incompatibilities between their instrumental and basic values. This means that an accurate perception and definition of these environmental problems must involve the participation of the effected and affecting parties in supplying the observational data essential to identify the value mismatches. Further, some form of dialogic-political-communal process will need to evolve to transform the communal understanding into a form of regulation that ameliorates the disturbance and reconciles the value conflicts. Finally, it is the nature of the new "bads" that they cannot be collected under the span of control of one or even a few traditional, centralized administrative agencies. They require the participation of assemblies of quasi-autonomous behavioral entities in the programmatic processes designed to restore stability and augment synergy.

Some of today's advanced enterprise entities are discovering this because to a degree they are experiencing aspects of the new complexity internal to traditional spans of control. (This is particularly true of some of the new science-based industries.) They are responding by evolving more open regulatory forms now being referred to as "matrix management" and "participatory management." This observation is not intended as an endorsement of what often seems to me to be a faddish and ill-defined advocacy of participatory management. I am inclined to believe that widespread participation of component entities in the prescriptive cybernetic processes underlying ongoing performance activities in the production of conventional goods may often prove maladaptive. I emphasize more the concept of "participatory development" because it is at the times when social group

behavior has to "regroup" that these developed participatory processes are increasingly required. They must be involved in the evolution of the new cybernetic structures called for by the new "bads."

The procedures and public-private entities that can accomplish this have not yet been developed. It may be that something like this constitutes the next generalizing creative task of social evolution.

No one can seriously doubt man's inability to subject our host planetary and biological ecosystems to a degree of human-social control (i.e., instituted at a level and scale of complexity) sufficient to sustain indefinitely the growth of the material-energy throughput that sustains human society. But it seems entirely conceivable that the adaptability of social processes to the new "bads" may evolve to a degree able to stabilize the social process in a manner sufficient to forestall the behavioral regression projected by Heilbroner. Happily, the interpretation offered in these pages further suggests not only that the avoidance of the new "bads" and the creation of the new "goods" called for by the emerging situation are compatible needs but that each can play a role in the satisfaction of the other. To limit population and industrial growth may both foster and require human development. There are several aspects of this.

The new regulatory processes will have to achieve the higher levels of social information processing essential to deal with the new forms of relational complexity—in terms of both the integration of activities and the resolution of conflict. The evolution of these group processes will depend upon a corresponding development of the capacity for higher individual levels of human information processing. This will require increasing the proportion of the human population more activated and guided in their behavior by Allport's growth motives (relative to deficit motives). That very need should increase the number and variety of social roles that will tend to educe these kinds of developmental responses.

The Role of Religion

This is the natural point to relate this conception to one of the principal concerns of the symposium—the role of religion in the emerging historical process. There is an important conclusion yielded by the view espoused here. The new forms of social regulation required to avoid the new "bads" and realize the new "goods" cannot be generated exclusively by the old trick of internalizing the field of disturbance through expansion of the span of formal organizational control. The necessary adaptations cannot be preengineered and imposed from above. There is a natural limit to the traditional prescriptive and proscriptive controls that foretells a necessarily larger role

for the exercise of self-control by society's behavioral entities. Ralph Wendell Burhoe emphasizes that the locus of this form of cybernetic influence is to be found in the "common brain or information processing mechanism" he refers to as a common "culturetype" (as opposed to genotype) replicated and operating in a population of brains.[8]

This is, of course, not a new phenomenon. Every stable era of evolving societies must develop a culturetype that is congruent with its historical situation. At the most fundamental level, our current problems are rooted in the fact that the operative values of our current culturetypes are no longer consistent with a new historical situation. All of the cybernetic mismatches that define our problem situations are a consequence of underlying mismatches in the values that form and inform social cybernetic processes.

These value incongruities show up in different ways. First, the symbolic values of the prevailing culturetype are heavily weighted toward manifestations of the deficit values of basic human motivations at a time when the requirements of the emerging era require the culturetype to reinforce the growth motives. Second, a great deal of confusion that goes beyond what one might naturally expect in a period of social transition has been introduced into symbolic culture-typical values. There is a tendency, born of the deepening hierarchies of formal social organization and the commercial propaganda unique to the industrial era, for people not to discriminate effectively between instrumental and basic values. Third, the predominant culture-typical values are revealed to be inconsistent with the stability requirements of the environmental ecosystem, and this means that they are inconsistent with basic stability values and even, potentially, with social survival requirements.

