

positions as were thought to control lower animals. However, the behaviorist-environmental revolution in this century American psychology led to a rejection of this sort of explanation. In its place, great emphasis was placed on the processes of learning and conditioning. The second law of thermodynamics, leading in physiology to the principle of homeostasis, led in psychology to the proposition that all behavior is drive-reducing. This principle, together with the principles of association learned from the first law, led to apparent theoretical solutions to both the performance and the development problems of motivation. Behavior results from a state of disequilibrium and is directed to a reestablishment of equilibrium. The sorts of stimulus events which can lead to disequilibrium and the kinds of motor performance which are instrumental to the reestablishment of equilibrium were acquired through associative learning.

It would take us far afield to consider the controversies to which psychology was led by this general point of view. Suffice it to say for the present that the old instinct theories have never again enjoyed the use they once had in answers to the question of where values come from. However, the empirical doctrine of associationism which replaced instinct theory has come upon evil days as an adequate theoretical base for responding to the same question. Some of my colleagues will still disagree, but I believe it correct to assert that both instinct theory and classical learning theories have failed as attempts to account for the origins of human values.

But the question of the origins of values is still a very lively one. In contemporary psychology, research, and theory on the problem comes under the heading of socialization. The human infant is born as a social innocent and comes in the course of development to manifest an entire range of tastes, preferences, passions, desires, and moral principles as a product of his continual interaction with social influences. Freud suggested that the major mechanism of socialization is identification, whereby the child comes to project the moral standards and values of his parents. More modern theorists and researchers, from O. H. Mearns to John Piaget and Lawrence Kohlberg, consider that a child develops through a series of stages in the process of socialization which correspond in part to the stages of cognitive or intellectual development. The sources of internalized norms and values are considered to be not only parents, but peers, social reference groups, and idealized ethical systems.

For the present discussion it is sufficient to recognize that there is in contemporary psychology a great amount of theoretical and research activity on the problem of socialization—on the problem of how individuals come to acquire the values that regulate their social behavior.

For example, a number of monographs have appeared on the problem of political socialization, where the concern is to describe the way in which a child comes to evaluate political figures, institutions, doctrines, and opportunities for political activity [3], [5], [6]. This line of research has received a great impetus recently from recognition of the

two key terms are related to two major areas of psychological research and theory—cognition and motivation. Also, the terms beliefs and values are related in a generic way to two subdivisions of philosophical inquiry, epistemology and ethics. What a man does is conceived as depending both upon what he believes (exerts, knows, suspects) and what he values (wants, desires, prefers).

Admittedly, such a conceptualization is highly schematic and crude; indeed, even if developed it turns out that there are many important psychological questions which simply cannot or should not be approached in this way. But if one is to undertake a discussion of values, it is important to recognize the logistic position of values in a full behavior theory.

A clear paradigm is afforded by modern decision theories of both descriptive and normative varieties. All such theories contain a variable that is cognate to value and all contain a variable that is cognate to belief. It is also common to all such theories that choices, decisions, or behaviors are presumed to result from some combination of motivational and cognitive antecedents. In simple gambling games, for instance, choice of play is presumed to depend upon the expectancy of success associated with each outcome and the positive or negative payoff of each outcome. In normative terms, the expected value of each bet can be readily calculated for all well-defined games. In descriptive terms, a major psychological scaling problem exists in understanding how individual expectancies and utilities are functionally related to the objective odds and payoffs.

The fundamental operation for defining values in this approach relies upon the preference paradigm. Given a range of possible objects, events, or states of being, all of which are equally available to the subject (in this case, expectancies are equivalent for all options), the relative frequency of choice among options is supposed to reflect the relative values of the subject for the objects, events, or states of being in the array. As we shall see later, some fundamental problems are submerged by this method of operationalizing values. However, it should be clear that the preference paradigm is the major way of closing the conceptual gap between values and behavior.

If decision theories offer a way of conceptualizing the relationship of values to behavior, they do so by incorporating certain facilitative assumptions about the nature of values. It is generally assumed, for example, that values are where you find them—preference hierarchies are assumed as given, and the problem of the genesis of values is simply avoided. The question of how values are translated into behavior is only one of the concerns of the motivational psychologist. The other question is that of genesis or development. How do evaluative dispositions come to be what they are? What are the antecedents for the development of human motives?

At one time the stock answers for this sort of question were taken from the instinct psychologists. Post-Darwinian thinkers of the 19th century were ready to consider human beings as motivated by the same sorts of instinctive dis-

evident fact that political socialization in the United States does not appear to be working very well. Dissent and radical attempts to reform the political order certainly seem to be manifestation of social values, but they are not the sorts of values which those who manage the current system would recognize as the most admirable ones.

