

Toward an Information-based Theory of Irrational Systems Behavior

SASAN RAHMATIAN and CHARLOTTE HIATT

Department of Information Systems and Decisions Sciences, California State University,
Fresno, CA 93740-0007, U.S.A.

(Received 23 September 1987; in revised form 31 August 1988)

Key words—Bounded rationality; systems behavior; satisficing; assumption; postulate; information; reason; reasoning; attribution.

Abstract—Starting with resistance to change as a real-world, practical ground for understanding the apparent irrationality of human behavior, this paper proceeds to sketch a theory of rationality. Rejecting the logical/linguistic framework of rationality, we adopt the pragmatic/behavioral one instead, and within that framework build a conceptual base. The outline of the theory is embodied in seven fundamental propositions. The highlight of the theory is a postulate stating that all purposeful human behavior is rational. This postulate derives from a theory in which purposeful behavior is conceptually based on three types of assumptions. It is argued that the attribution of irrationality to others is itself a form of purposeful behavior, and therefore assumption-based. The observer's lack of information about the actor's assumptions is viewed as the underlying explanation of his attribution of irrationality to the actor's behavior.

INTRODUCTION

RESEARCH in the areas of organizational and systems behavior indicates that the attitude and behavior of *people* involved in change greatly influence the success or failure of systems and organizations. Block [5] has identified a set of 12 categories into which systems failures can typically be classified; most of these categories involve *people* factors. Therefore, in order to effectively incorporate a new technology into an organization, systems professionals must successfully address certain fundamental human issues. Chief among these is the problem of resistance exhibited by *people* confronted with change.

The classic study of Coch and French [9] sparked an increased interest in, and awareness of, problems related to resistance to change. More recently, Collins and Moores, in their study of microprocessors in the office environment, found that resistance has become a major factor in system-related changes, primarily due to the fact that these changes are occurring ever more rapidly and involve a new stratum of employees [11]. Given the tremendous inter-

est in the psychological processes of change generated recently, it is not surprising that volumes have been written on the topic.

Almost every book on management theory and principles addresses the topics of:

- (1) Common reasons why people resist change.
- (2) How to avoid resistance to change.
- (3) How to manage change.

In the field of organizational development, the term 'change agent' is used to designate a person or group who causes change to happen. Since the implementation of new systems often necessitates change, managers and systems personnel are perceived as the primary agents of change. They are, therefore, primary recipients of overt demonstrations of resistance to change.

The literature relating to resistance to change is too voluminous to be reviewed here. However, despite the diversity of research approaches and results, one specific thread seems to run through the entire literature. The common denominator is that in the attempt to implement new systems, managers and systems people must be able to change employee behavior patterns from resistance to cooperation. Consequently, change agents need to understand the factors that shape human reactions in response to change. At stake is the fundamental question as to whether it is justifiable to attribute irrationality to others when they resist change.

One area in human psychology, attribution theory, attempts to explain 'why' people interpret their environment the way they do. A fundamental principle in attribution theory maintains that people tend to perceive selectively those things that fit most comfortably into their current understanding

of the world [14]. Although extensive research has been done in attribution theory, Jaspers *et al.* [15] claim that Kelley's version of the theory might count as a 'rational' attribution process. In a review of literature on the consequences of attributions, Kelley and Michela [17] observe that attributions affect our feelings about past events and our expectations about future ones, our attitudes toward other people and our reactions to their behavior, and our conceptions of ourselves and our efforts to improve our fortunes.

This paper is an attempt to present a theory of rational behavior which may provide change agents with a unique view of what they may presently perceive as irrational behavior exhibited by people resisting change. The proposed theory goes far beyond resistance to change as its domain of applicability. It is our conviction that the postulate presented towards the end of the paper can assist all those interested in understanding the apparently irrational behavior of other people. Specifically, the proposed theory represents a critique of the theory of bounded rationality advocated by Simon [23]. It is argued that the attribution of bounded rationality to the behavior of other people is usually itself, in an interesting sense to be explicated, an instance of bounded rationality.

LITERATURE REVIEW AND BASIC DEFINITIONS

There are fundamentally two different frameworks within which rationality has been conceptualized. One can be called the 'logical/linguistic' framework, while the other one can be referred to as 'pragmatic/behavioral'.

Within the logical/linguistic framework, compatibility with predefined rules is held to be the overriding criterion for assessing rationality. These predefined rules tend to be, in most cases, 'laws of thought' discussed in classical formal logic. In this view, people are rational to the extent that they are capable of sound deductive and inductive reasoning.

A good example of this concept is the four card experiment [25] in which subjects are presented with four laboratory cards showing 'A', 'D', '4' and '7'. They are told that every card has a letter on one side and a number on the other. They are then presented with the following rule: 'If a card has a vowel on one side, then it has an even number on the other side.' They are asked to identify which of the cards they need to turn over in order to find out whether the above rule is true. The 'right' answer is: cards 'A' and '7'. Any other answer is deemed irrational in that it reveals the subject's failure to under-

stand and apply the classic equivalence-of-contrapositives rule. In other words, anybody who does not recognize that the given rule is logically equivalent to 'If a card has an odd number on one side, then it has a consonant on the other side,' has failed a basic test of rationality. Cohen [10] extends the argument to experiments based on the probabilistic notion of rationality (i.e. maximizing expected relative value) and attacks them on a similar ground. That is to say, it criticizes empirical demonstrations of irrationality coming out of both the logically-rooted and the statistically-rooted concepts of rationality.