These value defects are associated with a major defect in the prevailing weltanschauung. The culturetype does not provide the behavioral entities of society with an appropriate image of their relationship to their encompassing environmental systems or show how that relationship reveals what is adaptive, meaningful, sustainable, and self-fulfilling behavior. There are no guides to the self-control or the self-fulfillment appropriate to the current historical situation. This is our cue to the role of religion. Burhoe expresses it succinctly: "Man's present crisis with respect to his capacity to live with his fellow men and with his total ecosystem is, of course, a crisis in his values. . . . Hence, the only solution today is to reconstruct, reform, and revitalize the cultural institutions that transmit the cultural values proper to an advanced civilization. . . . This is the task that traditionally has been done by religions and their associated arts, rites, dramas, poems, etc. But, we know that the traditional religions are

ailing, . . . the problem is not so much to get rid of traditional religion. . . . what we need to do is to reform and revitalize religious institutions in the light of contemporary knowledge."[9] A larger development of this theme has been undertaken by both Burhoe and Ferkiss.[10]

The Inadequacies of Heilbroner's Perspective

Now let me return to my review of *Human Prospect.* In effect, Heilbroner's scenario says that our developed organizational forms and supposedly unalterable psychological propensities foreclose any chance of success in regulating ecosystemic disturbances of such size and complexity. Accordingly, we are fated to retrench by an inexorable social dynamic. We will be forced to reduce the level of human-social maintenance by reducing population, dismantling the industrial system, and establishing simpler, authoritarian social systems more typical of an earlier time. The problem is to be resolved not by social reorganization that extends the span of current forms of social regulation or through the development of new forms but through social regression—regression designed to shrink the quasi-ecological fields of social relationships so that the disruptive overlaps with planetary and biological ecological fields will be eliminated. Instead of regulating the field of disturbance, we are to withdraw from the field.

I would argue that the concepts and metaphors that guide Heilbroner to this image are too restrictive. Consider the consequences of four sets of conceptual presuppositions shaping Heilbroner's view.

First, he employs a limited view of social organization and social process. This assertion was made earlier in the paper and its explanation launched the effort to sketch a different kind of conceptual system. Perhaps the nature of the restriction can now be articulated more precisely.

If one's conceptual base perceives social transformation as a scalar growth dynamic, there are several necessary consequences: (1) That dynamic must inevitably aggravate the new "bads" beyond all tolerance. (2) That dynamic cannot conceive of its own self-reorganization. (3) This means that no social adaptation is possible except a defensive, reactive adaptation in which social behavior regresses to earlier steady-state, no-growth forms. Furthermore, the traditional forms of performance management are well tested and known to be adequate for the regulation of such simpler performance tests. There is a certain deductive inevitability about it all. Given the conceptual presuppositions, can Heilbroner come out anywhere else?

Second, the psychological motivational presuppositions are too re-

strictive. All Heilbroner offers us is a Freudian "pop psychology." It is within the tradition of economics to erect elaborate deductive structures upon excessively simple psychological assumptions. Heilbroner would have us believe that human nature is fully explained by the deficit motives of man (even worse, a restricted subset of them that does not even do justice to the richness of either the Freudian or behaviorist traditions—both of which are tension-reduction, closed-system conceptual structures). Genus *Homo* seems to be denied any developmental capabilities at all. It is clear that with a closed-system social structure formed by closed-system psychological structures we are doomed to fail in making successful, open-system adaptations of the kind the current historical situation would seem to require.

Third, the religious presuppositions are too restrictive. Heilbroner's image of religion appears to accord with the view that it performs an essentially "opiate" function. In a restricted, closed, steady-state economy the meaning of man in the present and the meaning of the future must be provided by what is sometimes described as the sociological function of traditional religion. There is no glimmer here of the possibility of an open-system or evolving religion that is attuned to, and provides the values for, social and human adaptability and development. There is a hidden inconsistency in this view. Why would man need traditional religious myth to provide a projected sense of meaning and future in the absence of strong developmental motives that require satisfaction?

Finally, there is a restricted view of the relationship between order and freedom. Heilbroner explicitly maintains that the resolution of our emerging historical situation requires that we must give up freedom in order to maintain social order. This presupposes a conceptual dichotomy that is highly restricted. Carl J. Friedrich has spoken effectively to this.[11] He says that there are three dimensions to freedom: (1) Independence or "non-interference by another human being [or social entity] is the elemental notion of political freedom." But this independence is limited by the fact of one's being a member of a social community. (2) Freedom of participation emphasizes the active relation of man to social system. (3) "Freedom of creation . . . is tremendously important for the development of [society], and for each human being it implies the problem of self-development." Friedrich goes on to say: "[Y]ou have to 'organize a great deal of order in order to get more of [these freedoms]. This is the most interesting part of the topic. . . . It is very little understood by people who talk about freedom that these freedoms limit one another. You cannot maximize them all at the same time. If you want to maximize the freedom of

independence, you are necessarily going to reduce the freedom of creativity and the freedom of participation in the bargain.' "[12] In a publication of my own, I add the following:

> Thus, the dialectic of social order and human freedom is best reconciled through developmental evolution of higher levels of social information processing in all social systems. As Friedrich points out, a great deal of order is essential to provide for the exercise of higher-order freedoms. Conversely, we can say that in a complex changing environment, social order has a way of slipping into disorder unless social entities are free to recreate order—to bring emerging sources of disturbance under control. The order that best provides for human freedom is an open-system order. The freedoms that best serve social order in a changing world are participation and creativity, rather than independence.[13]

Closed-system metaphors cannot imagine evolutionary possibilities.

