Decision Making and the Study of Social Process

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Within the limits set by structural arrangements and by institutions, individuals choose their course of action. Anthropologists have always been interested in the outcome of these choices either because they reflect ongoing change or because they elucidate interrelations between institutions. In order for decision-making analysis to be more than anecdotal, however, it needs to be guided by a set of assumptions concerning reasoning and cognitive processes, and the conditions germane to them. Economists, sociologists, psychologists, philosophers and mathematicians have already outlined many useful assumptions. Part of our task in this paper is to contribute to a systematization of those assumptions that are most relevant to anthropological interests. We also discuss the advantages and limitations of decision analysis for social anthropology, examine the theoretical and methodological implications of "rationality," and present a sequence of hypothetical steps that we regard as requisites for an adequate decision-making analysis.

Introduction

In recent years a number of anthropologists have turned to decision-making analysis as a way of illuminating the social dynamics of the people they have studied. Although the decision approach in anthropology is not new, having somewhat independent roots in the work of Firth (1956) and Goodenough (1951), it is our belief that the implications of the approach for theory in social anthropology have yet to be fully explored. In this paper we attempt to examine decision-making analysis in terms of its advantages and limitations, and the role that it may play in furthering social theory. We also present our understanding of the logic of the approach and some examples of its application to field data.

It may be well to begin by stating what decision-making analysis, as used in this article, is not: it is not a theory either of society or of human behaviour, although it is based on assumptions regarding human behaviour. Rather it is a conceptual frame of reference with specific methodological implications. Theory enters at the level of specific decisions, i.e., why certain possibilities are chosen rather than others. We may develop a wide range of theories to account for why the people in a given community choose viri-local residence more frequently than other options, decide to sell their goods in one market rather than

another, or select certain people to work with. The hypotheses we generate may come from structural-functional, rationalistic, psychological or other theory, depending on the taste of the analyst. This is in fact one of the strengths of the approach. It invites a wide variety of explanations, and providing the data is adequate, allows each to be tested for its power in accounting for the distribution of observed choices. Although this may not be conducive to grandiose theorizing it allows the possibility of empirically testing hypotheses which are too often perpetuated without being required to demonstrate their merit.

Another advanatage of decision-making analysis is the degree to which it permits the investigation of social processes and social change. In this regard, some advocates of the approach have placed it in opposition to more static approaches, such as structuralism—an opposition we believe to be unnecessary. At most decision-making analysis is a supplement to and refinement of structural analysis. The latter allows us to formalize certain principles of organization, principles which are major ingredients in many or most socially significant decisions. But although structural analysis is important, it need not conclude the analytical process. Even isolated systems are constantly changing, both as the result of ecological pressures and internal dynamics. As long as the change is slow the structural-functional concept of equilibrium is not without utility, as Gluckman points out in a recent article (1968); but we cannot totally dismiss the accusation of some commentators that the structural-functional emphasis on equilibrium is politically loaded towards maintaining the status-quo in developing countries (Social Responsibilities Symposium, 1968). Basically, structural models are representations of jural norms, or normative behaviour, or a combination of the two. They are designed to describe the rules of a society at a given point in time, and they focus upon generalities and consistencies rather than the range of variation encountered. For understanding the latter statistical models are more useful, as Levi-Strauss, Fortes, Leach, Murdock and others have pointed out. Statistical models describe what people do, and if fully developed describe not only the range of behaviour but the frequency of each type. But they, too, are limited and the frequencies do not in and of themselves explain or account for behavioural variability or predict patterns of change. At best they can be used as indicators.

Firth long ago pointed out the advantages of attacking the problem of social change by conceiving of behaviour (i.e., social organization) as the cumulative outcome of individual choices. Within this framework social change is perceived as the result of factors which affect choice patterns either by making some opportunities less attractive than others, or by introducing a new range of opportunities.[1] There is no reason why this approach need be limited to the study of social change. It is equally applicable to the analysis of the ongoing social process, including the processes that maintain the viability of institutions. If we wish to understand the effectiveness (or efficiency) of specific institutions we can go a long way toward attaining this goal by approaching it form the standpoint of accumulated individual decisions. The same is true if we are merely asking why a particular pattern of behaviour persists. Thus by examining the considerations that lead individuals to behave in conformity with institutional requirements (to make conforming decisions) and contrasting those that precede deviant behaviour (non-conforming decisions), we may gain valuable insight into the factors which support institutional structures.

The essential point about decision-making analysis is not, therefore, that it is better for either diachronic or synchronic analysis, but that it avoids the problem of dichotomization posed by stability and change. It forces us to focus on all the essential factors that influence particular decisions, and from this base we can add a temporal dimension (by looking at changes in decision outcomes through time) or not, depending on the problem we are investigating.

