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MODERN SCIENCE AND MORAL VALUES--A SYSTEMS VIEW

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In my presentation I would like to focus on science, values, and the social organization of decision-making as three societal components that are mutually interrelated in complex ways, and to argue essentially that the system they help constitute (that is, the larger sociocultural system) requires serious large-scale study and a more fundamental understanding before we can expect to proceed very far with intelligent discussion and decisions in their regard.

Let me open my argument with some critical comment on statements made by the recently retiring President of the AAAS, Dr. Glen T. Seaborg, in his address of last June in Mexico City, entitled, "Science, Technology, and Development: A New World Outlook." (Published in Science, 6 July, 1973) I do not at all mean to pick on the author, but take his views as fairly representative of many thinking persons today.

The author argues:

> Today we must think of the New World in terms of the entire world, as a community of mankind whose future lies in pursuing the belief that knowledge--universally obtained, widely shared, and wisely applied--is the key to the viability of the human race and the earth that supports it....We are interested in the advancement of science because we know that it will result in the advancement of man....

Here we find the seeds of what some have begun to call the "ideology" of science and technology: that it alone or primarily holds the key to human salvation. One accutely problematic phrase in this quote is "wisely applied." Application of any plan of societal scope means decision-making, which means politics, involving a sociocultural context

whose forces help structure outcomes one way or another. Our wisdom in applying science must, therefore, derive from a much more extensive and deeper understanding of the sociocultural system: for example the sociodynamics of group structure that shapes and channels value priorities of competing groups, and the authority and power structures that finally bring scientific findings and value priorities into juxtaposition and concrete implementation. There is a huge gap between the verbal expression of moral values and their subjective interpretation on the level of concrete action. It is within this gap that social and cultural forces, which we must study much more to understand, shape human destiny. Natural science (which is tacitly taken to be the meaning of the single word "science" by many) is only one of the factors in the equation expressing the complex relation between values, social organization and technology.

It goes without saying, of course, that while social science and social engineering are being developed, the scientific community should take immediate steps to help provide the kinds of social organizations that might bring science and value considerations closer together. I have in mind as an example the recent formation in England of the Council for Science and Society, an organization of leading scientists and their critics, designed to arouse public discussion about the possible consequences of socially important new research. In the light of what we have argued above, the aim of this group was particularly aptly put by Jerome Ravetz, its first executive secretary and one known in England as the advocate of what he calls "critical science," (a concept with some similarities to ideas of the Frankfort School of "critical philosophy and sociology"): the Council's aim will be to warn of the dangers of new scientific

advances before commercial interests or institutional battle lines are formed.

Returning to Dr. Seaborg's address: despite his rather extreme optimism about the role of science in solving social problems, the author does recognize some grave difficulties.

> "One of the most difficult things we will have to do, and do soon, is to seek ways to ensure that all the peoples of the world share more equitably the vast human benefits that energy can bring."

And in pointing to the potential of the new International Institute for Applied Systems Analysis in Vienna, his tone becomes less reassuring:

> "Hopefully, their analyses, models, and warnings will be effectively brought to the attention of the world's political leaders and their significance will be understood, heeded, and acted upon."

Besides this tacit cry for help form the area of the policy sciences, the author gives recognition also to the social science theoretical problems involved: Warning of overconfidence in the success of the natural sciences in solving the population or hunger problems, he suggests that a more sustained success must be "based upon recognition that we are dealing with a series of dynamic processes and relationships and not a group of simple problems that can be solved for now and all times."

And pointing to the broad range of large scale technical and social innovations that would be required to prevent the developing countries from experiencing the serious urban problems of industrialized nations, he sees clearly the more fundamental problem:

> "Should we attempt all this, it would also require a vast change in our global economic and political arrangements, based on a degree of cooperation, integration, and planning that can, at best, be achieved only over a long period.... We must be just as creative and innovative in our social, political, and economic thinking as we are in our planning and use of science and technology. Furthermore, we cannot deal with human and technological matters in any but the most integrative, interactive way. We may therefore find that in the years ahead we may not be able to make the maximum use of our science and technology in the cause of man unless man, in his various nations and societies, is willing to change many of his tradition-bound ways, free himself of many prejudices and outmoded ideas, and explore new frontiers in human relationships....