Another example of research on socialization is provided by Bandura [1] and his students at Stanford University. Children are allowed to observe the stylized behavior of models in novel situations, and are observed on subsequent occasions to demonstrate themselves the sorts of behavior they have observed. The acquisition of social values is shown to take place by observational or vicarious experience and can be accomplished in a single trial. The evidence for the effects of observed violence on television upon exhibited aggression is one of the products of this line of research. While Bandura and others who are working on the problem continue to explore the conditions under which this effect occurs, we may take it as established that socialization proceeds in part through the assimilation of vicarious experience and is not merely a matter of higher order conditioning.

Obviously, in the modern world the range of value models which is actually or potentially available to developing individuals is very large. One of the most impressive products of advanced technology is the capacity to exhibit remote occurrences to the developing person. The visibility of humanity to humanity is increasing tremendously. This introduces the possibility that the process of socialization will occur in a far less predictable way in the future than it has in the past, where a much more limited set of value models were available for possible adoption. The general norms of freedom of access to information and individual freedom of choice in soliciting information produce consequences which are inimical to a consistently and efficiently socialized social order.

A case is currently pending in the state of Wisconsin concerning the control which an Amish sect may maintain over the education of their children. The Amish provide their own schooling for their children through the eighth grade, but do not send them to school thereafter. The state of Wisconsin has a general statute requiring all children to attend school until age sixteen, and has brought suit against the Amish in an effort to send the children to public high schools. The prosecutor for the state argues that the children are being forcibly oppressed and that the state of Wisconsin has a responsibility to liberate these children by exposing them to the range of values which non-Amish Western culture has to present. But the Amish know that control of information is control of socialization. For the sake of their own cultural survival, they cannot afford to take chances with freedom of information and freedom of choice [14].

Similar restrictions of information are practiced by the regimes of South Africa, where television is prohibited, and China, where until recently, Mao's bamboo curtain effectively shielded the people of China from the opportunity to assimilate by observation the corrupting values of the West.

In our society we have been socialized to the proposition that knowledge is good, freedom is good, individual choice is good, technological progress is good. Our decisions as individuals and as a society have been strongly influenced by these values. Indeed, the message of the cautionary moral sermon is that these kinds of values *should* be applied to our decision matrices. It is my objective in the remainder of this paper to show how the implantation of these perfectly admirable values leads to unintended and, from my perspective, highly undesirable consequences.

THE VALUE PARADOX POSED BY TIME, OR WHEN ARE THE CHIPS CASHED IN

Decision theorists consider only those choice situations which can be mapped and which are bounded in time. Similarly, in cost-benefit analyses of proposed projects or technical developments, a time horizon must be established. But the arbitrary establishment of time boundaries produces a disjunction between the decision model and the real world. Second, third, and higher order consequences of chosen courses of action continue to be realized into the indefinite future. Because these consequences are not evaluatively neutral, the initial solution to the decision problem may yield paradoxical and nonmaximal consequences.

Considerable psychological research has been done on the problem of delay of gratification [8]. Experimental situations are devised such that a subject may accept a small reward now or a larger reward later. This research has established the existence of consistent individual differences in the capacity to delay gratification. Some individuals seem to make decisions in a larger framework of time than others.

The functional relationship between time and utility is, of course, included in the analysis of technological feasibility studies. Some developments are explicitly designed to yield short-term benefits, which in the longer run produce negatively valued outcomes. For example, the development of efficient mass-production techniques for manufactured articles yields relatively immediate benefits. However, the long-term consequences, such as worker and consumer boredom and rapid diminution of raw materials will eventually be realized, and in such a way as to make questionable the wisdom of initially opting for the techniques of mass production. Clearly, different companies and different nations differ in the extent to which they try to include long-term consequences in their decision matrix.

One of the most ambitious technological projects of the post-war era is being executed in Brazil [15]. A 3000-mile highway is being cut through the Amazon jungle, in an attempt to open up the heart of the South American continent for development. Obviously, the decision of the Brazilian government to build this highway is a bold one. It entails the assumption of weighty short-term sacrifices—diversion of capital and technological expertise from other possible projects. However, Brazilian technocrats are confident of the long-term benefits of the completed project. Access to new land, new raw materials, provision of new

opportunities for the starving people of the arid Northeast of Brazil, as well as the less tangible benefit of building national pride are reasonable objectives in the long run for Brazil. However, the consequences of this project will not stop suddenly with the realization of these objectives. The Amazon rain forest produces a sizable proportion of the world's oxygen. Will the development of the Amazon region endanger this supply? The development of Brazil as a major economic power is already being perceived as a threat by other nations in Latin America. Brazil has in the past 150 years had only one war with a neighboring country. Will the increased power of Brazil bring about new Latin American wars? Will the present precarious balance of power in the world be upset by the emergence of a new super-power, which the Trans-Amazon highway will facilitate?