In actual fact a number of anthoropologists have studied institutional behaviour by analyzing decisions. Certainly many of the economic and legal studies begin from such a stand-

point, but all too frequently the underlying assumptions remain implicit. It almost seems that anthropologists, in contrast to economists, political scientists, sociologists and psychologists, loathe to examine the methodological premises that underlie their collection and analysis of data. In part this reflects, in our opinion, a continued resistance by the majority of anthropologists to quantification beyond a rather simple statistical level. But while it is true that much of our data and key concepts do not lend themselves readily to quantification, we cannot ignore the consequences of personalized and often erratic methodology. Whatever approach we use, we ought to be committed to such fundamental methodological principles as reporting all observed cases of the phenomena in which we are interested, including those which are contrary to our generalizations; the exploration of possible alternative explanations; and so on. These principles need not be elaborated upon--they can be found in any elementary discussion of the scientific method.

Perhaps we are belaboring the obvious, but all too frequently ethnographic generalizations are built upon an undifferentiated hodgepodge of behavioural observations, informants' statements about what is and ought to be, and the analyst's own theories about the way things should be. One of the great strengths of decision-making analysis is that it helps to differentiate and relate these disparate sources of information. Decisions are, first and foremost, a form of behaviour. Ideational factors, such as norms, beliefs, values, etc., are then seen as hypothetical determinants of behaviour (making a decision), but their power as variables is an empirical issue. We can learn a great deal more about both behaviour and the ideational order if we clearly differentiate them first and then attempt to relate them systematically. The question of how much people's behaviour (i.e., decisions) corresponds to institutionalized values and norms is critical for an understanding of both social dynamics and social change. Isomorphism of norms and behaviour ought never to be taken for granted.

One of the characteristics of decision-making analysis that renders it somewhat controversial is that it is ego-oriented; it begins from the viewpoint of the actor. Proponents of the structural view, and others who prefer the perspective of the "outsider," seem to find this a decisive limitation. However, we do not believe that these viewpoints need to be mutually exclusive. Although decision-making analysis begins from an actor's viewpoint, the data it yields can be used in a wide range of theoretical models, including those which take the outsider's perspective. Its very advantage, in fact, is that it permits a great deal of interpretive refinement, from close-grained micro-analysis to broad level macro-theory. For example, by closely analyzing the factors which a farmer takes into account in planting, harvesting and selling his crops we not only gain insight into his cultural view, but gain valuable clues as to the ecological determinants of his behaviour. Even though the farmer's view may be incomplete, perhaps even erroneous in some respects, to ignore the systematic influences on his decisions is shortsighted indeed.

It should also be understood, in clarification, that although decision-making analysis is ego-oriented it is not confined to the actor's *conscious* perceptions. Just as individuals are not normally aware of the principles that pattern their speech, they are frequently unaware of the factors which influence their decisions. The job of the analyst does not stop, therefore, with his informants' statements about why they chose *a* rather than *b* or *c*. His purpose is to account for as much of the observed variance in behaviour as possible; to account for the distribution of decisions. To do this he may have to take into account factors which appear to influence decisions without the awareness of his subjects. The man who holds a feast only because "he feels like it," may do so with high frequency every time his status has been publicly threatened. Such influences are a valid part of any decision-making analysis. We would like to stress that this is not a matter of imputing motives but of postulating factors which affect decisions. In this sense it is no different from postulating functions and relationships, none of which can in fact be observed; yet theory rests on such postulates.

Among the more persuasive arguments for the decision-making research strategy is that it provides a channel into a wide body of theory which has been developed in related disciplines. For some time the fields of economics and political science have been particularly active in this respect, and have generated some sound and many provocative generalizations which may well prove useful in building more sophisticated anthropological theories. More recently sociologists and psychologists have added new dimensions and perspectives. There is no reason to think that anthropologists cannot do likewise. They would then not only benefit from others' research but would contribute to the development of genuinely universal models of human behaviour. The fact that these diverse disciplines, each with their own theoretical concerns, find substance in decision-making analysis should in itself commend the approach to anthropology.

Limitations

Like any other approach, decision-making analysis has its limitations and creates problems as well as solves them. Although the fundamentals of the approach are hypothetically applicable to a wide variety of behavioural forms, inasmuch as most actions imply alternatives (if only in the form of not doing it), in actual practice it is difficult and impractical to subject many kinds of behaviour to decision analysis. Conditioned behaviour and behaviour which forms an integral part of a continuous stream, such as friendly encounters between intimates, cannot readily be cast into a decision framework. Behaviour which is not particularly dependent on stable characteristics may be too complex to be analyzed as decision outcomes (see Foldes 1968). The approach is far better suited to instances in which the behavioural alternatives are clear-cut and discrete, such as choice of residence, the day on which to plant or to hold a feast, etc. However, there is a large body of intermediate forms of behaviour, not ordinarily thought of as decisions, that lend themselves very nicely to such an approach. For example, many events which involve sequences, such as ceremonies, may be looked at as a series of contingent decisions in which antecedent outcomes affect the possibility of subsequent outcomes. Political meetings, social control processes, legal procedures and economic cycles, are only few of the examples of such intermediate forms (see section on strategy below).