It has been cogently argued [10] that cognitive illusions of the type exemplified above are not a reliable foundation for assessing the rationality of human behavior. After all, going back to the experiment discussed above, the rule that contra-positives are equivalent is derived from the truth-table definition of the conditional (If ... then ...) type of statement. It is unreasonable to term a person's lack of agreement (let alone familiarity) with a definition 'irrational'. If anything, this attitude itself smacks of irrationality!

In the logical framework of rationality, the rules against which the compatibility of a behavior is judged need not be rules of logic; they can also be rules and laws developed within the various domains of human activity. Hence we speak of 'technical rationality' when we are interested in evaluating the action under consideration in terms of the dictates of science and technology (whatever we may take those to be!). Likewise, we think of 'social rationality' in terms of conformity to social norms and values, while we conceptualize the 'economic rationality' of an action in terms of whether it is based on some accepted type of cost/benefit calculus. Given the plurality (hence relativity) of all these rules and laws, we again find the logical/linguistic framework wanting. It fails to provide us with a consistent, objective way of assessing human rationality. We therefore proceed to the other framework.

The second framework may be called 'pragmatic/behavioral'. In this view, people are regarded as purposeful systems, in the general sense that they pursue objectives and seek ways of accomplishing them. People are rational, in this context, if their actions are instrumental in enabling them to achieve their desired ends, given their assumptions and pre-suppositions. Due to the emphasis placed on objectives and ends/means linkages, those who are fond of buzzwords may refer to this framework as the 'systems approach' to rationality. While we do not advocate the use of buzzwords, we maintain that there is a significant aura of holism surrounding the theory to be proposed. In order to pursue a formal exposition of our theory, the following definitions

are put forth as the basis for a mutual understanding of the concepts involved.

Definition 1. An *objective* is a future state or situation deemed desirable by a person (or group of people) taking actions in pursuit of it.

Definition 2. An *actor* is a person (or group of people) taking actions in pursuit of an objective.

The above definitions are generally accepted in one form or another. There may be varying opinions with regard to the following definitions.

Definition 3. A *behavior* is said to be *rational* if it is regarded, by the actor, to be the most effective means of reaching the actor's objective(s).

Equivalently,

Definition 4. A *decision* is said to be *rational* if it is considered, by the decision-maker, to be the best alternative for reaching the decision-maker's objective(s).

The above concept of rationality is compatible with many predominant views found in the literature. Kuhn considers a person's behavior rational if 'it is instrumentally directed towards his goals within the context of the situation as he sees it—i.e. if it is based on his images' [18, p. 76]. Thus whether a person's images are 'correct' (whatever that means) is not pertinent to the logic, and thereby the rationality, of the decision. Kuhn uses the term 'opportunity function' to refer to one's perception or image of the situation one is facing. The opportunity function can be viewed as a set of constraints within which a person operates. By extension, if a system is designed to meet certain user specifications (and does so), then the behavior of the system is rational regardless of the particular nature of the specifications.

How can one determine whether one's behavior is instrumental in achieving some end? According to Kuhn [18], as long as a line of action is a preferred alternative and is viewed as possible by the actor, it is deemed rational, even if the actor is mistaken about his opportunities and happens to be unorthodox in his preferences. The optimality of an action ought to be considered in a general 'cost/benefit' context. As Kuhn puts it, 'all costs and all benefits are in the final analysis subjective' [18, p. 86] i.e. only the decision-maker is in a position to assess what constitutes a cost and a benefit.

Argyris [3] also holds that human action is intentionally rational. People apply a 'reasoning process' when they analyze a situation and take subsequent action. This 'reasoning process' refers to the 'premises that people create, the inferences they make from the premises, and the conclusions they reach' [3, p. 41]. In other words, the frame of reference of

the decision-maker must be considered in assessing the rationality of his decision. One must, as Toda and Shuford [24] point out, enter the 'small world' of the decision-maker. For example, a behavior may appear irrational when faulty information causes it to be in error. Both Kuhn and Argyris maintain that, in such a case, we must say that one acted on incorrect information, and therefore made an error; but that the behavior itself was directed towards the desired outcome and was rational in the light of the assumed information. The person may have been misinformed but not irrational.

Simon makes a distinction between subjective and objective rationality. Objective rationality is said to apply if the behavior under consideration 'is the correct behavior for maximizing given values in a given situation' [23, p. 76]. In contrast, subjective rationality is said to be found in a situation if the behavior is the correct behavior for maximizing 'attainment relative to the actual knowledge of the subject' [23, p. 76].