Given these insights into the social depths of the problems, the author's conclusion is most disappointing:

> "In conclusion, let me focus briefly on the human force that will be necessary to carry out much, if not all, of the change demanded to create a livable future. That force is organized knowledge; and it is transmitted by education. It is education, perhaps more than any single factor, that will determine how we survive--the way in which developing nations develop, the quality of life in all nations, and the extent that human freedom and dignity flourish in a complex and highly organized world."

Now, we take nothing away from the importance of education if we argue that the educational institution is not, anymore than science and knowledge itself, an autonomous, independent variable in social system dynamics. To give a concrete example, we might be reminded of the fact that many of the characteristics of contemporary education in the United States were a response to the Sputnik stimulus and its political interpretation, to say nothing of its military implications. Neither can we dismiss out of hand the analysis of our educational system as heavily oriented over a long historical period toward an economic conception of achievement and "progress," anymore than we can deny the substantial orientation of scientific research to political conceptions of national security and welfare.

This leads us, then, to our general thesis that science and technology, values, education, politics and economics, are all components within a highly interactive system that must be understood as such. Single factor theories are of little help, whether the appeal is to science, education, morals, or economics. We cannot invoke any of these as a deus ex machina: there are no autonomous external forces to bring to our rescue. As modern ecology has been insisting, we are dealing with a system of which we and our institutional arrangements are interdependent parts, and must therefore pull ourselves up by our own systematic bootstraps if we are to do it at all.

Since the concept of moral values is brought into focus by the title of our conference, let me offer my opinion that it is one of the most underdeveloped and vaguely defined concepts in social science and public discourse, despite the central theoretical role it is often intended to play. From anthropological studies, where most of the more useful analysis has been done, it becomes clear that moral values must be conceptualized, not in the usual static manner, but to reflect the dynamic way they actually seem to operate in social life. Values are active principles, and get their meaning from the full context of action. They are group generated and maintained, not individual matters of taste. And they are relative to the hierarchy of other values that always surrounds them, a hierarchy that is subject to change in its arrangement and that is not always logically consistent. Thus, it provides no information at all to state that one is in favor of peace, freedom, or equality; what we need to know to give these meaning is what other values one will or will not sacrifice to attain them--that is, where they lie within one's value ranking for a given situation.

Many of us can easily subscribe to the view expressed in the recently revised "Humanist Manifesto II":

> "We affirm that moral values derive their source from human experience. Ethics is autonomous and situational, needing no theological or ideological sanction. Ethics stems from human need and interest. To deny this distorts the whole basis of life."

Such a perspective receives support from the recent increase of interest in social evolutionary theory. It is a reasonable thesis that moral values represent the evolution of rules of social interrelationships that have been relatively successful in adapting individuals and groups to one another in a more or less workable manner for the environmental conditions prevailing.

Some general systems theorists even suggest that we exploit the structural parallelism or isomorphism between adaptive variation in genetic information shaping the structure of biological species, and the adaptive variation of cultural information--in this case moral rules--shaping the structure of social groups. The organization within and among groups can be seen as a channeling of social and psychic forces that give shape to the transformation of value hierarchies and interests into goal decisions and actions. The success or failure of these actions relative to the values and goals of the various groups feeds back in the form of pressures to change the value priorities or the group structure, and sometimes to generate new value principles. In this way societies tentatively build on the basis of past principles, present fears, and future hopes. Sometimes intelligence seems to play a role in the process, but seldom at the broader societal level where intelligent action requires a high level of integration and consensus. For intelligence, like the science it makes possible, is not an automatic force, independent of the social conditions organizing and directing it.