Perhaps a more stringent limitation of the approach is the sheer quantity of data that it calls for. Critics frequently point out that a field worker may have to collect so much information in order to do an adequate job on only a few decisions that he would of necessity have to neglect many other important areas, and might possibly lose the broader perspective offered by less precise, but more holistic, approaches. This is a genuine problem, and one that is not easily countered. Limitations of time and resources are very real considerations in the logistics of research endeavour. Nevertheless the problem need not be as acute as it appears at first sight. It is true that in order to do an adequate job we must collect a substantial number of well documented cases, but we need not observe every case. For most purposes a judiciously chosen sample will do. Furthermore, once we have mapped out a decision domain it is often not difficult to train an assistant to collect relevant data on pertinent cases, leaving the anthropologist free to do other things. Another strategy is to concentrate on an aspect of behaviour that involves essentially the same decision-making principles. Economy can also be attained by focusing on multi-purpose data such as full demographic information on a broad segment of the population (for use of such data in decision analysis, see Howard 1970). The important consideration is not that investigation be exhaustive, but that one knows just how much variance can be accounted for; how well the analysis predicts (or retrodicts) the distribution of observed cases. An investigator may be able to account for, let us say, 40 % of the observed instances and decide that the investment of energy

required to increase accuracy is not worth the effort; or he may find his model scores 80 % and decide to press on, depending on the interest and importance of the behaviour involved.

The criticism that focusing upon a limited body of specialized material may be at the expence of a broader perspective is less true today than in the past. An increasing number of students are going to previously studied societies, and enter the field with their predecessors' broad perspectives behind them; they therefore are free to concentrate more specifically on areas of special interest. When one also considers the dramatic increase in anthropological trainees, not only the desirability but the necessity for more focused research becomes apparent. Coming generations of anthropologists can be expected to develop greater methodological and theoretical sophistication along with increased specialization. Decision analysis may help provide a bridge.

Having outlined the relationship of decision-making analysis to anthropological theory in general, we shall now review some of the main features and basic logic of the approach.

Conditions for Rationality

Let us return to what we mean by a decision. Primarily, a decision is an act of behaviour which occurs within a context that could be described as a "state of nature." By this we mean to include a number of events, some outside the domain of human control, others the product of individual and collective behaviour. Although human actions frequently elicit actions from others, or otherwise are productive of changes in the social or physical environment, it does not necessarily follow that this is inevitably true. An action may be directed toward preventing changes as well as eliciting them. It likewise does not follow that only human actions induce changes, for some aspects of human systems may respond to non-human influences (e.g., crop failure).

Decisions can be studied from the standpoint of how they affect the behaviour of persons other than the decision-maker, or by focusing on one individual, we can study how the "state of nature" affects his decisions. The former approach is associated with game theory and the latter with formal decision theory. Game theory is a more useful approach in the analysis of competitive situations since it focuses upon the interaction of two or more actors. Decision analysis, in contrast, takes into consideration the actions of individuals other than the decision-maker only inasmuch as they affect his choices. From his perspective, their behaviour is part of the "state of nature".

As behavioural outcomes, decisions depend upon antecedent conditions, the first of which is opportunity, i.e., a situation in which options exist. Here it is useful to distinguish between the viewpoint of the actor and that of the investigator, for the latter may perceive opportunities that are not seen by the former. In our opinion it is wise for the investigator to begin by mapping out all the opportunities of which he can conceive in a given domain of activity, whether or not they are recognized as possible choices by the actor. This may then lead him to ask why certain possibilities are not recognized - - potentially a very useful point to begin explanatory exercises.

A second antecedent condition is the value attached to each opportunity, as perceived by the actor. Here it may be useful to distinguish values within the decision framework from its association with goal-oriented approaches. The perspective of human behaviour as goal oriented relates individual, and at times collective, action to particular end states, whether or not these are conscious. Values are generally seen as being synonymous with goals or as variables leading to the selection of certain paths to one goal rather than others. It is therefore nearly synonymous with *motivation*. Although this approach may be useful in accounting for the behaviour of individuals *qua* individuals, or among groups whose behaviour variability is so limited that we are justified in assuming motivational uniformity,

it provides too simple a model for most social groups. Herein lies the failure of culture and personality studies based on assumptions of motivational uniformity - - they cannot cope with the variability which is such a striking feature of even the simplest society (see Wallace 1961). From the decision-making point of view values are seen not only as internalized motivating forces, but also as preferences subject to situational variables. Used this way the concept allows us to search for situationally determined regularities within the variation of intragroup behaviour. In the case of rational behaviour, values provide a basis for determining the implications of all competing opportunities, so that the most desirable choice can be made.