The above distinction between objective and subjective rationality is incompatible with our earlier definitions which insist on considering the rationality of a behavior from the actor's viewpoint. Oddly enough, Simon himself disputes the legitimacy of the above distinction on the ground that 'the notion of objective rationality assumes there is some objective reality in which the (real) alternatives, the (real) consequences, and the (real) utilities exist'. He then goes on to assert that one 'can only speak of rationality relative to a frame of reference; and this frame of reference will be determined by the limitations on the rational man's knowledge' [20, p. 138]. He further states that we may speak of the rationality of the subject relative to the frame of reference of the observer if the subject is (say) a rat and the observer is a human being. Then the person's perception of the situation is objective and the rat's subjective. If, however (he continues), both the subject and the observer are human beings and the situation is a non-artificial one, then it becomes difficult to specify the objective situation. It will be safest, in such situations, to speak of rationality only relative to some specified frame of reference, he concludes. This conclusion, in our opinion, destroys the basis on which the distinction between subjective and objective rationality was drawn in the first place. We take it that Simon's assumption about the validity of the notion of objective rationality (which lies at the foundation of bounded rationality, as will be seen later) is thus contradicted by Simon himself! Stated differently, Simon erected an abstract system, only to deny that it had any concrete reality.

We turn to Kast and Rosenzweig for a last confirmation of our proposed definitions *vis-à-vis* sys-

tems literature. Their concept is very close to ours in that they emphasize the point of view of the decision-maker. They further add that what is good for one individual or group might differ considerably from what is good for some other individuals or groups. What satisfies one decision-maker may not satisfy another. They conclude that 'if we speak of a choice from the point of view of the decision-maker, it may always be rational' [16, p. 387].

The above point that the rationality of an action cannot be assessed in terms of whether others consider the outcome (or even intended outcome) of the action good or bad is very important. Its significance lies in its potential to dissociate ethical behavior from rational behavior. For example, it is not uncommon to hear it being said that what (say) Hitler did was irrational, when the speaker actually meant that what he did was unethical. What Hitler was trying to do may have been irrational, in addition to being certainly unethical. The unethicalness of Hitler's plan had no obvious implication for its irrationality. The unethicalness of Hitler's plan was based on the fundamental principle that human life is sacred and that innocent people should not be massacred. The (ir)rationality of his plan, on the other hand, had to do with whether his strategy was instrumental in helping him reach his objectives. And it was not; although it conceivably could have been. The erroneous association of ethicality and rationality is one of several faulty associations which we will identify and dispel in this paper.

THE OUTLINE OF A THEORY

We are now prepared to infer certain propositions from the above discussion. These propositions will constitute the backbone of the theory to be offered later.

Proposition 1. (Ir)rationality¹ is an attribute of means, not of ends, except insofar as those ends may themselves be means towards higher ends in a hierarchical structure [19].

This proposition, a corollary to Definition 3, is consistent with the position that the rationality of an action cannot be judged with reference to the desirability of the goal sought. In assessing the rationality of a behavior, one must take the desirability of the intended outcome as given (unquestionable), and proceed to only estimate its instrumentality, unless the intended outcome itself has no intrinsic value [22] and is perceived to be only a means of reaching a still higher outcome. Proposition 1 is also supported by Kuhn who asserts that 'the question of rationality cannot be

asked of goals (selector states) but only of means as related to them' [18, p. 75].

Another proposition that can be inferred from the foregoing discussion is:

Proposition 2. (Ir)rationality is an attribute of a system's (or individual's) behavior and not of the system (individual) in general.

The above proposition in effect embodies a 'grammatical' point, suggesting that a specific *behavior* or *decision*, rather than an entire system (or individual), is the appropriate referent of the adjective 'rational'. The only legitimate sense in which we may speak of a 'rational system' is a statistical sense which ought to be explicitly defined and thoroughly justified by the person employing the phrase. For instance, it may be agreed that if more than 95 per cent of an individual's behavior is irrational (however this last term may have been defined), then the individual will be said to be irrational in an unqualified sense.

We now turn to a more explicit analysis of purposeful behavior which is the foundation of human rationality. We begin with three basic definitions.

Definition 5. A *teleological assumption* is one of the form 'it is desirable to produce Y ', where Y is an objective.

Definition 6. A *causal assumption* is one of the form 'under circumstances C_i (action) X will produce (outcome) Y '.

Definition 7. A *factual assumption* is one pertaining to an assumed fact about the way things are and takes the form 'such and such is the case'. It is an assumption to the effect that a certain set of circumstances prevails and must be regarded as true (or given).

A factual assumption may be based on either direct sensory perception ('it is raining') or indirect logical inference ('he must be rich because he wears expensive clothes'). Factual assumptions based on direct sensory perception tend to have a higher probability of being true than those based on indirect logical inference. In either case, they are fact-like statements about an aspect of the world. A factual assumption need not be true to be made. However, it must be believed by the purposeful actor to be true.