Merely suggesting these possible long-term consequences is likely to lead foreign observers to wish Brazil to go slowly with its development. From our perspective, there may be the additional hazard that the technical and economic development of Brazil may mean the end of one of the most delightful tourist attractions on earth.

THE INDIVIDUAL-COLLECTIVITY VALUE PARADOX

We may now see a relation between the time paradox and the problem which Hardin [4] has aptly called, "The tragedy of the commons." Hardin demonstrates that individual prudence may inexorably produce collective disaster. As the limits of scarce resources are approached by mass development and consumption, the benevolent invisible hand of Adam Smith may turn into a device of mass strangulation.

Obviously, it is in the interests of all of the more than 150 nations on earth to seek technological development. The modern media act as our missionaries, only they do the job much more efficiently. Without question, the underdeveloped nations of the world want what we have, they can see the images of our products and our techniques very clearly. We may attempt a cautionary moral sermon to the effect that our own society is in deep trouble—that the technological problems we have solved have left in their wake much more difficult problems—despair, the mindless urge to destroy, pervasive psychoneurotic difficulties. The cautionary moral sermon will have no effect. It is as if the neighboring farmer urges you not to add another cow to graze on the commons because he can attest that a big herd like the one he has brings nothing but headaches.

Our attempts to tell smaller nations that they should not develop a nuclear arsenal, in the interests of the collectivity, are of a similar kind. It is obvious that power matters in international relations. If you do not have power you are not getting as much respect as you might if you did have power. Result: It is in the interests of every nation to develop its nuclear capability. Of course, the result is collective disaster.

The point is that it is difficult to get an individual or a collective entity socialized to the interests and values of their competitors, so that when they make decisions, they will

take our values into consideration. In order to accomplish this, to revert to an earlier point, socialization to collective interests must be controlled and directed. But if socialization to collective interests is truly to be controlled and directed, we must establish not only a world government, but a world government which does not give ultimate value to knowledge, freedom of inquiry, individual choice, and technological progress.

Nobody wishes to do this. We have steadily resisted attempts at tyrannical collectivization in this century, and we are likely to continue to do so. But in the meantime, the inexorable tragedy of the commons is working towards its last act. Erlich's population bomb is ticking. Nine million new automobiles continue to appear each year as testimony to our veneration for freedom of choice. Wars of "liberation" continue, so that newly liberated peoples can aspire to the same kind of material affluence which Americans are finding to be so stale and tasteless. These are some observations about human values which the student may find astonishing or puzzling.

THE CHIMERA OF PROBLEM SOLVING

Both of the preceding value problems may be considered problems of extension. For the first, extending the dimension of time yields paradoxical transformations of decision payoffs. For the second, extension from the individual to the collectivity produces unanticipated transvaluations. I wish to close by mentioning a third value-paradox—one that is a problem of intension rather than extension. I refer to the problem of intrapsychic value conflicts.

While one may not agree with Freud about the instinctual origins of the problem, abundant evidence exists for the proposition that man is at war with himself, that he does not have unequivocal values, that the solution to what he thinks of as his problems only produces other problems.

I wish to resort to a quotation from Orwell [9, p. 163] which illustrates very well the sort of paradox I have in mind:

If you look into your own mind, which are you: Don Quixote or Sancho Panza? Almost certainly you are both. There is one part of you that wishes to be a hero or a saint, but another part of you is a little fat man who sees very clearly the advantages of staying alive with a whole skin. He is your unofficial self—the voice of the belly protesting against the soul. His tastes lie towards safety, soft beds, no work, pots of beer and women with 'voluptuous' figures. He it is who punctures your fine attitudes and urges you to look after Number One, to be unfaithful to your wife, to bilk your debts, and so on and so forth. Whether you allow yourself to be influenced by him is a different question. But it is simply a lie to say that he is not part of you, just as it is a lie to say that Don Quixote is not part of you either, though most of what is said and written consists of one lie or the other, usually the first.

If this sort of speculation has merit, and I consider that it does, then it yields an interesting conclusion when put

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...another example of research on socialization is provided by Bandura [1] and his students at Stanford University. Children are allowed to observe the violent behavior of models in novel situations, and are observed on subsequent occasions to determine themselves the sorts of behavior they have observed. The question of behavior is shown to take place by observation of behavior as positive and can be accomplished in a similar fashion. Evidence for the effects of observed violence on television and exhibited aggression is one of the products of this line of research. While Bandura and others who are working on the problem continue to explore the conditions under which this effect occurs, we may take it as established that socialization proceeds in part through the establishment of vicarious experience and is not merely a matter of direct conditioning.