Not all acts of behaviour are carefully reasoned in terms of their implications. A good many in fact may be impetuous responses to immediate stimuli and without regard for relative values, alternative means and the range of expectations. This distinction between carefully reasoned, or "rational" decisions and those which are not, is of considerable importance and cannot be glossed over, for they have very different theoretical implications. To treat all decisions "as if" they were rational (as economists often do) is to distort empirical reality to an extent we cannot afford. It is therefore imperative that we specify the conditions under which a decision may suitably be labeled "rational". Minimally these are as follows:

1. The individual must be free to act and must not be obliged to follow a particular course of action. This does not mean that there must be no restrictions whatsoever but that he is permitted a range of possibilitis (minimally two) from which to choose. When an individual is completely under the authority of someone lse his choices cannot be considered "rational", unless of course he is granted the freedom to choose by those who control his actions.

2. More than one possibility must be perceived by the actor, each being distinct from the other. Here again it is important to distinguish between the perception of an investigator and that of the actor. If we do not know whether an actor perceives at least two options we have no grounds to infer rationality.

3. The actor must be able to conceptualize not only the possibilities open to him, but the probabilities associated with each one as well. Probabilities need not be objective statistical probabilities; they may be subjective estimates[2]. He must, therefore, have access to information concerning previous outcomes, either on the basis of his own experience or that of others. When probabilities are difficult to estimate either objectively or subjectively, the decision-maker may find it impossible to choose rationally. Contrariwise, the greater the certainty of particular outcomes the easier it is to make a rational choice and the more likely a person is to show confidence in his choice. This does not imply that certainty is a necessary indicator of rationality. Even under conditions of considerable uncertainty choices may be rational; in fact, creative choices, such as those made by successful entrepreneurs, are often made under conditions of uncertainty (Shackles, 1949, 1966). However, in situations of *complete* uncertainty, it does not make sense to label decisions as rational, even though the decision-maker is perfectly lucid about the situation confronting him. Such decisions invariably have the quality of gambles. In this respect rational decision-making depends upon both cultural accumulation of knowledge and individual experience. Because complete certainty is not a necessary requirement of rationality, decision-models are well suited for studying evolutionary social change, provided that possible outcomes can be formulated by the actors; but when confronted with sudden and revolutionary changes, an individual may find it impossible to make rational decisions unless he has access to information on which to estimate probable outcomes. In such circumstances he may either be forced to act impetuously or to rely on probabilities which formed the basis of rationality under conditions of status quo. This may help to explain the impetus of tradition even during times of revolutionary change.

4. The choices must be perceived by the actor as mutually exclusive, the selection of one precluding the selection of others, at least at any given point in time. They must also of

necessity be comparable, i.e., genuine alternatives to one another and not of a different order. Thus, if on a given day one woman goes fishing and another leaves her husband and returns to her parental residence, it makes no sense to formulate propositions about deciding to go fishing or changing residence, for these are not of the same order. Going fishing contrasts (or competes) with such options as staying home and tending the children, while returning to the parental home contrasts with remaining with the husband. It must be emphasized that comparability must be in the eyes of the actor, for considerations of rationality imply an actor-centered perspective.

5. The individual must be able to rank outcomes according to a scale of preferences. This requires that some common system of values be applicable to all the options in a given set, but not necessarily a universal principle of valuation. Economists use the vague notion of "utility" as the basis for constructing a common scale for market economies, but for anthropological purposes it would seem wiser to open the door for empirical investigation in order to obtain a sharper focus. Thus we may find some preferences ranked according to political pay-off, others according to quantity of resources, etc. Instead of a universal system of ranking, we assume that individuals use a set of rules which helps them to define preferences. Thus we avoid the difficulties of theorists who assume, in order to devise simple statistical decision models, that preferences are transitive, such that if an individual prefers *a* to *b* and *b* to *c*, he must prefer *a* to *c*. As Edwards (1967) has pointed out, experiments designed to test this assumption are inconclusive. We are suggesting, instead, that if we abandon the statistical model of decision-making such an assumption proves unnecessary. When only specific sets of choices are evaluated, we need only know the rules used by an actor to establish his preferences and the factors which define the sets of opportunities to be evaluated in order to predict outcomes (see Ortiz, in press).

It should be emphasized that preferences are to be distinguished from expectations regarding outcomes. An individual may prefer wheat but plant maize because he has greater confidence in the yield of the latter. This distinction is not always taken into account in the literature on economic decisions; outcomes and expectations of outcomes are often defined teleologically.

Although it is true that rationality may be incorrectly imputed to behaviour which is in fact unreasoned, errors of this type can be minimized if the field worker is judicious in his approach to decision-making analysis. He ought, for example, to select initially behavioural areas in which the actors themselves recognize the necessity for choosing between definite options. Only when he gains a firm appreciation of culturally designated goals and values the network of social positions and roles, and the activity systems within which behaviour takes place [3] - - in short, a firm structural-functional grasp of the society under investigation - - should he venture into areas of more subtle differentiation.