The following is an example of how the above types of assumptions work. Suppose a firm has set itself the objective of improving its poor public image. As a course of action, it has chosen to donate generously to the public broadcasting system. The teleological assumption here is that improving its public image is desirable. This assumption may turn out to be false if improving public image is only a means to a higher end (say, to improve its stock

performance) but turns out to be an ineffective one. The firm may succeed in improving its public image but, to its surprise, fail to improve its stock performance. The causal assumption is that the action of donating generously to public broadcasting will indeed improve the corporate image. In reality, this action may even further damage the poor public image if it is perceived as a means of co-opting the public broadcasting system for ill-intentioned motives. Three critical factual assumptions being made here are that the firm has a public image problem in the first place, that the public broadcasting system will accept its donation, and that the firm has the financial strength to donate a large sum to the broadcasting system.

Based on the last three definitions, we offer our next definition.

Definition 8. A system (individual) is said to behave *purposefully* if this behavior is based on the three types of assumptions just discussed, namely teleological, causal, and factual types of assumptions.

It would take additional theoretical work to demonstrate that the concept of purposeful behavior embodied in the above definition is compatible with those generally agreed upon in the literature. Of these, one of the most popular is the one by Rosenbluth and Wiener:

... an object behaves purposefully if it continues to pursue the same goal by changing its behavior as conditions change. [8, p. 33].

This is compatible with our definition in the following way. Setting the goal and stabilizing it over time ties in with the teleological assumption. Changing the behaviour appropriately to ensure that it is in successful pursuit of the goal has to do with the causal type of assumption. Finally, ascertaining that the conditions are changing and determining the specific nature of those changes have to do with the factual assumptions.

We can now synthesize the last four definitions into a single proposition:

Proposition 3. The *logic of purposeful behavior* is:

- (1) Y is desirable to produce (teleological assumption).
- (2) Under circumstances C_i , action X will produce Y (causal assumption).
- (3) Circumstances C_i prevail (factual assumption).

Therefore:

- (4) Action X is desirable to take.

The above proposition does not mention alternative actions (x_1, x_2, \dots). In purposeful behavior, a number of actions may be available to the actor. The transition to rational behavior occurs when the actor perceives one of these actions to be the *most*

effective. (If the actions happen to be equally effective, then they are not really alternative actions in terms of their effectiveness.) Speaking of the 'most' effective action implies that there are degrees of effectiveness. This warrants further exploration.

'Effective' literally means capable of producing an effect. In the context of purposeful behavior, the produced effect must be more than just any effect; it must be an expected, desirable result. Continuing this line of thought, Argyris defines effectiveness as 'the degree to which people produce their intended consequences in ways that make it likely that they will continue to produce intended consequences' [3, p. 83]. In purposeful behavior, more than one action may be minimally effective (acceptable) to qualify for consideration. By contrast, in rational behavior, the actor selects the action considered maximally effective.

Argyris lends support to Proposition 3 when he states that people have intentions about what they are trying to accomplish and that their actions are designed to achieve these desired outcomes [3, p. 41]. Thus, their action, according to our definition, is purposeful. As mentioned earlier, Argyris maintains that people follow a 'reasoning process' when they diagnose situations and act on the basis of them. People design their actions in a given situation with a 'causal microtheory in mind' [3, p. 95].

Reformulating Argyris's view within our framework, we can state that all purposeful actions follow a reasoning process in the following manner:

- (1) People have intentions about what it is they are trying to accomplish; i.e. they take certain states to be desirable to reach (teleological assumption).
- (2) They design actions to achieve the desired outcome, using premises that they have created, the inferences that they have made from the premises, and the conclusions they have reached. In our terms, given their premises about what is real, they assume their actions will produce the desired end (causal assumption).
- (3) They assume that their premises about what is real are true (factual assumptions).

Based on the above three,

- (4) They will act intentionally consistent with the design.

This view has led Argyris to believe that people are fundamentally rational. They are 'rational in the sense that they strive to bring about their intended and designed consequences' [3, p. 96].

We now proceed to the following proposition which is the point at which the proposed theory departs from much of the literature.

Proposition 4. To attribute (ir)rationality to a system's behavior is itself a form of purposeful behavior.

This proposition dispels the myth of the neutrality/objectivity of the observer and helps remind the person that (s)he, too, is operating within a certain frame of reference. A most explicit expression of this idea can be found in Churchman [7, p. 28] where, referring to the famous story about the elephant and the blind men, he states:

What is interesting about this story is not so much the fate of the blind men but the magnificent role that the teller had given himself—namely, the ability to see the whole elephant and consequently observe the ridiculous behavior of the blind systems describers. The story is in fact a piece of arrogance.

It, therefore, follows from Definition 3 and Proposition 4 that:

Proposition 5. The attribution of (ir)rationality to a system's behavior is based on assumptions about the system's assumptions.

More explicitly:

Proposition 5.1. When system O (Observer) attributes (ir)rationality to system A 's (Actor) behavior, this is based on certain teleological/causal/factual assumptions that O has about A 's teleological/causal/factual assumptions.

To illustrate, if A lives one mile from his place of work along a direct route but does not take the direct route to work, then O may term A 's behavior irrational because of the following assumptions that O may have made about A 's assumptions.

(1) O may assume that A 's teleological assumption is that it is desirable to go to work via the shortest route, i.e. that A 's objective is to minimize the distance traveled. In reality, however, A may have as his objective the minimization of the time traveled. The two objectives are not necessarily equivalent.

