# FROM THERMODYNAMICS TO VALUES: A TRANSITION YET TO BE ACCOMPLISHED

*by Mihaly Csikszentmihalyi*

The main question raised by this symposium appears to be an old epistemological (or at least methodological) question, namely, how relevant are natural science laws to the understanding of human behavior? On the first page of his contribution, Professor Katchalsky states that experience has discouraged people from addressing questions concerning the foundations for a moral system to philosophers or to psychologists, and that "there has been a growing tendency to regard science itself as a philosophical foundation . . . which could provide the dictum for a meaningful, satisfying, and decent life."[1] The other scientists on the panel heartily subscribe to this notion. Yet on the evidence of this symposium, it is difficult to see how people will avoid being discouraged by the answers that natural science can give to their quest for meaning.

It is often the case that whenever a physicist, chemist, or biologist points to a natural law from his discipline as being relevant to human values, he usually does so with the hope that in some miraculous fashion the law he knows so well will be applicable, with minor modifications, to the realm of human phenomena. This hope is understandable since we all like to achieve the maximum effect with the least effort to ourselves, but in realistic terms it is obviously unattainable. Katchalsky quotes Mayr regarding the "enthusiastic but poorly informed physical scientists" who are trying "very hard to squeeze all of biology into the straight jacket of a reductionist physical-chemical explanation,"[2] yet he himself seems fairly enthusiastic about trying to squeeze social and psychological phenomena into a biological straitjacket. Not without some ambivalence, however; later he justifiably warns against "the danger of projecting the concepts of one discipline into another and of using analogies instead of careful analysis of the system under consideration," and rails at "the vague vocabulary of those speakers looking to natural sciences for authoritative support."[3]

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It seems that natural science can help in developing a value base for human decisions in basically two ways. The first is by providing information about natural processes which man must take into account if his decisions are not to conflict with the realities of his environment. In this sense the Second Law of Thermodynamics and the Hardy-Weinberg law of genetics are "givens" that one must reckon with in shaping a course for human action. The second form that the natural scientist's contribution can take is the attempt to reduce human problems to the level where they can be handled by natural laws. So that when scientists offer their help for solving the problems of the world, they rarely wish to limit their role to a relatively modest advisory one. They usually expect that the discipline in which they are competent will serve as the basis on which human values will *directly rest*—hence the various survival imperatives, thermodynamic imperatives, etc., which claim to contain axiomatic truths from which a network of laws affecting behavior can be derived. This is, of course, an old hope of mankind; at least since the time of Newton and Leibniz (and a long time before people began turning to the social sciences for answers), it was believed that one should somehow be able to derive normative laws from natural laws. Why this hope keeps being disappointed can perhaps be explained by using illustrations from the contributions to this symposium.

### Drawing Analogies between Natural and Social Phenomena

Let us return for a moment to Katchalsky's paper. He describes at length a series of interesting experiments in hydrodynamics and concludes with the generalization that flow structures "survive only on energy input which is dissipated in the maintenance of structure."[4] Given the emphasis placed on the arguments that culminate in this law, one is led to expect that flow structures have something important to tell us about structures affecting human behavior. What exactly? There are, of course, structures that are uniquely human and that are very important for understanding the laws of human action: social systems such as families or governments, symbolic systems, productive systems, value systems, etc. But is there anything in common between these structures and a heavy liquid in a shallow dish—except the barest twinkling of an analogy? Granted, social systems also need some sort of "energy" input in order to survive. But this is something that thinkers have known since earliest antiquity, although even now there is no agreement as to what form of energy is exactly involved. Marx pointed out that social and cultural "superstructures" rest on the

energy input provided by the productive system, while Freud held that the structures of civilization are maintained by energies deflected from the satisfaction of instinctual needs. Both of these conceptions of "energy" have been incorporated in our contemporary understanding of the dynamics of human systems.[5] It is not yet clear which of these two versions of energy is more appropriate to explain structures of the kind we are talking about, or whether a third form of energy will turn out to be a more useful construct, or whether any energistic model will in the long run be quantifiably applicable to human concerns after all. What is clear is that any form of energy that will explain the emergence and maintenance of social structures must be something very different from the thermal energy which accounts for the existence of flow structures. Of course, Katchalsky is perfectly aware of this, as shown by his conclusions in which he emphasizes the quantum jump to symbolic processes in evolution. Yet he fails to develop the implications of this transition, which surely calls for a new methodology to investigate the new realm of human phenomena, a methodology which must rest on, but be independent of, the conceptual framework of the natural sciences.