Generally speaking, rational decisions lend themselves more readily to systematic analysis, but it is incorrect to presume that non-rational decisions must of necessity be abandoned to anecdotal account. Even impetuous decisions may be strongly influenced by cultural norms, and at a deeper level by shared psychological characteristics. They may, in short, turn out to be quite highly patterned and predictable. The impetuous and apparently irrational moves to breed pigs or plant beans by farmers with very limited resources could be explained as a gamble with a possible high pay-off relative to a highly likely small loss (Ortiz, 1967). However, the analysis of non-rational decisions requires a modified research strategy. Since rational decisions imply an awareness on the part of an actor of the conditions affecting his choice, it follows that at least in some cases we can rely on him to articulate the elements and structure of decision-making models; he may, however not, be aware of all factors which an analyst can deduce from situational regularities, as pointed out earlier. Some adjustments might be required to generalize the model, but the essential data is obtainable through verbal

interaction with decision-makers. Nonrational decisions do not ordinarily grant us that luxury. Since individuals may not be aware of the influences affecting them it is up to us, the anthropologists, to generate hypotheses as to what these influences might be. We then have to find ways of measuring and scaling them in order to generate a consistent model. It is here that we must take a step back in order to make some judgments about values, norms and preferences. Howard (1970) had this in mind when he concluded in a recent paper applying decision analysis to the study of adoption on Rotuma:

> "This in my opinion is the central idea behind decision making analysis. It is an attempt to register and understand the full range of considerations that go into deciding things among a group of people, and then to show how these combine to create predictable regularities for a particular set of decisions."

This approach requires the same attention to norms, values, etc., that one would expect from any thorough social study; it merely adds the requisite of applying them as hypotheses in order to account for particular distributions of behaviour. An excellent example of this strategy is provided by Monberg's analysis of adoption and fosterage on Bellona Island (1970).

Underlying the notion of rational decision-making is an assumption that individuals confronted with a situation of problematic outcome will gather relevant information, programme and process it, evaluate the outcome, and make a decision. Part of an investigator's analytical challenge is to decipher the programme being used, but this is not enough. It is also necessary to specify the conditions which are relevant. Let us take a simple hypothetical example. Suppose a man constantly decides to go fishing when it rains and to go to his garden when the sun shines. The distribution of his activities will depend over time on the relative frequency of rain and sunshine. If the first year it rains 60 % of the time and the second 30 % of the time the distribution of his activities will differ radically from one year to the next, even though his decision-making programme has not been altered. It is not enough, therefore, to simply describe the programme being used; one must also take into consideration the kind and distribution of input in order to account for the distribution of decision outcomes. In short the distribution of decision outcomes is a function (in the mathematical sense) of the decision-making principles used by a group of individuals *and* the frequency of circumstances under which decisions are made. Changes in distribution over time may therefore reflect changes in either the decision-making programme (including the addition of new considerations, the deletion of previous ones and changes in values and expectancies); or changing circumstances (Howard, 1970). Changes in the definition and occurrence of decision points is equally relevant as it directly affects the factors considered (Ortiz, in press).

Thus far we have discussed decisions as though they were independent of each other, but this is frequently not the case. Decisions may be sequentially related so that each is dependent wholly or in part on the outcome of previous ones. These may be called *decision chains* or *decision trees*. Decisions which are partial determinants of subsequent ones in the chain we label *instrumental*, those which conclude a chain as *terminal*.

We are brought now to a more complex level of analysis and one that we believe has been neglected despite its great relevance for the functioning of social systems. This is the study of behavioural strategies and tactics as they operate in different societies. By the term "strategy" we refer to the way in which individuals attempt to assemble a sequence of instrumental decisions in order to maximize the probability of a favourable terminal outcome.

A "tactic" is an act of behaviour (i.e. decision) calculated to produce conditions favourable to a subsequent outcome, whether instrumental or terminal. The study of strategy and tactics would be most helpful in illuminating such social processes as politics, economic exchange and religion, all of which involve attempts to maximize outcomes. The importance of strategies and tactics in the study of social change is apparent in studies of *latinization* of Latin American Indians. Ortiz (1967) describes how cash variations in crop commitment and patterns of consumption can be understood as part of strategies of social mobility, that is, as attempts of Indians to become mestizos; the initial planting of a large extension of land with coffee can be regarded as an instrumental decision towards the final objective of improving social status. Any one of the instrumental decisions within the relevant decision chain is evaluated against terminal expectations. Indians who are shy or live too far from mestizo households have no confidence in their ability to achieve higher prestige in the outside world and thus employ a different social and economic strategy.