(2) O may assume that A 's causal assumption is that since the direct route is the shortest, taking it will minimize distance traveled. In reality, however, A may believe that the direct route is under construction and that taking the detour will indeed minimize, rather than maximize, the distance traveled.

(3) O may assume that A 's factual assumption is that such-and-such a route is the shortest. In reality, however, A may not even be aware of the existence of such a route.

What is significant about Proposition 5.1 is that it points out that O himself operates within a specific framework and, as such, is guided by his own teleological, causal, and factual assumptions. In other

words, O can never be a totally impartial, objective, and omniscient observer no matter how strongly he believes he is or how hard he tries to be.

Another way of looking at a person's perception of another system's behavior is stated as follows:

Proposition 6. The attribution of irrationality to a system's behavior is symptomatic of *either*: the use of a concept of rationality different from the one embodied in Definitions 3 and 4; *or*: the lack of some critical information about the system.

An expanded version of the above proposition is:

Proposition 6.1. When system O (Observer) attributes irrationality to system A 's behavior, it is invariably the case that *either*: O is using a concept of rationality different from the one presented in Definitions 3 and 4; *or*: O is making incorrect assumptions about at least one of the following: A 's teleological, causal, or factual assumptions.

With the observer's assumptions joining the actor's assumptions as the legitimate domain of analysis and questioning, we move towards a more holistic view of rationality. It is in this sense that we believe our proposed theory is systemic in nature. Proposition 6 also justifies the title of the paper in terms of its emphasis on the proposed view being information-based. Rationality is not only an attribute of an action; it is also an attribute of the observer's information (or lack thereof) about the actor's assumptions.

At this juncture, we can turn to the theory of bounded rationality and explicitly relate it to our own. The boundedness of human rationality is generally believed to derive from one or more of the following [23]:

- (a) limitations with respect to knowledge of alternative courses of action;
- (b) limitations with respect to knowledge of the relative utilities of these alternatives; and
- (c) limitations with respect to knowledge of the consequences of these courses of action.

The fact that such limitations exist in reality cannot be denied. The existence of such practical constraints, which amounts to the lack of omniscience on the part of humans, is a trivially true fact.

We believe the nontrivial question to be: to what extent does the decision-maker cope with such constraints in terms of his own objectives? For instance, take the limitations with respect to knowledge of alternative courses of action. Surely one can spend more time and effort generating a larger number of alternatives. However, the question invariably arises: is the cost of searching for a superior course of action lower or higher than the expected marginal

benefit? To the extent that the cost of searching for a better alternative is perceived by the decision maker to be not worth the extra benefit, the decision-maker would lose the incentive to search for the superior course of action.

If anything, it would indeed be *irrational* to generate a larger number of alternative courses of action under such circumstances! But the observer will fail to reach this conclusion if *he* is bounded by his own assumptions about the decision-maker's objectives. For instance, a deadline may be an externally imposed *constraint*. However, trying to meet the deadline would be an *objective*. One may desire to meet a deadline for a variety of possible reasons: to keep one's job, to impress one's associates, to satisfy one's own ego, etc. And these *are* objectives. The observer, being bounded in insight, would then construe the decision-maker's behavior (in adopting the first acceptable course of action that helps him meet the deadline) as 'satisficing' behavior (Simon's term), not realizing that it is indeed optimizing behavior when viewed in the context of the objective of meeting the deadline.

Or take the more-or-less common experience of shopping for a car. Surely one can spend an indefinite amount of time looking for a better and better car. But this time and effort would prevent the decision-maker from pursuing other objectives which may be more important than 'to buy the perfect car'. We conclude that:

The observer's failure to comprehend the full variety of objectives pursued by the decision-maker, coupled with his ignorance of the relative value (attractiveness) of those objectives to the decision-maker, prevent the observer from seeing the bounded optimization of the decision-maker's behavior, causing him instead to mistakenly interpret the decision-maker's behavior as satisficing.

The only explicit reference to this point which we are aware of can be found in a short footnote in [26, p. 65]. Another view of bounded rationality would be to tie it in with degrees of effectiveness of alternative courses of action. Since degrees of effectiveness seem to correlate with degrees of rationality, a continuum of rationality emerges in which bounded rationality can find a place. This view is acceptable as long as it does not jeopardize the notion that rational behavior has to do with the *most* effective action as perceived by the actor.

So far we have been criticizing the view of bounded rationality in terms of its internal logic. Perhaps an equally convincing critique can be based on pragmatic considerations, to which we now turn.

When the observer attributes less-than-fully-rational behavior to the actor, this is based on two elements. The first element—which we have been

emphasizing so far—has to do with certain misconceptions that the observer may have about the actor. However, a second condition must also be fulfilled, namely the observer's ignorance of his own boundedness and his subsequent (though misguided) insistence on having perfect information about the actor's teleological, causal and factual assumptions. To the extent that the observer becomes aware of, and admits, his own boundedness, he will begin to give the actor the benefit of the doubt and seek additional information about the actor's assumptions. In this light, the principle of human rationality would gain the epistemological status of a postulate. Certain scholars [19, p. 50] have presented rationality as a tautological axiom. However, we present it here as a behavioral postulate.