The Grounds for Hope in Man's Future

Since I have dared to imagine some evolutionary possibilities here, one might be tempted to ask what the chances are that some of the hypothesized characteristics might emerge. But to ask the question is to misunderstand the message. It is the nature of the evolutionary process that we cannot know the particularities of future states definitively in advance. But it is also in the nature of the process that social evolution cannot take place without prior emergence of an image of evolutionary possibilities in the mind of socialized man and the translation of these images into evolutionary experiments in social action that become validated by their effective service to the needs of man. The evolutionary process does not prevalidate either optimism or pessimism. But it does prevalidate hope! This cannot be sufficiently underscored, for another lesson of evolutionary understanding is that this glimmer is all that man's growth motives require to work miracles of adaptive generalization. I do not think that man is served well in the present historical situation by a weltanschauung that plunges man into weltschmerz, a world view of despair.

If something more consistent with these images emerges in the future, it may, conceivably, not come until after society has been prepared for this new "renaissance" by passing through another "dark age." But the previous Dark Ages, whatever the popular image, were not so much a regression to earlier social forms as a prolongation of partially retrenched transition forms. Whether or not necessary forms of social restructuring take place, what kind of transition is required, how long it takes, and how much man suffers in the process

will depend a lot upon how rapidly man begins to model his social adaptive processes on a better scientific understanding of evolutionary processes and of mankind's emerging human nature. So far, establishment social science is not helping much, and the insights of Heilbroner and the covey of world-system modelers are of a more superficial kind. It is a serious question whether they lead more than they mislead.

In conclusion, the images offered here suggest that, if we could succeed in stabilizing population and thermodynamic throughputs at levels that do not leave mankind scrounging to fulfill the most base "deficit motives," the closing of the energy-consumption frontier could be transformed into the opening of a new frontier of human development. But this will require a new adaptive generalization in social evolution that reorients social motivations and social processes away from their fixation upon the increasing exploitation of our host natural environments. The avoidance of the new "bads" and the satisfaction of the new "goods" will both be served by giving to social organizations and processes a primary role in educing the developmental potentials of individuals—potentialities commonly left dormant and frustrated by earlier social eras and the absence of which constitutes the root sources of our currently uncontrollable disturbances. Since there are many who need to be served, and since we are just beginning to uncover the developmental possibilities latent in human nature, this could provide man with a new frontier capable of absorbing all his creative energies and capable of maintaining the dynamic character of the social process. A thermodynamic steady state need not imply a sociodynamic steady state. In fact, the entire evolutionary process from molecules to man has taken place under an essentially steady state of the energy flux on the planet! A new level in the evolution of *Homo*'s culture and social organization may be achieved. But the process will have to be served by paradigms that can imagine new human-social possibilities and their necessary supporting social structures.

NOTES

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3. Karl R. Popper, *The Poverty of Historicism,* 3d ed. (New York: Harper & Row, 1964).
4. Peter Roberts, "The World Can Yet Be Saved," *New Scientist* (January 23, 1975), pp. 200–201; Mihajlo Mesarovic and Eduard Pestel, *Mankind at the Turning Point: The Second Report to the Club of Rome* (New York: E. P. Dutton, 1974).

5. Edgar S. Dunn, Jr., *Economic and Social Development: A Process of Social Learning* (Baltimore: Johns Hopkins University Press, 1971).
6. Ibid.; Edgar S. Dunn, Jr., *Social Information Processing and Statistical Systems* (New York: Wiley Interscience, 1974).
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9. Ralph W. Burhoe, "The Control of Behavior: Human and Environmental," *Journal of Environmental Health* 35 (1972): 255.
10. Ibid.; Victor Ferkiss, *The Future of Technological Civilization* (New York: George Braziller, Inc., 1974).
11. Carl J. Friedrich, "The Dialectic of Political Order and Freedom," in *The Concept of Order*, ed. Paul G. Kurtz (Seattle: University of Washington Press, 1968), pp. 342–50.
12. Ibid., p. 350.
13. Dunn, *Social Information Processing*, p. 196.