At a still more complex level are decision-making interactions in which the decisions made by each individual are contingent upon those made by others, often in a sequence of indeterminable duration. We are brought here into the realm of influence, power and negotiation, and area in which anthropologists have barely scratched the surface. Some of those interested in these problems have made use of Game Theory. It is an attractive approach since it provides a set of precise and fruitful concepts for describing some interesting classes of situations, and offers well-defined methods for illuminating their specific properties (Midgaard, 1968).

One of the more inspiring attempts in this area of research has been made by Barth (1959, a, b) in his analysis of Pathan politics. He elucidates the problem of coalition formations and the crystalization of coalitions into two blocks by analyzing the nature of competitive relations, the code which governs coalition formation, and the type of strategy used in the political game. He reminds us that game analysis must also take into account changes in the state of knowledge or changes in preferences of players as well as changes in strategies. It would be interesting to consider as well how far can certain situations stimulate a player to look for and find new strategies. Barth points out (1967) that we must also consider the bonuses received and the cost of a victory. As can be appreciated this introduces a number of complications which cannot be easily expressed axiomatically. Another difficulty of the game theory approach is that it minimally requires two assumptions: that the rules of the games be known to all participants and that the utility functions be established.[5] A third complicating factor is that game theory does not help us define the set of opportunities open to a player nor to define the point at which decisions are made. This does not invalidate the use of the approach; it simply adds methodological complexities to the task. Hence we must decide when it is useful and when too cumbersome. In the analysis of relatively stable situations, or less competitive situations, a decision model is more helpful. Barth moves imperceptibly in this direction when in a recent article (1967, b) he discusses economic change. Fur cultivitors in villages where they have no contact with Arabs have taken up fruit growing in irrigated orchards as a form of cash-crop production very much in the style of Arab horticulturalists. Barth does not explain this phenomenon as a process of acculturation, but as a system of resource allocations affected by a number of constraints which have feedback effects on ongoing decision strategies. In an earlier publication (1967, a) he outlines with more clarity the strategies in Fur economy.

The Decision Process

We shall now follow a sequence of hypothetical steps that would be required for an adequate decision-making analysis. The order in which the steps are presented is based on the

logic of the approach; it is not necessarily meant to be a prescription for the gathering of data.

1. An essential first step is to locate the decision-maker, who may or may not be a person performing the actions that interest us. To use a common example, a couple involved in an arranged marriage may have nothing to do with choosing one another, with making ceremonial arrangements or with choosing a residence. All these decisions may rest with their respective parents, or other kinsmen. It would do little good, therefore, to know the values and preferences of brides and bridegrooms under such conditions. Howard has previously distinguished (1964) between the principles used in arriving at decisions and those used in selecting a decision-maker. He calls the former cultural principles and the latter structural principles. Structural principles include status differentiating factors like age, sex, social ranking, etc.-principles which come into play when decisions must be made implicating two or more individuals. Sometimes the rules are clear and authority ascribed; in other cases they are unclear and subject to negotiation. It is important under either circumstance, however, to distinguish individuals who are entitled to make decisions from those who actually do so. Thus in the case of arranged marriages it is not enough to know that fathers are entitled to choose their children's mates. If in a certain proportion of cases the parents merely validate choices made by their children it is of theoretical importance to distinguish the two sets of circumstances, for parents are likely to use different principles of choice than do lovers. To the extent that these diverge we may find quite different distribution of choice types.

A more concrete example is provided by Howard's analysis of Rotuman adoption practices. He describes the conditions under which parents allocate their children to the households of relatives. Under different conditions (e.g., father or mother of children deceased, separation or divorce, fatherless child, and complete family) different individuals hold the right of allocation, and they allocate the children differently. In order to account for the allocation of adopted children, therefore, one must determine first who is doing the allocating, or at least be able to make a reasoned guess (Howard, 1970).

2. The social and economic environment of an individual structures opportunities in such a way that some are more obvious and thus more easily perceived than others. Whether or not an individual perceives the opportunities which his environment highlights is a matter of individual perception, but though the mechanisms of perception are relevant and must be considered, they are beyond the scope of this paper and the competence of the writers. As anthropologists we should be concerned, instead, with how the social reality and social structure obliterates or highlights certain opportunities.

Cognitive processes affect the attention which individuals give to any opportunity, but unhappily it is not easy to elucidate empirically the cognitive processes of an individual. Present attempts generally rest on the analysis of language and cognitive structures, or the interrogation of individuals while they consider and search for information. These methods are helpful, but methodologically imperfect; in the first two instances the information is too general and static for decision-making analysis, in the second instance the interrogator may intrude too much in the thought process of the informant. Nevertheless, until techniques of inquiry are perfected they shall remain as the most useful, though questionable approaches.