Consider first, the following:

Definition 7. A *postulate* is a general proposition that can be neither confirmed nor disconfirmed empirically but which is held true because of some interesting and useful consequences that may follow from it.

Perhaps the most well-known postulate in science is the principle of conservation of energy. The discovery of the anti-neutrino illustrates the postulational nature of this principle. It was once thought that a neutron disintegrates into a proton plus an electron. But the energies of the proton and the electron do not add up to that of the disintegrating neutron. It may thus be tempting to reject the principle of conservation of energy. Instead, physicists treated it as a postulate and wondered what interesting and useful consequences would follow in the face of this empirical anomaly. They, therefore, postulated the existence of a third particle coming out of the disintegration process, namely the 'anti-neutrino'. The existence of this postulated particle was later demonstrated empirically. In the same spirit, we advance the following postulate:

Postulate. All purposeful human behavior is rational.

The above postulate can be very helpful in administrative decision-making. For instance, in managing a business enterprise, it can make the difference between survival and failure. Peter Drucker elaborates on one of the implications of this postulate when he admonishes that 'the first rule is that there are no irrational customers' [12, p. 83]. Confronted with the apparent irrationality of the customer (the decision-maker) in terms of (say) his purchasing behavior, the manager (observer) has a choice: *either* to regard his own information as complete and thus label the customer's behavior

'irrational', or to realize that 'customers almost without exception behave rationally in terms of their own realities and their own situation' [12, p. 83]. Following the second path may have useful consequences for the manager. He may, for instance, find out upon further investigation that a recent entrant into the market is offering the same product at a lower price, or that the quality-control function in his firm has been slipping recently, or that an entirely new substitute product is dominating the market, etc. These are useful discoveries, in the sense that they tend to open lines of communication between the firm and the customer, allowing the former to adopt appropriate strategic responses, while enabling the latter to be served more effectively. On the other hand, regarding the customer as irrational would have immediately closed the door to true understanding, preventing the firm from engaging in constructive problem-solving.

As another example, take an innovator who has discovered a low-cost method of manufacturing a product. His low cost would allow him to sell the product at a price substantially lower than that of the competition. He, therefore, goes ahead and starts manufacturing and marketing the product. However, it turns out that sales are disappointing. Why? Because of the 'irrationality' of the customers who believe price and quality are correlated: if it is cheap in price, it must also be cheap in quality. This hypothesis may not be totally unfounded. But, regardless of its truth or falsity in reality, the hypothesis is at work to hurt the above business. Therefore, what the innovator ought to do is to acknowledge its existence and to find ways of breaking up the psychological correlation between price and quality by (say) pursuing an advertizing campaign which gives the customer a glimpse into the low-cost method of production. Or accept the correlation and jack up the price!

As a third example of the pragmatic implications of this postulate, we turn to Ackoff's experience with family planning in India [2, p. 33]. Rather than regard as irrational those Indian families who had or wanted to have a large family, he decided to regard them as rational and discover the real reason behind their behavior. In the spirit of a postulate, Ackoff (in reference to the explanation of large Indian families in terms of their rationality) states that 'such an explanation of their failure yielded no ideas about how to increase effectiveness' [2, p. 34]. Looking for rational reasons behind the lack of 'family planning' in India, he discovered that large families provide Indians with a form of unemployment insurance or old-age security. This discovery made him reach a conclusion which is really the fundamental thesis of this paper, namely,

'Irrationality is usually in the mind of the beholder, not in the mind of the beheld' [2, p. 35].

The following proposition summarizes the main theme of this paper:

Proposition 7. To postulate apparently irrational behavior as rational tends to reveal unexpected but useful assumptions on which the actor's behavior is based, namely assumptions of at least one of the following types: teleological, causal, and factual.

REFLECTIONS ON THE PROPOSED THEORY

The Oxford English Dictionary identifies 'reason' as the root of 'rational'. Specifically, it defines 'rational' as 'having the faculty of reasoning; endowed with reason'. We believe equating 'having the faculty of reasoning' with 'endowed with reason' is misleading. It is precisely this equation, often made tacitly, which is partially responsible for creating the view of rationality which we have rejected in this paper. Let us pursue this in more detail.

Reason is different from reasoning. Reason is teleological; reasoning is ateleological. They both have to do with answers to the most fundamental questions humans can ask, namely, 'Why?' But this is where the similarity ends. Reason takes a behavior and interprets the 'why?' behind it as 'towards what objective?' For example, 'why did she scream?' can be formulated teleologically as 'what was her objective in screaming?' A possible answer would be, 'because she wanted to attract the attention of others to herself'. The same question ('why did she scream?') is also amenable to an ateleological explanation. This time, not believing in purposes or objectives, the question must be seen from an external view. This means the *observer's* reasoning about the behavior is all that counts. And this reasoning takes the form of 'in conformity to what rule?' Recall that 'rational' can also mean rule-based. So in this interpretation, the screaming of the person can be explained through the following reasoning (or rule): she screamed because she is a redhead and all redheads are hot-tempered. Note the absence of any trace of purpose in this explanation. In its place, we see a strong reference to a law-like rule ('all redheads are hot-tempered').