The same point is brought out by the partially conflicting positions of Professors Lindsay and Potter. According to Lindsay, the thermodynamic imperative enjoins on all of us the consumption of as much entropy as possible so that we might increase the order in our environment. Potter takes exception to this view and claims that his survival imperative is mightier than the thermodynamic one and that the former dictates the necessity for an unspecified amount of disorder to be present in the system if the system is to survive. In pondering this difference of opinions, one finds it difficult to perceive in what way the argument of Lindsay and Potter constitutes an improvement over the debate that philosophers and social scientists have held for ages concerning the relative merits of order and change in human affairs. In contemporary social science the argument is centered around the poles of structural functionalism, on the one side, and conflict theory on the other.[6] It has achieved a high degree of sophistication in the analyses of Campbell.[7] The problem is that the concept of order and disorder or entropy becomes terribly complex when applied to social phenomena. This fact is exquisitely illustrated by the title change in Professor Wallace's paper, which read "Perceptions of Order and *Disorder* in Human Cultures" in its first draft, "Perceptions of Order and *Richness* . . ." in the second (my emphasis). One man's richness can easily be another man's disorder, as the long history of social injustice and exploitation amply shows. And the uncertainty of the distinction is fur-

ther documented by the statement in the same paper that Handsome Lake, after bringing back order to the life of the Iroquois, "also proposed adding some variety to the life by endorsing education, farming in the white style, and changing the dominant kin relationship . . . to the monogamous family household."[8] Now if the repressive education to which Indian children were subjected, farming and monogamy are identified as "variety" (or richness, or disorder?), then would their opposites be "order"? There is no need to press the argument to reveal the arbitrariness of such equivalences; the fit between the concrete historical processes and the conceptual categories used to explain them is obviously rather loose.

Further examples of problems that arise when analogies become reified and then treated as if they were real phenomena include Lindsay's assumption that "ordered thinking" proceeds according to the laws of thermodynamics. Potter is ready to point out the questionableness of that asumption, but then proceeds to equate accident, disorder, and chance with "strong inferences" and "inspiration" in thinking; yet acts of inference or inspiration might be described with equal justice as manifestations of ordering or negentropy. If a strong inference is a manifestation of disorder while a logical deduction or proof is an example of order, then it follows that an inference is the negation of a deduction, which is rather hard to take.[9]

### Unidentical Problems and Methods in the Natural and Social Sciences

These examples suggest that the dangers of metaphysical arguments about human problems are not to be avoided by simply clothing the discussion in scientific terms. It can be just as metaphysical to argue about human values with reference to such concepts as "energy," "entropy," "order," and "disorder" as it is with reference to "spirit," "manifest destiny," or "the will of God." When carelessly applied to the explanation of sociocultural behavior, both sets of concepts are equally nonoperational, nonfalsifiable, and hence nonscientific.

The paradox resides in the fact that, in order to be truly scientific, the study of man has to face its own independence. We must realize that the problems and methods central to the various natural sciences cannot be the ones central to the social sciences. To understand how values affect the behavior of men, we must recognize the unique forces and systemic characteristics that determine the motions of men. And that requires the study of the laws of consciousness and volition, two uniquely human processes which social scientists have shied away from for the exact reason that should have attracted them: consciousness

and will are furthest removed from those processes that physical scientists study. But as long as psychologists and sociologists limit themselves to the conceptual frameworks of physicists, chemists, and biologists, they will remain second-class citizens in the republic of science.

In the meantime, the older scientific disciplines can help by providing stimulating analogies, as they have done in the present symposium. It should be recognized, however, that there is a danger involved: if these analogies are taken too seriously, they might stifle the independent inquiry that should lead to the discovery of the specific laws of *human* behavior. We will remain in the thrall of the beautiful laws of natural science and never develop the confidence and the motivation that are necessary to perceive the regularities that are crucial for understanding the realities of the human situation.

NOTES

1. A. Katchalsky, "Thermodynamics of Flow and Biological Organization," *Zygon* 6 (1971): 99–125.
2. Ibid., p. 101.
3. Ibid., p. 122.
4. Ibid., p. 107.
5. E.g., Talcott Parsons and Edward Shils, *Toward a General Theory of Action* (Cambridge, Mass.: Harvard University Press, 1951); Talcott Parsons, "The Incest Taboo in Relation to Social Structure," *British Journal of Sociology* 5 (1954): 101–17; R. Dahrendorf, "Toward a Theory of Social Conflict," *Journal of Conflict Resolution* 11 (1958): 170–83; and P. E. Slater, "Social Limitations on Libidinal Withdrawal," *American Journal of Sociology* 67 (1961): 296–311.
6. See, e.g., Dahrendorf (n. 5 above); M. L. Cadwallader, "The Cybernetic Analysis of Change in Complex Social Organizations," *American Journal of Sociology* 65 (1959): 154–57; and F. Cancian, "Functional Analysis of Change," *American Sociological Review* 25 (1960): 818–26.
7. E.g., D. T. Campbell, "Natural Selection as an Epistemological Model," in *A Handbook of Method in Cultural Anthropology*, ed. R. Naroll and R. Cohen (Garden City, N.Y.: Natural History Press, 1970), pp. 51–85.
8. Anthony F. C. Wallace, "Perceptions of Order and Richness in Human Cultures," *Zygon* 6 (1971): 151–56.
9. Karl R. Popper, *The Logic of Scientific Discovery* (New York: Basic Books, 1959), p. 278; *Conjectures and Refutations* (New York: Basic Books, 1963), p. 51.