The amount of information available to an individual decision-maker is as relevant as the type of information he collects. To a certain degree social contact, lines of communication, etc., are responsible for the extent of knowledge, but an individual can accumulate more information if he sets about actively to search for it. How far this search is feasible or encouraged must be determined by the investigator. The amount of information available prior to making a decision depends on when a decision has to be made. But time is not the only factor which affects the information gathering process.[6] An individual may take greater care to gather information if the conflict between alternatives is high (that is, if the choice of one implies that the other must be completely foregone). Furthermore, if there is no

clear-cut preference between alternatives, decision-makers are likely to be stimulated to gain greater knowledge in order either to discover a more desirable opportunity or to heighten the preference of any one of the original alternatives (Carter, 1954). Some psychologists stress that high-conflict conditions lead to re-evaluation of data; others suggest that re-evaluation is more likely to occur in the post-decision period, after the individual experiences the conflict of choice (Festinger, 1957, 1964).

We have mentioned that the subjective evaluation of chance with regard to each outcome requires previous experience on the part of the decision-maker. The empirical accuracy of his evaluation thus depends not only on the number of events experienced, but also on whether he has stopped to consider and re-evaluate his decision in the light of previous outcomes. Ortiz (1967) has pointed out that such evaluations are more likely to be made with anticipated decisions than when they are taken in the course of action. Furthermore, if previous decisions have brought regret because outcomes did not correspond to expectations, the individual is likely to be more careful when making the same type of decision in a future instance. Thus the field worker should note the frequency of regretted decisions. Some economists, in fact, have used degree of regret or surprise as a measure associated with utility.

It is also quite possible, though yet untested, that while individuals are collecting information they are also evaluating it according to their order of preferences (the process used to rate them is discussed in the next section). If this is the case, we can expect decision-makers to continue gathering information until they become aware of a number of opportunities which are distinctive and can be differentially ranked. Sometimes this searching process is curtailed because immediate action is required; decisions then overlap with action and the outcomes are often quite different than if decisions were to precede action (Ortiz, in press). In some instances information searching continues until the number of opportunities discovered are too many for the individual to evaluate; Carter (1954) has suggested that in such circumstances making a decision may become impossible and the individual paralyzed into inactivity or forced to impetuous behaviour.

It is also important to determine whether or not information seeking is objective and impartial. Festinger (1957, 1964) suggests that pre-decision evaluation is relatively objective. One wonders if the same results would be obtained outside experimental situations. In fact studies on divination and witchcraft accusations indicate that tension, conflict and competiveness introduce the wish if not the opportunity to bias decisions.

3. Next, the set of possibilities must be evaluated in terms of pay-off value to the decision-maker. In the simplest situation individuals only have to evaluate one possibility, their decision being in effect to act or not to act. Judgment of value is in such cases independent of competing alternatives; the choice criterion presumably is whether the expected pay-off is worth the investment in time, effort, commodities, etc. In more complex situations, however, when a number of opportunities exist, actors are presumed to evaluate choices relative to one another. The goal of an analyst under such circumstances ideally is to rank order actors' preferences, for the decision is not simply whether to act or not, but to choose one course of action to the exclusion of others. This may prove to be no easy matter, for different scales of values may be operating with regard to different options, and despite the neat "utility" concept of formal economic theory, it may be impossible to calculate with any measure of assurance the relative value of wheat versus companionship. However, actors do not need to operate with a single, ordered transitive scale in order for us to label their behaviour rational (Ortiz, in press). Decision-makers are presumed to consider only one set of opportunities at any given point. What we need to discover is the factors that determine the set of opportunities and the rules that are used to rank them within the set. Ortiz has pointed out that in the case of economic decisions the definition of a set is related to the timing of decisions.

Even though order of preference may be clear, choice is not simply determined by values

assigned to outcomes. First order preferences may involve great uncertainty or excessive investment, or they may be precluded by circumstances beyond the control of the individual. When such is the case we may find people selecting lower order pay-offs which are less costly and more secure.

4. One must then determine as precisely as possible the investment which must be made by an individual in order to maximize the probability of pay-off. Investments, like pay-offs, may take a social form. The degree to which an individual must forego the approval of his fellows, or incur their disapproval, is as much part of investment as time, effort and expenditures in most instances. As with preferences we need to construct a scale, no matter how crudely, of the relative weight given to different kinds of costs if we are to approach a reasonable standard of prediction.

5. In evaluating an outcome actors must determine whether costs and outcomes are fixed, or nearly fixed, or whether they are variable. If they are variable, rationality requires a formulation of expectations for each outcome. Expectations may range from a carefully calculated attention to probabilities based upon a substantial amount of empirical evidence, in which case we speak of *risk*, to highly subjective feelings, or conditions of *uncertainty* (cf. Knight, 1921). To some extent we are likely to find these different modalities related to their place in institutional structures. Thus certain decisions may be embedded in an institutional structure that provides accumulated, culturally available information and therefore fixes the range of probabilities for the actor. Other decisions are less institutionalized and may leave the individual alone with his subjective impressions.