The above distinction between reason (the teleological sense of 'why?') and reasoning (the ateleological sense of 'why?') has an important implication for rationality. To believe in reason (in the sense defined) leads one to the view espoused in this paper. As a postulate, there is always a reason behind one's behavior, even if oneself happens to be unaware of it. Science needs optimism (that there

IS an answer) in order to make progress. As such, this postulate exemplifies the optimism that fuels the progress of science and prevents it from reaching a dead end.

A fascinating case in point is the invention of the concept of masochism. Rather than view a particular class of behaviors as irrational, psychologists posited the desire (objective) to inflict pain upon oneself in those who exhibit that type of behavior. This demonstrates that the concept of rationality is worth saving even at the expense of inventing such a contrary-to-common-sense construct.

Another fascinating case in point has to do with the invention of the concept of the unconscious. In terms of our framework, unconscious processes are explainable as a special case of attribution, i.e. *self-attribution*. The actor, reflecting (at time t_2) on his past behavior realizes that the 'true' motive behind his action (at time t_1) was not what he thought it was at time t_1 . Rather, the 'real' motive, hidden at time t_1 , was something else. No matter which one is the true motive, the point is that the actor always *looks back* and attributes a different motive to his past behavior. Conceptually, this is not different from somebody else making that attribution. In fact, this attribution *does* classically begin as a suggestion by that other somebody else: the psychoanalyst.

Saving rationality from an unfair and immature demise can have the advantage of forcing one to look for a more accurate word any time one is tempted to use 'irrational' due to one's intellectual laziness. Many times, when we rush into describing a behavior as 'irrational', we may find ourselves better served by using one of the words from the following list: unrealistic, emotional, naive, complex, different, absurd, etc. To this list also belongs 'unethical' which we covered earlier. Three pseudo-synonyms of irrational are of special interest to us: misinformed, mistaken, misguided.

Recall that purposeful behavior is based on three types of assumptions: factual, causal, and teleological. If a person is misinformed about something, then he is holding factual assumptions which are false. Under such circumstances, it would be inappropriate to label that behavior 'irrational'. Instead, 'misinformed' is much more accurate and to the point.

Now consider purposeful behavior failing due to wrong causal assumptions. For instance, consider a child who believes that crying a lot will cause others to regard him in a more sympathetic light and make them do what he wishes done. This belief may be totally rooted in his experience if his parents turn out to have complied with his wish every time he cried. So within his family environment, the crying behavior is completely rational. Now suppose

the child goes to a different environment (let us say school) where there is more discipline. For the first few times that he purposefully cries in this new environment, he is not going to get what he wants. But does that mean his behavior is 'irrational'? Not if his 'batting average' (so to speak) at home is taken into account. After all, how should he have known that the new environment was different in that it no longer held the causal linkage between crying and satisfaction as sacred? In this new environment he is going to wake up to the absence of such causality. Sooner or later he is going to see that his belief in the universal truth of his causal law was mistaken. Hence we propose 'mistaken' as an appropriate substitute for 'irrational' when the causal assumption is at fault.

Finally, we suggest that 'misguided' be used instead of 'irrational' when the teleological assumption is in question. We feel 'misguided' is appropriate because 'guided' means 'directed' (as in 'guided missile'), and a teleological assumption goes wrong when the person involved moves in the wrong direction towards the wrong goal.

We are thus committed to the position that although human behavior is never irrational, it may frequently be misinformed, mistaken, or misguided. To regard this as a mere play on words is to perpetuate the misinformed, mistaken, or misguided tendency of hurriedly labeling an action 'irrational' when there may in fact exist a perfectly good reason for it!

To show an application of the proposed theory, we are going to briefly discuss an example which integrates the suggested propositions in the context of a common real-world experience, namely smoking. Many people regard smoking as irrational behavior, as it causes lung cancer. Our theory suggests that the observers' (those who call smoking irrational) assumptions, if articulated, may turn out to be the opposite of those held by the actors (the smokers). Let us first focus on the observers and their assumptions.

- (1) Even if it is given that smoking 'causes' lung cancer, the observer's teleological assumption is that living a long life (without smoking) is more desirable than a shorter life with smoking.
- (2) The observer's causal assumption is that smoking causes cancer. There are of course different concepts of causality. But for the above assumption to be valid in any scientific sense, it is necessary that statistics reveal that all those who smoke are, sooner or later (say within a specified time period) afflicted with lung cancer.
- (3) The observer is making a number of factual assumptions, the most important of which is that the smoker is aware of, and believes in, the cancer statistics.

Now let us look at the smoker's assumptions.