Perhaps enough has been said to alert us to the perils of any facile use of the folk notion of moral values, and to warrant an appeal for much greater empirical and conceptual research in this area. And in particular, when we talk of applying science and technology to the promotion of human values, we have to take note of the implicit assumption that we know what these are, or what they mean empirically, or whether there is any kind of social consensus about them. Although most of us can agree on verbal expressions of values, serious difficulties arise when we try to interpret them in more concrete terms.

More generally speaking, then, it is imperative that we underwrite the research required to understand more precisely and deeply the broader organizational and interactional dynamics of sociocultural systems, so that any effort of science and technology may stand a chance of being successfully applied to promote human values. Let me close by

mentioning briefly two areas of research I am involved in which seem especially pertinent to our theme. Both are based on a systems approach. One lies in the area of collective decision making in society; the other attempts a fairly precise modeling of such social structural properties as control, regulation, adaptation, and structural change.

The first takes as its point of departure the extensive work done on the theory of games, strategies, and decisions and extends it to the more socially realistic situations in which numbers of individuals and subgroups make collective decisions involving their material interests and social values under conditions of scarcity and of organizational and cultural constraints or their absence. As has been suggested by studies of the so-called "prisoner's dilemma" game, by the work on collective voting of Kenneth Arrow, Marvin Olson, and others, by Garrett Hardin's analysis of the "trajedy of the commons", and by sociological studies of panics and other crowd phenomena, rational individual decisions taken collectively may lead to outcomes that are unexpected, indeterminate, or undesirable for both the group and its individual members. Exploratory studies by some of my colleagues and myself suggest that there is a common pattern to be found underlying these different collective decision phenomena, which we take to be a first step in understanding how to avoid the potential ruin that may result from apparently rational collective actions. Our analysis attempts to go beyond a study of the logical structure of collective decision-making to show the way in which internal and external social controls and structural constraints influence individual value rankings, action opportunities, and action outcomes. It appears to follow from the analysis that there may be a number of ways of resolving the dilemmas of collective decision-making by the application of reasonable kinds of social engineering. But much further work needs to be pursued here.

The second area of research mentioned is much more abstract, and is being undertaken jointly with a colleague trained in control engineering. It attempts to develop a systems methodology for defining operationally, and applying to sociocultural systems, a number of concepts that are more and more being brought over into social science from other fields. We argue that if we are going to use in social science theory such concepts as control, self-regulation, adaptation, homeostasis, and the like, and if we pursue the general systems theoretical principle that there is a fundamental isomorphism between substantively different kinds of complex, open systems with the above properties--whether they are electronic, biological, or social in nature--then serious conceptual work must be done to define and operationalize those concepts for sociological application. If social structures and processes embody such properties, then, despite the varying concrete forms they may take, there are a limited number of basic kinds of structures operating. In defining morphostatic (that is, adaptive structure-maintaining) forms and morphogenic (that is, adaptive structure-changing) processes, we aim eventually to define more precisely the underlying structure of broad societal control processes such as democracy, autocracy, and the like. In doing so it is hoped that we can raise the level of political discussion to a greater precision and fruitfulness. It might even be that much ideological argument can be replaced by scientific debate.

It is not possible to discuss further here the details of such research. Given the past limited performance of social science, one probably has a right to remain skeptical about immediate advance on this front. And there are still those who will even believe that a true social science is not possible. This, however, is a classic case of the self-fulfilling prophecy, which may operate by the withholding of the kind of

support that alone would advance social science beyond its present rather static state. In closing, I would like to reiterate, however, my main point that as long as our knowledge of sociocultural systems remains so limited, our ability to relate science and technology to human values will also remain bogged down.

1) general thesis: science, technology, values, education, politics & economics are all components in a complex system.

2) values are active principles and are relative to a hierarchy of values

3) appeals for greater empirical and conceptual research related to values.

4) two areas of research
- collective decision-making in society