The processes by which individuals estimate the uncertainty of outcomes still remain to be clarified. This aspect of decision process has hardly been explored by economists or psychologists (Cox, 1967). The prime anthropological task is, in our opinion, to sort out social and cultural variables which affect calculations. Here we must distinguish between calculations regarding pay-offs and those involving a possibility of having additional costs. In some cases the number of variables affecting such calculations may be higher than others; we can expect calculating techniques to vary accordingly. We must not overlook the fact that though the decision-maker is an individual, the process of estimating uncertainty may be discussed in a group; thus interpersonal relations, competition, role performance, etc., may effect the perception of probabilities (Simon, 1967). Social situations may encourage over-optimism, ensued by disappointment, regret and confusion. They may also lead to unanticipated successes. Such experiences no doubt affect future estimates and may even encourage an actor to search for new rules of estimation.

When evaluating subjective probabilities decision-makers do not generally obtain a single solution, but a distribution of probable outcomes. In most social contexts giving consideration to the whole range of possible outcomes is impossible, giving rise to the question: how do individuals reduce the range to a few simple variables which they can integrate into a workable decision model? Shackle (1949) has suggested that individuals focus on the most likely and the least likely outcomes; everything else elicits a high degree of surprise. There are a number of objections to his suggestions, and empirical data do not lend strong support to his proposition (Carter, 1954). Only further empirical analysis can help us understand the processes involved in evaluating uncertainty, and the means by which individuals simplify a range of subjective estimates.

6. All of these previous measurements (or approximations) can be related to one another in the form of quasi-mathematical formula as follows:

Value of pay-off X expectations of obtaining it — value of expected cost → incentive to choose

This simply suggests that the positive thrust towards making a particular decision (value

of pay-off X expectancy of obtaining it) is to be balanced against the negative pressure of expected costs. In the simplest situation, when a decision is one of taking a particular course of action or not, the formula suggests that a positive resultant will lead towards action, a negative resultant towards inaction. In more complex situations, with multiple options, it suggests that the option with the highest positive incentive is the one that will be chosen.

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At this point it is perhaps necessary to emphasize the heuristic nature of this type of formulation. Although put in quasi-mathematical terms it does not require precisely quantified information in order to be of value. Neither of the authors are sophisticated mathematicians, but we believe the value of relating elements in such a formula aids clarity to the form of research questions and the kinds of data we gather. If it forces us to seek ways to quantify some of our material in order to render our hypotheses and theories more testable and subject to disproof, so much the better. It is a goal worth working towards, but one we must regard with caution. There have been innumerable attempts to measure utility and uncertainty weights; so far they have not met with unqualified approval. Georgescu-Roegen (1966) has warned us that attempts to quantify all information may at times be empty; considering that his field of competence is statistical decision theory, such advice should not go unheeded.

As we have suggested decision theory will not provide the answer to many questions that have occupied previous generations of anthropologists.[7] Rather its value lies in the new directions it entices us to take, and in the new theoretical and methodological tasks it places before us. It also generates a somewhat different image of our subjects than that of previous approaches. It requires us to see them more as active participants in social processes and somewhat less as reactors to social forces. They are seen as planners and strategists, rational at times, impetuous at others, but above all as men and women engaged in the process of trying to make the world livable, just like the rest of us.

FOOTNOTES

1. The use of choice and decisions as a framework for the analysis of social change suffers the same limitation as the use of equilibrium models: they are inappropriate for studying rapid social change. As the rate of change accelerates, as in a revolutionary situation, rational decision-making is apt to give way to impetuous or gambling choices because of gaps in information and inability to formulate expectations. This point will be discussed later.
2. Knight (1921) has pointed out that we must make a distinction between risk and uncertainty; in the first case we are dealing with statistical probability of an event while in the second case we are dealing with a subjective estimate of its occurrence. Risk can be calculated, uncertainty may be subjectively estimated. An individual can calculate the probability of an event only when the following conditions are met: a) if he can obtain frequency ratios from a numerous set of performances; b) if the performance can be repeated; c) if the experiments from which the frequency ratios are derived do not destroy the circumstances in which they are performed, hence that they do not become unique acts; d) if the environment is stable; e) if he considers only the total results of a large number of trials and not each trial separately.
3. See Howard (1963) for a discussion of activity systems in relation to decision-making analysis.
4. This is a similar type of explanation to that used by Friedman and Savage (1948) to explain why the same person who buys insurance, thus paying to avoid having to take a risk, will also buy a lottery ticket. They treated the apparent contradiction as part of the same logical rational process and explained it in terms of a utility curve that provides both for gambling and protecting assets.
5. In order to simplify analysis and render it mathematically possible von Neumann and Morgenstern (1944) have included utility functions as a rule of the game.
6. See Ortiz (1967, and in press) for a discussion of factors which determine the definition of decision points.
7. See Foldes (1968) for a discussion of the value of other approaches in social sciences.

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