- (1) The teleological assumption held by the smoker may be that living a short but pleasurable life is better than a long but boring one.
- (2) The smoker's 'causal microtheory' may be one that rejects the 100 per cent link between smoking and cancer. This may be based on the smoker's personal familiarity with a number of heavy smokers who lived long and good lives. He may have more faith in what his own eyes see than in reports produced by 'a bunch of scientists'.
- (3) In terms of factual assumptions, the smoker may not even be aware of scientific reports linking smoking to cancer. Or, if he is aware of them, he may believe that the statistical reports are tampered with for political reasons. This belief may in turn be based on a number of statistical reports which he personally knows are politically motivated. Or he may even question the statistical or methodological foundations of those reports.

With the actor holding ANY ONE of the above three types of assumptions, his behavior becomes rational. With his belief in all three, rationality becomes triply apparent. The above analysis does not of course take into account the social dimensions of smoking. With new elements entering the picture, all the assumptions are likely to change.

CONCLUSION

The alternative view of human rationality proposed in this paper presents a formalized, yet pragmatic, approach to a fundamental aspect of human behavior. We began by introducing resistance to change as a practical ground upon which to construct our theory. The resistance to change witnessed by change agents (especially by system designers and implementers) is a primary factor for inducing them to attribute irrationality to the behavior of others. When faced with the inevitability of implementing change, systems professionals must not only develop the skills to educate users but, as Argyris [4] urges, their 'competence ... in dealing with emotionality and strain in interpersonal and intergroup problems must be raised'. Strategies aimed at achieving fundamental change must include more than just diplomacy. They must also involve a deep understanding of human behavior. In the education of systems professionals, there should be the same emphasis on psychology as there currently is on technology. In the words of a leading systems educator, 'while the dramatic and rapid developments

in technology require an inordinate amount of attention from the analyst, these developments have also resulted in a greater need to pay attention to the human element of systems work' [6]. We hope this paper has been a small step in fulfilling that need. An explicit and detailed application of the proposed theory to the problems of resistance to change in organizations would clearly go beyond the scope of this paper and require another paper of equal length.

REFERENCES

1. R. L. Ackoff and F. Emery, *On Purposeful Systems*. Aldine Atherton, Chicago, IL (1972).
2. R. L. Ackoff, *The Art of Problem Solving*. Wiley, New York (1978).
3. C. Argyris, *Reasoning, Learning and Action: Individual and Organizational*. Jossey-Bass, San Francisco, CA (1982).
4. C. Argyris, MIS: The challenge of rationality and emotionality. *Mgt Sci.* February (1971), B275-B292.
5. R. Block, *The Politics of Projects*. Yourdon, New York (1983).
6. J. G. Burch et al., *Information Systems: Theory and Practice*. Wiley, New York (1983).
7. C. W. Churchman, *The Systems Approach*. Dell Publishing, New York (1968).
8. C. W. Churchman and R. L. Ackoff, Purposive behavior and cybernetics. *Social Forces* 29 (1950), 32-39.
9. L. Coch and J. R. P. French, Overcoming resistance to change. *Hum. Relat.* 1 (1948), 512-532.
10. L. J. Cohen, Can human irrationality be experimentally demonstrated? *Behav. Brain Sci.* 4 (1981).
11. F. Collins and T. Moores, Microprocessors in the office: a study of resistance to change. *J. Syst. Mgt* November (1983), 17-21.
12. P. Drucker, *Management: Tasks, Responsibilities, Practices*. Harper & Row, New York (1974).
13. J. H. Harvey and G. Weary, Current issues in attitude theory and research. *A. Rev. Psychol.* 35 (1984).
14. D. Hellriegel et al., *Organizational Behavior*. West Publishing, St. Paul, MN (1986).
15. J. Jaspers, M. Hewstone and F. D. Fincham, *Attribution Theory and Research*. Academic Press, New York (1983).
16. F. E. Kast and J. E. Rosenzweig, *Organization and Management: A Systems and Contingency Approach*. McGraw-Hill, New York (1979).
17. H. H. Kelley and J. L. Michela, Attribution theory and research. In M. R. Rosenzweig and L. M. Porter (eds.) *A. Rev. Psychol.* 31, Annual Reviews Inc., Palo Alto, CA (1980).
18. A. Kuhn, *Unified Social Science: A System-Based Introduction*. Dorsey Press, New York (1975).
19. R. D. Luce and H. Raiffa, *Games and Decisions*. Wiley, New York (1957).
20. J. A. March and H. A. Simon. *Organizations*. Wiley, New York (1963).
21. O. D. Resources. In R. H. Sprague and B. C. McNurlin (eds.), *Information Systems and Management in Practice*, pp. 429-431. Prentice-Hall, Englewood Cliffs, NJ (1986).
22. S. Rahmatian, The hierarchy of objectives: toward an integrating construct in systems science. *Syst. Res.* 2 (1985), 237-245.
23. H. A. Simon, *Administrative Behavior*. Macmillan, New York (1976).
24. M. Toda and E. H. Shuford, Utility, induced utilities, and small worlds. *Behav. Sci.* 10 (1965), 238-254.
25. P. C. Wason, Reasoning. In B. Foss (ed.), *New Horizons in Psychology*. Penguin, New York (1966).
26. M. Zeleny, *Multiple Criteria Decision Making*. McGraw-Hill, New York (1982).