Obviously, in the modern world the range of value models which is actually or potentially available to develop the individual is very large. One of the most impressive products of advanced technology is the capacity to extend vicarious experience to the developing person. The visibility of humanity to humanity is increasing tremendously. The ability to reduce the possibility that the process of socialization will occur in a far less predictable way in the future than in the past, where a much more limited set of value models were available for possible adoption. The general nature of freedom of access to information and individual freedom of choice in seeking information produce conditions which are inimical to a consistently self-referential social order.

...is currently bonding in the state of Wisconsin concerning the control when an American may maintain control of their children. The American people are being schooled for their children through the right to send them to school elsewhere. The state of Wisconsin has a general statute regarding all children to attend school with the state, and has brought suit against the American in an effort to send the children to public high schools. The prosecutor for the state argues that the children are being forcibly oppressed and that the state of Wisconsin has a responsibility to liberate these children. ...

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In our society we have been conditioned to the proposition that knowledge is good, freedom is good, individual choice is good, technological progress is good, the decision by individuals and as a society have been strongly influenced by these values. Indeed, the message of the contemporary movement is that these kinds of values should be applied to our decision making. It is my objective in the remainder of this paper to show how the application of these particular academic values leads to unintended and from my perspective, highly undesirable consequences.

THE VALUE PARADOX FORMS IN TIME OR WHEN ARE THE CURS CURRERE?

Decision theorists consider only those choice situations which can be mapped and which are bounded in time. Similarly, in cost-benefit analyses of proposed projects in technical development, a time horizon must be established. In the arbitrary establishment of time boundaries produce a distinction between the decision model and the real world. Second, mind and higher order consequences of chosen courses of action continue to be teased into the indefinite future. Because these consequences are not exhaustively mental, the mental solution to the decision problem may yield paradoxical and nonrational consequences.

Considerable psychological research has been done on the problem of delay of gratification [8]. Experimental situations are devised such that a subject may accept a small reward now or a larger reward later. This research has established the existence of consistent individual differences in the capacity to delay gratification. Some individuals seem to make decisions in a larger framework of time than others.

The functional relationship between time and utility is of course, included in the analysis of technological decisions. Some developments are explicitly designed to yield short-term benefits which in the longer run produce very different outcomes. For example, the development of efficient mass-production techniques for manufactured articles yields relatively immediate benefits. However, the long-term consequences, such as worker and consumer boredom and rapid deterioration of raw materials will eventually be realized, and in such a way as to make questionable the wisdom of initially opting for the techniques of mass production. Clearly, different companies and different nations differ in the extent to which they try to include long-term consequences in their decision matrix.

One of the most ambitious technological projects of the postwar era is being executed in Brazil [15]. A 3000-mile highway is being cut through the Amazon jungle, in an attempt to open up the heart of the South American continent for development. Obviously, the decision of the Brazilian government to build this highway is a bold one. It entails the expatriation of wealthy short-term investors—direction of capital and technological expertise from other possible projects. However, Brazilian technicians are concerned of the long-term benefits of the completed project. Access to new lands, new raw materials, provision of new

together with the observation that technology can only solve problems of the Sancho Panza variety. The conclusion is that technical solutions do not really solve a person's problems—they merely transfer the problem to a different aspect of self. When a person's belly is empty his overwhelming problem is well defined, and it has a technical solution. But when his belly is full, he may have leisure to pursue a depressing series of thoughts about the significance of his efforts, the meaning of his life. "What are people for," asks one of Kurt Vonnegut's characters just before he commits suicide. Such a question would not occur to someone struggling to live.

My final observation, then, is that technical problems admit of technical solutions, but that these solutions will inevitably produce additional psychological problems—not so much deficit problems as identity problems. When individuals feel an identity problem coming on, they may retreat from it, but only at the cost of creating for themselves living problems of a more technical kind. Thus we see the modern phenomenon of the high level drop-out, the professional man who opts out, chucks it all and joins a rural commune. I do not see that kind of regressive role transformation as a solution to the society's problems, but rather as an indication of the nature of those problems.

As a final note of observation, I must confess that I can see no clearly realizable solution to such problems as overpopulation, pollution, the nuclear arms race, diminution of

national resources, or the less tangible problems of loss of identity and cultural despair. I expect that we will continue to trade these problems for each other. But I am astonished because I remain hopeful about that which I do not see.

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Vision, Faith, and Knowledge

DUNCAN T. HOLLOWOM AND J. HERBERT HOLLOWOM

Abstract—The authors discuss the general relationships between technology and personal and social values. They attempt to stimulate consideration by individuals and societies of the changing judgments and ethics now required both for the engineering profession and individual engineers.

They suggest that values and actions in the social environment are symbolic and that most of our present institutions are responsive to an environment of the rather distant past. Laissez-faire, the Adam Smith "hidden hand," and "caveat emptor" no longer can be the guiding principles of a technology or of an affluent social system.

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to bring about the coordination for which the Hand is unseen (for example, Milton Friedman taxing illusion). The second type of proposal for reform is founded upon the hope that the nature of man can be changed by instituting new economic relationships, and by a system of propaganda which encourages business and technical people to consider their social responsibility. Note that the difference between these two approaches is that the latter asserts that it can be changed by the better

TWO HUNDRED years ago Adam Smith articulated an ingenious explanation to an uncomfortable problem. He theorized that individual economic action taken to maximize personal utility would, through a process of coordination by an "Unseen Hand," lead to a maximization of the collective good. Important as this theory has been in our economic history, it is not clear whether its wide acceptance has been due to its empirical accuracy or to its intellectual comfort. What a reassuring thought it is to consider that the more selfish and narrowminded we are, the more we are furthering the public interest.

Today, in an era of vast corporations, external diseconomies, and a high degree of complexity and interdependency, one might well wonder where our faith in this mystical Unseen Hand has led us. For many of us the peace and comfort of a belief in the universal harmony between

most delightful tourist attractions on earth. The development of Brazil may mean the end of one of the additional luxuries that the technical and economic development of Brazil may mean the end of one of the most delightful tourist attractions on earth. The development of Brazil may mean the end of one of the most delightful tourist attractions on earth. The development of Brazil may mean the end of one of the most delightful tourist attractions on earth.

THE INDIVIDUAL-COMMUNITY VALUE PARADOX

We may now see a relation between the time paradox and the problem which Harbin [4] has aptly called "The tragedy of the commons." Harbin demonstrates that individual producers may inexorably produce collective disaster. As the limits of scarce resources are approached, the mass development and consumption, the paralytic mirage of Adam Smith may turn into a device of mass strangulation.

Obviously, it is in the interests of all of the more than 150 nations on earth to seek technological development. The sharp media act as our missionaries, only they do not reach more effectively. Without question, the underdeveloped nations of the world want what we have; they can see the images of our products and our technologies very clearly. We may suggest a cautionary moral lesson to the effect that our own society is in deep trouble, that the technological problems we have solved have led to their more difficult problems, despite the modest gains to destroy, personal, professional, difficulties. The cautionary moral lesson will have an effect. It is as if the neighboring farmer urges you not to add another cow to your farm because he can afford that a big farm has the one he has bought nothing but headaches.

Our attempts to tell similar nations that they should not develop a market system, in the interests of the community, is of a similar kind. It is obvious that power matters in international relations. If you do not have power you are not getting as much respect as you might if you did have power. Result: it is in the interests of every nation to develop its own capability. Of course, the result is collective disaster.

The point is that it is difficult to get an individual or a collective entity socialized to the interests and values of the competitors, so that when they make decisions, they will

to our restriction for freedom of choice. We will continue to see new inventions which will help us to overcome our present limitations. We will continue to see new inventions which will help us to overcome our present limitations. We will continue to see new inventions which will help us to overcome our present limitations. We will continue to see new inventions which will help us to overcome our present limitations.

THE CHIMERA OF PROGRESS

Both of the preceding arguments may be considered problems of extension. For the first, extending the boundaries of time yields paradoxical transformations of decisions. For the second, extension from the individual to the collectively produces unanticipated transformations. I wish to close by mentioning a third consideration, one that is a problem of intention rather than extension. I refer to the problem of intersubjective value conflict.

While one may not agree with Freud about the intellectual origins of the problem, abundant evidence exists for the proposition that man is at war with himself, that he does not have unconflicted values, that the solution to what he thinks of as his problems only produces other problems. I wish to refer to a quotation from Orwell [9, p. 104] which becomes very well the sort of paradox I have in mind.

If you look into your own mind, which we call the Unseen Hand, you will find that it is a very complex and interdependent system. It is a system of many parts, each of which is in conflict with the others. It is a system of many parts, each of which is in conflict with the others. It is a system of many parts, each of which is in conflict with the others. It is a system of many parts, each of which is in conflict with the others.

If this sort of speculation has merit, and I consider that it does, then it yields an interesting conclusion when we